

**THE STATES OF DELIBERATION**  
**of the**  
**ISLAND OF GUERNSEY**

**COMMITTEE FOR THE ENVIRONMENT & INFRASTRUCTURE**

ELECTRICITY STRATEGY FOR GUERNSEY

The States are asked to decide:

Whether, after consideration of the Policy Letter entitled 'Electricity Strategy for Guernsey' dated 5<sup>th</sup> June 2023 they are of the opinion:

1. To agree that a strategic direction is needed to inform the Island's future investment in its electricity supply, in order to achieve a cost optimal solution which enables opportunities for greater energy resilience to progress.
2. To:
  - (a) Agree that Guernsey's electricity supply and demand strategy between now and 2050 should be the most cost-optimal balance of the Energy Policy objectives, as updated and detailed in Section (4), and that therefore Pathway D becomes the States' strategic direction; and
  - (b) Agree that the Committee *for the* Environment & Infrastructure, the Committee *for* Economic Development, the Policy & Resources Committee, the States' Trading Supervisory Board and Guernsey Electricity Limited will carry out further detailed work, including consideration of the financial implications and funding options, which will need to be brought back to the States on each major component of the preferred pathway before any financial commitment is made by the States; and
  - (c) Agree to set the following solar PV targets for Guernsey, namely that i) 5MW of capacity will be installed and operational by 2025 and ii) that 10 MW of capacity will be installed and operational by 2028; and
  - (d) Agree that, in the event that a direct 100MW interconnector with France is established, the security of supply criteria will be N when it becomes operable, which would require the retention of sufficient generating capacity to meet peak demand; and
  - (e) Agree that the approach to the development of the electricity market should follow that set out in Section (7) of the policy letter.
3. To direct the Committee *for* Economic Development to bring back proposals for direction to the Guernsey Competition & Regulatory Authority that align with

the strategic direction, as set out in Section (7), including any necessary interim measures.

4. To direct the Committee *for the Environment & Infrastructure*, in consultation with the Development & Planning Authority, to explore ways to further facilitate the installation of solar PV arrays as soon as reasonably practicable, as explained in paragraph 3.3.6.
5. To direct the Committee *for the Environment & Infrastructure*, in consultation with the Committee *for Economic Development* and the Policy & Resources Committee, to bring back practical proposals for the establishment of the Renewable Energy Commission.
6. To rescind the following Resolutions of the States, as detailed in Section (13):
  - (a) Resolution 8 of Article VIII of Billet d'État XI of 2020 "States of Guernsey Energy Policy 2020-2050"; and
  - (b) Resolution 12 of Article VIII of Billet d'État XI of 2020 "States of Guernsey Energy Policy 2020-2050".

The above Propositions have been submitted to Her Majesty's Procureur for advice on any legal or constitutional implications in accordance with Rule 4(1) of the Rules of Procedure of the States of Deliberation and their Committees.

**THE STATES OF DELIBERATION**  
**of the**  
**ISLAND OF GUERNSEY**

**COMMITTEE FOR THE ENVIRONMENT & INFRASTRUCTURE**

**ELECTRICITY STRATEGY FOR GUERNSEY**

The Presiding Officer  
States of Guernsey  
Royal Court House  
St Peter Port

5<sup>th</sup> June 2023

Dear Sir

**1 Executive Summary**

- 1.1 In line with global trends towards greater electrification, Guernsey's demand for electricity is increasing. This demand will continue to rise as the Island's population grows and the uptake of electric heating systems and vehicles accelerates, alongside the increase in digitisation and other technological innovations that require electrical power. Our Electricity Strategy must ensure that Guernsey can manage and meet this demand with the optimal balance of security of supply, affordability and decarbonisation, and that the Island's infrastructure can facilitate and support higher levels of electrification.
- 1.2 Without an updated Electricity Strategy and with demand increasing, the on-island thermal power plant (the "power station") in the Vale would need to be used more regularly to generate electricity as there is a maximum amount of electricity that can be imported through the existing subsea cable via Jersey, from France, which peak demand already exceeds. In the absence of a different strategic direction, Guernsey Electricity Limited ("GEL") would have to increase on-island thermal generation in line with the status quo, which modelling shows would be the costliest way to meet the Island's future electricity demand. Whatever strategic direction is agreed through this policy letter, there is a need for GEL to invest significantly in its thermal power plant, as a proportion of the equipment is at, or approaching the end of its life. However, the Strategy will influence the type and capacity of assets, and therefore the cost to consumers.
- 1.3 Through the development of the Electricity Strategy ("the Strategy"), the Committee *for the* Environment & Infrastructure ("the Committee") has

thoroughly explored the most cost-effective way of providing energy whilst supporting local renewables, in line with the direction established through the States of Guernsey Energy Policy 2020-2050. The Strategy has been developed taking careful consideration of the objectives set out in that policy, relating to security and resilience of supply, greater energy independence, consumer value and choice, equity and fairness, decarbonisation and wider economic benefits.

- 1.4 The Strategy has been developed iteratively through a technical consultation process with the Electricity Strategy Steering Group<sup>1</sup> (“the Steering Group”), the Energy Partnership (a consortium of local energy industry representatives), key stakeholders in the business community, and broad political input, with subject matter expertise provided by Siemens (on supply and demand) and PwC (on market structure). The Committee would like to thank all of the industry and business representatives that helped to shape the Electricity Strategy. Their knowledge and experiences were instrumental in reaching the proposed strategic direction. The Committee would also like to thank Steering Group members Deputies Haskins, Le Tocq and Moakes, as well as Mr Jeremy Thompson, who carefully considered technical reports and the feedback from industry throughout the process and supported the Committee in reaching its recommended approach.
- 1.5 The Strategy has three core areas of focus: supply, demand and market framework. Through approval of the propositions in this policy letter, the States can provide the local energy industry with strategic direction as to how electricity will be supplied up to 2050, and establish an appropriate and supporting market structure, which enables energy providers, potential investors, and others to make informed business decisions. The policy letter and Electricity Strategy consider how electricity demand levels are predicted to change in the future, what measures would be most beneficial in influencing and managing that demand, how electricity could be sourced to meet demand and what the market framework would need to look like to support the supply approach.
- 1.6 The Strategy provides strategic direction: it does not set in stone the specific components of the preferred pathway; nor does it commit the States to specific projects or significant expenditure on them. In agreeing the Strategy, the States is giving direction and focus to the further work that needs to be done. For each major aspect of the Strategy there is a range of options, including options on how each can be financed. Once a strategic direction has been agreed that

---

<sup>1</sup> The Steering Group comprises Deputies de Sausmarez, Haskins, Le Tocq and Moakes (between them representing the Committees for the Environment & Infrastructure, Economic Development and Policy & Resources, with further connections to the States’ Trading & Supervisory Board, the Committees for Employment & Social Security and Education, Sport & Culture) and Mr Jeremy Thompson, the former chair of the Guernsey Renewable Energy Team.

further work will examine the options and bring detailed information and recommendations to the States to enable the Assembly to make an informed decision on each component. This iterative approach is effectively a series of gateways: only once the more detailed work has been completed and proposals agreed will each major component progress. Should that detailed work find that a particular component is not viable, could be better delivered through an alternative technology or approach, or should the States for any other reason decline support for specific proposals when they come forward, the Strategy's preferred pathway is flexible enough to accommodate that and the strategic direction will be adjusted accordingly.

- 1.7 The Committee is recommending a strategic direction that includes certain technologies to provide Guernsey's electricity based on current understanding of commercial viability and costs. Other technologies may become commercially viable and more appropriate for Guernsey over the lifetime of the Strategy, which is flexible and adaptable enough to facilitate alternative technologies as desirable. For the avoidance of doubt, the preferred pathway can accommodate, and will not preclude, electricity generation using alternative technologies in the future.
- 1.8 The Energy Policy objectives have been refined and more clearly defined following feedback received through the consultation process for the Electricity Strategy. The objectives were weighted to reflect the prioritisation determined by the stakeholders, enabling comparison on a cost-optimised basis. The industry and political responses to the prioritisation exercise were closely aligned, with 'security and resilience' rated clearly first and 'greater energy independence' second by both stakeholder groups.
- 1.9 The most substantial aspect of the development of the Strategy has been the thorough consideration of different supply options (known as pathways), which were modelled in detail to enable comparison. This modelling supports the decision-making process around a strategic direction that meets predicted future electricity demand and the Energy Policy objectives (security and resilience, consumer value and choice, greater energy independence, decarbonisation, equity and fairness, supporting a vibrant economy). The options for energy storage were also investigated as well as the use of alternative fuel cells such as hydrogen.
- 1.10 All pathways require upgrade of and investment into GEL's existing, ageing, infrastructure and are set out in summary below:
  - Pathway A – the Base Case: maintaining the existing split of generation (the interconnector via Jersey from France, plus on-island thermal power plant);

- Pathway B – Greater Independence: generating electricity on-island only through renewable energy sources (more solar PV<sup>2</sup> and an offshore wind array) and the thermal power plant;
- Pathway C – Renewables First: maintaining the existing interconnector and substantially increasing the amount of generation produced locally from renewable energy sources (more solar PV and an offshore wind array);
- Pathway D – Dual Interconnector with Offshore Wind: establishing a second, direct, interconnector and increasing the amount of generation produced locally from renewable sources (an offshore wind array and more solar PV);
- Pathway E – Dual Interconnector without Offshore Wind: establishing a second, direct interconnector and more solar PV; and
- Pathway F – Lighthouse: investing in innovative technologies alongside proven commercially viable technologies (such as solar PV, offshore wind and thermal generation) to grow the economy through sale of renewably generated electricity.

1.11 Having carefully considered several iterations of the modelling, each iteration having been adjusted to take into account feedback from the technical consultees, **the Committee is recommending Pathway D – Dual Interconnector with Offshore Wind** – as the preferred supply pathway to be taken forward.

1.12 The preferred supply pathway outlines how Guernsey can meet the predicted electricity demand up to 2050, whilst ensuring security of supply and balancing the need for affordability and decarbonisation. It also supports the economy through the use of technology that is currently commercially viable or predicted to become so in the coming years. The proposed pathway looks to keep costs contained whilst offering flexibility to the approach to allow for changes in circumstance. It is the joint second lowest cost option overall (Renewables First being the cheapest) but provides greater flexibility and resilience than all other options. It also has the lowest associated carbon emissions.

1.13 The preferred supply pathway includes a 100MW direct cable to France (referred to as “GF1” throughout this policy letter), in addition to the existing subsea cable (which has a 60MW nominal capacity and is referred to as “GJ1”) connecting us, via Jersey, to France, with a fixed-bottom offshore wind component in the region of 65MW. Whilst the proposed pathway references specific technologies, the pathway does not commit Guernsey to using those specific technologies (or indeed to a specific cable destination); rather, the pathway recommends solutions that provide the most cost-optimal solutions as

---

<sup>2</sup> “Solar PV” is the abbreviation of “Solar Photovoltaic” and refers to the technology that converts energy from sunlight into electricity.

understood today. There is flexibility to utilise alternative technologies should they become viable in alignment with existing States' policies. If all aspects are approved when specific detailed proposals are brought forward, once operational, the offshore wind component would supply between 46% and 55% of Guernsey's electricity needs, GF1 would supply between 37% and 43%, and solar would supply between 8% and 10%, reducing the amount of electricity that would need to be imported. This supply option is an enabling pathway that allows for flexibility in the market moving forward. The establishment of a second interconnector removes the single point of technical failure associated with reliance on one interconnector and increases resilience of supply, therefore reducing the associated costs. The offshore wind and solar components further increase resilience of supply cost-effectively and give the Island greater energy independence.

- 1.14 The purpose of the Strategy is to enable Guernsey to manage and meet the Island's electricity demand in a way that best balances security of supply, affordability and decarbonisation. As part of the modelling, the Committee explored ways in which larger renewable developments could be implemented within Guernsey's territorial waters, generating more electricity than the Island's demand so that a significant quantity could be exported. The modelling examined the requirements of an export proposition in the context of the Strategy's purpose and concluded that it may be possible, and could potentially be advantageous, to add in the additional generation capacity required to provide an exportable element. This additional capacity could be delivered either by increasing the size of the wind array above the component required by the Island, or as a separate development.
- 1.15 This Strategy therefore focuses on the offshore wind component that is required to meet the Island's needs, acknowledging that there are different ways it could be delivered. To be cost-optimal, it is recommended that the component that supplies the domestic demand should be publicly owned, either directly by the States or through a States-owned entity. While it is feasible that the offshore wind component is not publicly owned but secured through contractual arrangements instead, this will result in a higher cost to the consumer as a profit element will need to be factored in.
- 1.16 The focus of this policy letter and the Electricity Strategy is on meeting our domestic needs first and foremost, ensuring that there is sufficient electricity supply to meet future demand levels. The preferred pathway includes consideration of the ability to 'spill' (send through the cable) any electricity that exceeds Guernsey's domestic demand back to France, which could generate some revenue, but that has not been factored into the financial assumptions as the returns are likely to be modest.
- 1.17 However, nothing proposed through this policy letter would prohibit the

continued exploration of opportunities for larger scale renewable infrastructure that provides energy that exceeds the Island's own future needs and in fact the options are complimentary. The Committee intends to continue exploring such options, including through conversations with the States of Jersey who are also committed to investigating the potential of its offshore wind resources. Jersey is actively working on the policy and legislative framework that will enable progress to be made and is working closely with the Committee on this matter, sharing knowledge gained and exploring areas of joint interest.

- 1.18 Should other technologies (such as tidal stream energy, for example) become commercially viable in the future, this supply pathway would support their implementation. Further details of the assessment of options can be found in Appendix C of the Future Electricity Demand and Supply Strategy (Appendix 1).
- 1.19 Electricity is a profoundly important commodity, and its importance will only increase as our population grows and our economy and lifestyles become ever more digitised. It is therefore essential that we invest in the infrastructure that is necessary to support Guernsey through the energy transition over the coming decades. There are no no-cost – or even low-cost – options. Investment (whether that is through the States or GEL or private businesses) is absolutely necessary, and significant expenditure (again in one form or another) is therefore inevitable under any scenario – even a scenario in which no strategic direction is agreed. In fact, a scenario in which no strategic direction is agreed will ultimately result in the greatest cost burden for Guernsey consumers.
- 1.20 The costs cited in the modelling are indicative only and further work will be required to develop the costs as part of the delivery of the strategy. The indicative costs are useful in evaluating the different options, as the modelling uses common assumptions that allows like-for-like comparisons, which can inform the decision needed at this stage on a strategic direction. It is also important to note that these indicative costs do not differentiate between States expenditure, GEL expenditure or expenditure by other businesses or parties: again, the specifics around how each major component of the Strategy is funded will be decided when recommendations, supported by detailed information and analysis, are brought to the States at future stages. Further, it is also important to explain that these indicative costs cover the period up until 2050. It is therefore worth bearing in mind that the predicted profile of expenditure (which should not be assumed to be direct States expenditure) at a more granular level of five-year periods is more realistically manageable than the daunting total expenditure figure. Not only do the total indicative expenditure figures vary depending on the pathway, but so too does each timeline of when that expenditure is likely to be required.
- 1.21 The total indicative expenditure (TotEx), including both capital expenditure and operating expenditure over the period to 2050 associated with Pathway D –

Dual Interconnectors with Offshore Wind – is £1,730m. This comprises £630m capital expenditure (CapEx – e.g. purchasing of generation equipment, build costs and interconnector costs) and £1,100m for operational expenditure (OpEx – e.g. maintenance and fuel costs). It is important to note – as explained in the previous paragraph – that these costs are not all anticipated to be borne by the States, and neither will that expenditure be required immediately, as costs will be spread across the period to 2050.

- 1.22 By comparison, the indicative TotEx cost of the base case (i.e. continuing the status quo) is the joint most expensive option at £1,910m over the same period, split into £380m in CapEx and £1,540m in OpEx. The Committee is keen to make clear that while it does not recommend this pathway, this is nonetheless the default option that will be implemented if the States does not agree an updated electricity strategy through the debate on this policy letter. That is because GEL urgently needs to replace the thermal generators that are approaching end-of-life, and in the absence of strategic direction will have to assume the continuation and extension of the status quo and procure plant accordingly. In other words, there is no avoiding expenditure: there will be material, costly consequences should the States not agree an electricity strategy.
- 1.23 Affordability – both to individual consumers and to the States – is a serious consideration with no easy answers. Irrespective of the decision on the preferred pathway, GEL urgently needs to invest in its thermal plant. The strategic direction will inform what kind of plant is required and will affect the overall cost of supply, but there is not a scenario in which no investment is necessary. There is also a requirement – again irrespective of the strategic direction agreed – to invest more in Guernsey’s electricity grid infrastructure to support our current and future needs, following years of underinvestment resulting from a tariff structure that has not reflected the true cost of providing electricity to the Island.
- 1.24 As an Island, we are only just starting to experience increases in electricity costs, which is a result of that need to invest in the local infrastructure and to offset increasing generation costs caused by the energy crisis (which originated partly as a result of the conflict in Ukraine). The United Kingdom and Europe have experienced substantial increases for some time now. Guernsey’s main protection from these acute increases has been thanks to our existing contract for supply of electricity through the subsea cable, but that contract must be renegotiated soon as it expires in 2027. That means the cost of electricity will almost certainly have to increase – again, irrespective of any decision we take on the Strategy.
- 1.25 None of the pathways are inexpensive, and indeed if measured against historic costs to some degree they all feel unaffordable – especially at a time when we

are so acutely aware of the cost-of-living crisis in the community and the fiscal constraints in relation to States finances. However, realistically there is no 'do nothing' option. The Island needs to meet its future electricity demand and while the cost of all of the options may be unpalatable, the alternative is a failure to meet demand, which would have very serious consequences. It will be little consolation to know that the States is not the only government grappling with inevitable increases in costs of ensuring electricity demand is met: governments everywhere are having to adapt rapidly to the new normal in order to manage the energy transition for the communities they serve.

- 1.26 While it is not a holistic solution in its own right, demand management has a key role to play in a successful electricity strategy. The Committee's work has not just updated Guernsey's baseline demand projections, taking into account the strategic population objective agreed last year among other factors, but it has also examined how that demand can be managed to the community's greatest benefit.
- 1.27 Energy efficiency measures, such as improved energy efficiency standards in new and existing buildings, and home and office insulation, help to avoid unnecessary energy consumption, and ultimately help consumers to contain costs. While support for the greater adoption of electric heating and vehicles will increase demand for electricity, it will also reduce carbon and other emissions overall and provide more opportunity to manage electricity demand in future. For example, electric heating systems and Electric Vehicle ("EV") charging can be timed to help smooth out peaks of electricity demand.
- 1.28 In our current system, where thermal generation provides the 'top up' electricity to meet demand that exceeds the capacity of the subsea cable (known as an interconnector), relatively simple demand-side management could be the difference between needing to fire up the generators on-island and not. This could be achieved for example through tariffs that more clearly encourage electricity use in off-peak periods as opposed to peak periods, and greater awareness (through education campaigns and real-time data) of when such tipping points typically occur so that they can be averted more often.
- 1.29 The structure of the marketplace has also been reviewed to facilitate appropriate competition, recommend a proportionate regulatory system that allows third parties to invest in the local market with confidence, and define the role and responsibility of GEL moving forward.
- 1.30 The Committee is proposing that GEL remain the sole retail supplier, as our retail market is too sub-scale to support competition, but that competition is introduced in all other sectors of the market. Essentially what this means is that GEL will continue to supply all Islanders (both domestic and commercial customers) with electricity as it does currently through the network, but the

way in which electricity is sourced will change.

- 1.31 GEL will be required to work with other local providers to ensure that sufficient supply from local renewable sources helps to meet demand. This could include, for example, purchasing electricity generated from a large solar PV array from a separate commercial entity in order to feed into the network. Electricity generated at the thermal power plant would also have to be treated in the same manner so as not to prejudice other local providers. GEL will therefore be required to separate the generation aspect of the business and set up a “single buyer”<sup>3</sup> function to ensure an equal playing field for all generators.
- 1.32 GEL would also be responsible for managing the interconnectors. It is important that these critical infrastructure assets are publicly owned, either directly by the States, or through a States-owned entity such as GEL or through a new vehicle established for that purpose.
- 1.33 It is also essential that other companies and potential investors are provided with the reassurance that they are entering into a fair and transparent market, with equal access. To support this, the Committee recommends that GEL should be directed to undertake an ‘accounting unbundling’<sup>4</sup> exercise. This involves separating the accounts associated with the various activities undertaken within the business, making clear the costs and revenues that derive from each of them as well as transfer pricing for flows between business units. Making this information available increases transparency and would allow the regulatory authority to assess the proposed tariffs in a fully informed manner.
- 1.34 There must also be a suitable regulatory framework that provides a mechanism to challenge decisions that are made by the industry, whilst also providing investors with confidence. However, any regulation must be proportionate to the Guernsey market.
- 1.35 Setting the direction for regulation in the electricity market is the responsibility of the Committee *for* Economic Development (“CfED”). However, through the review of the Market Framework, the Committee believes it may be beneficial for certain aspects to be absorbed into the States of Guernsey. The options for regulation of the electricity market are set out in this policy letter and the Committee encourages the CfED, having explored these options in more detail, to bring back proposals to the States of Deliberation before the end of 2024.

---

<sup>3</sup> The “Single Buyer” is the entity responsible for administering the electricity market and the ancillary services market including daily scheduling and settlement.

<sup>4</sup> Unbundling involves introducing some level of separation between the different elements of the utility provider. There are multiple different levels of unbundling which can be delivered, with varying levels of change required.

- 1.36 If no decision is made through this policy letter, the Base Case (Pathway A) will be implemented, which is evidenced as being the costliest supply pathway, and will involve re-carbonising Guernsey's economy, increasing risk to our energy security, resilience and affordability in the short- to medium-term, and also exposing the Island to longer-term economic threats.

## **2 Global context**

- 2.1 Globally, the energy sector is responsible for around three-quarters of the greenhouse gas emissions that are driving climate change. There is strong international agreement on the need to reduce emissions to limit the long-term increase in average global temperatures to well below 2°C above pre-industrial levels. There is therefore a global focus on reducing the proportion of energy generated from hydrocarbons and increasing the proportion generated from low carbon energy sources such as renewables. This is known as the energy transition.
- 2.2 The war in Ukraine has impacted the supply of gas into the EU and associated prices for gas and oil. The timescale of the current hostilities is difficult to predict and the outcome highly uncertain. This is having a short- and medium-term impact on the EU energy market, as it shifts away from the significant reliance on specific supply chains and invests in renewable generation locally. This volatility is expected to continue over the next 12-18 months.
- 2.3 In addition to the anticipated volatility in the EU Market, the number of operable French nuclear plants was and remains reduced due to technical issues. Traditionally, France has been a net exporter of power, but the supply issues have meant that it has been forced to import to meet demand. GEL was approached by French wholesaler Electricity de France ("EdF") to seek an option for EdF to purchase generation capacity under the terms of the existing contract in order to meet demand, resulting in greater use of the local thermal power plant. This request was agreed in the context of a wider overall reduction in emissions but, due to a mild winter, only a limited amount of extra generation on-island was required.
- 2.4 Both Jersey and Guernsey have recently concluded the implementation of the UK-EU Trade and Cooperation Agreement ("TCA") relating to fisheries. This has been welcomed by the European Commission, the French Government and regional authorities in Normandy and Brittany. The TCA requires fishing vessels to be licensed and monitored and, as part of the licensing process, a number of the French fleet staged a protest at St Helier in 2021 and a threat that the electricity supply to Jersey could be cut off was issued. Had this threat materialised, this would have impacted Guernsey (because of the GJ1 interconnector) despite not being part of the dispute. However, this claim was

primarily a political gesture: giving effect to such an extreme and disproportionate decision would have had significant legal and practical obstacles on a domestic and international plane. While this was not acted upon, and was always unlikely to have been acted upon, it did generate both the headlines and the concerns it was designed to create. However, the Committee is aware that some political colleagues and industry representatives fear that this could become a reality in the future, which has impacted their views on the reliance on the supply from France alone.

- 2.5 From Guernsey's perspective, the risk of a dispute with France can be mitigated by continuing, or increasing further, the investment in co-operation work with Normandy and Brittany, through the Channel Islands' office in Caen, the Bureau des Iles Anglo-Normandes. This has been demonstrated, in respect of Guernsey's fisheries discussions, to keep a good level of support from the regional and departmental governments as well as the French State. A positive approach to EU relations more generally, managed with the Channel Islands' Brussels Office, will also provide benefits in strengthening the bilateral relationship with France. The Committee wants to ensure that the agreed Electricity Strategy enables Guernsey to maintain its relationship with the French Government and work together to ensure both jurisdictions can meet future demand levels whilst also transitioning to a green economy.
- 2.6 Whilst the addition of more cables can reduce the technical risk, the political risk of sourcing from another jurisdiction remains unchanged. Whilst a direct connection does not reduce the risk from the jurisdiction of supply, it would reduce any risk associated with delivery via a third country.
- 2.7 The Committee is proposing that investigations into the feasibility of establishing an additional interconnector, along with solar generation and an offshore wind array, take place and that detailed proposals are brought back to the States for approval in due course. Maintaining the existing GJ1 interconnector from France, via Jersey, and implementing a second direct interconnector along with increased levels of on-island renewable generation (solar and offshore wind) provides Guernsey with diverse supply options that allow for greater energy independence but also provide security and resilience. Through enhanced and resilient interconnection, Guernsey would be able to benefit from access to European energy markets, which are themselves transitioning to a green economy, whilst also generating renewable energy on-island.
- 2.8 Additional interconnection also allows for the exploration of the possibility of excess electricity from renewable generation at periods of surplus production to be fed back into the French grid, which could potentially provide a revenue generating scheme for the Island. This approach is referred to as "spill" or "spill export" and is different to 'export' which would require a commitment from

Guernsey to export a predetermined amount of electricity at set times. The existing subsea cable potentially allows for electricity to be transferred back (referred to as export or spill back) to France, via Jersey, but this is not included in the contract. Enhancements to infrastructure would also need to be made to facilitate this. The willingness for France to accept any spill would also need to be explored, since this will be unpredictable and in small amounts when general demand is low and may not be of commercial interest.

### **3 Policy Context**

#### **3.1 Policy Background**

3.1.1 GEL is wholly owned by the States of Guernsey, operating under a commercialised model, and is subject to regulation. The States of Guernsey provides direction to the regulator through the Committee *for* Economic Development<sup>5</sup> whilst the States Trading Supervisory Board has the role of shareholder and provides shareholder direction through policy objectives to GEL. The creation and establishment of policies by the States of Guernsey, such as the Energy Policy 2020-2050, sets out the aspirations for the energy sector as a whole.

3.1.2 Regulation relating to the setting of tariffs was transferred to the States Trading Supervisory Board (“the STSB”) in 2021 and the Guernsey Competition and Regulatory Authority (“GCRA”) was directed to maintain GEL’s exclusivity in conveyance and supply until an updated Electricity Strategy had been brought forward, where guidance on the energy industry market framework and associated regulatory regime would be provided.

3.1.3 Through the recommendations of the Electricity Generation Investment Options report<sup>6</sup> in 2001, the direction was given to both GEL and the regulator that investment should be made into the Island’s electricity system, the costs of which should be recovered from customers. This position was endorsed in 2014 through the “Guernsey Electricity Supply – Future Strategy”<sup>7</sup> when the States also agreed that enhancements should be made to the Island’s infrastructure to allow for additional interconnections and for local generation to take a secondary role.

3.1.4 The most recent policy direction to the energy industry was through the States of Guernsey Energy Policy 2020-2050<sup>8</sup> (“the Energy Policy”) which establishes

---

<sup>5</sup> [Regulation of Utilities \(Bailiwick of Guernsey\) Law, 2001 \(guernseylegalresources.gg\)](https://www.guernseylegalresources.gg)

<sup>6</sup> <https://www.gov.gg/CHttpHandler.ashx?id=5726&p=0>

<sup>7</sup> <https://gov.gg/CHttpHandler.ashx?id=87720&p=0>

<sup>8</sup> Billet d’État XI, P.2020.47 - [CHttpHandler.ashx \(gov.gg\)](https://gov.gg/CHttpHandler.ashx)

that the vast majority of Guernsey's energy supplies will come from clean, low carbon sources by 2050 at the latest, and reaffirms the Island's ambition to achieve carbon neutrality. The Energy Policy also recognises the need to revise the way in which electricity is dispatched by GEL (known as the "Merit Order") to prioritise on-island renewable generation. While a second interconnector and a reduction in on-island back-up generation through the thermal power plant were agreed in principle through the Energy Policy, the further work that has been carried out in the development of the Electricity Strategy has looked objectively at this approach in more detail alongside a range of other options.

## 3.2 Low Carbon and Low Emissions Definitions

3.2.1 Through the Energy Policy, the Committee was directed to provide a definition of what constitutes "low carbon" and "low emission" sources for on-island energy generation. As part of the technical consultation exercise carried out for the Electricity Strategy, consultees were asked for their views on the matter. A key element of feedback was that there was not sufficient clarity in the difference between "low carbon" and "low emission" from the existing description. As such the Committee has agreed the adoption of the following descriptions:

**'Carbon emissions'**, when taken in the context of energy production, relate to the lifecycle greenhouse gas emissions that are associated with the energy source. Energy sources that release carbon emissions below agreed values will be classified as low carbon; and

**'Emissions' or 'other emissions'**, when taken in the context of energy production, relate to the release of gaseous, particulate, or other matter that may impact upon air quality or the environment. This excludes greenhouse gas emissions in the context of energy production, which are captured under carbon emissions. Energy sources that release emissions below agreed values will be classified as low emission.

3.2.2 When considering carbon emissions, there was general agreement from industry representatives that certain types of energy would constitute low, or lower, carbon sources. However, there was some concern around the potential wider environmental impacts being overlooked if the focus was purely on carbon emissions in Guernsey. Specifically, when considering carbon content, it is important that lifecycle carbon is considered rather than carbon content at the point of use. Another key area of concern raised was that if the definition were to be overly prescriptive as to the types of energy sources that qualified as low carbon, then there could be issues with the adoption of newer technologies should they not be on the approved list.

3.2.3 The Committee does not propose that an exhaustive list of low carbon

qualifying energy sources be utilised; rather the adoption of a carbon quantification standard, with appropriate certification utilised alongside an illustrative list. The Committee therefore proposes the following requirements for an energy source to be considered low carbon:

- That lifecycle emissions and environmental impacts are considered, not just those at the point of use<sup>9</sup>;
- That the energy source is a renewable energy resource<sup>10</sup> that does not significantly alter the environment in which it is installed. Where the environment is significantly altered, such as the installation of a hydroelectric dam, a lifecycle carbon assessment should be undertaken;
- That nuclear energy is a source of low carbon energy, whilst noting that there are broader environmental considerations, and that nuclear energy is not classified as a renewable energy resource;
- That biofuels (also known as renewable or synthetic fuels), which have broader energy sector emission reduction potential<sup>11</sup> but currently are limited in scale, are considered low carbon where they are appropriately certified as not having contributed to land use change and, in line with the EU Renewable Energy Directive <sup>12</sup> article 25 paragraph 2, reduce the greenhouse gas emissions of the fuel they are replacing by at least 70%;
- That the approach to hydrogen as an energy source be aligned to the UK Low Carbon Hydrogen Standard<sup>13</sup> which sets a maximum GHG emissions intensity of 20g CO<sub>2</sub>e/MJ<sub>LHV</sub> (72g CO<sub>2</sub>e/kWh<sub>LHV</sub>) of produced hydrogen to be considered low carbon. This will also ensure consideration of lifecycle emissions. For simplicity the Committee also recommends the adoption of the “hydrogen colour spectrum”<sup>14</sup> with green and pink hydrogen being considered low emission sources; and
- That as and when new or alternative sources of energy are developed for use in the Island, they are assessed based upon their own lifecycle assessment and can be adopted as low carbon where they demonstrate reduction in emissions.

---

<sup>9</sup> Comparison of Biofuel lifecycle analysis - <https://www.ieabioenergy.com/wp-content/uploads/2019/07/Task-39-CTBE-biofuels-LCA-comparison-Final-Report-Phase-2-Part-1-February-11-2019.pdf>

<sup>10</sup> <https://www.un.org/en/climatechange/what-is-renewable-energy>

<sup>11</sup> [https://www.mjbradley.com/sites/default/files/MJBA\\_Role-of-Renewable-Biofuels-in-a-Low-Carbon-Economy.pdf](https://www.mjbradley.com/sites/default/files/MJBA_Role-of-Renewable-Biofuels-in-a-Low-Carbon-Economy.pdf)

<sup>12</sup> <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018L2001&from=EN>

<sup>13</sup> [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1092809/low-carbon-hydrogen-standard-guidance-v2.1.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1092809/low-carbon-hydrogen-standard-guidance-v2.1.pdf)

<sup>14</sup> <https://www.nationalgrid.com/stories/energy-explained/hydrogen-colour-spectrum>

- 3.2.4 The Committee also notes that there are advantages to allowing for fuels that reduce both greenhouse gases and wider emissions but do not meet the requirements outlined in paragraph 3.2.3 to be used in place of existing fuels. The Committee therefore recommends that, where sufficient evidence can be provided that there is not wider environmental impact, fuels with lower carbon content, such as certified biofuels, are supported as replacements for existing hydrocarbons. For the avoidance of doubt, lifecycle emissions and impacts must be considered.
- 3.2.5 When considering the other emissions that are associated with energy production, it is important to note that there is already legislation in place that considers emissions at point of use – the Air Pollution Ordinance<sup>15</sup>. Through this legislation there are a number of activities (as outlined in Schedule 2 of the ordinance) which are classified as “prescribed operations”, including some energy industry operations, which are licensed activities and will have specific conditions applied in relation to discharges to the air. The guidance here is intended to help with the decisions around energy sources and is therefore not intended to update or replace the legislation.
- 3.2.6 The burning of hydrocarbon fuels, including fossil fuels, releases not only carbon but other emissions, such as nitrous oxides and particulates, which are linked to negative health impacts. It is noted through the UK Net Zero Strategy<sup>16</sup> that their pragmatic approach considers air quality as well as carbon and wider environmental emissions. The Committee agrees that a pragmatic approach, including monitoring and reporting, be developed in Guernsey.
- 3.2.7 The Island currently utilises liquid fuels in the form of heavy fuel oil (“HFO”) for the thermal power plant, light liquid fuels (mainly petrol, diesel and domestic heating oil and small volumes of light liquid fuels in thermal power plant) and Liquid Petroleum Gas (“LPG”), alongside the use of solid fuels coal and wood burners to help meet the Island’s energy requirements. The Committee is of the view that when considering the types of fuel to be used in both power production and the wider economy, the broader benefits of using existing fuels with lower carbon and emissions impacts needs to be included.
- 3.2.8 When compared to diesel, hydrotreated vegetable oil (“HVO”) has been shown to reduce emissions when used, as both a mixture or in totality, as a substitute<sup>17</sup>. When burned, pure biofuels generally produce fewer emissions of

---

<sup>15</sup> <https://www.guernseylegalresources.gg/ordinances/guernsey-bailiwick/e/environment-and-public-places/environmental-pollution-air-pollution-ordinance-2019/>

<sup>16</sup> [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1033990/net-zero-strategy-beis.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1033990/net-zero-strategy-beis.pdf)

<sup>17</sup> <https://www.frontiersin.org/articles/10.3389/fmech.2018.00007/full#:~:text=Concerning%20soot%20emissions%2C%20the%20increase,nature%20and%20zero%20aromatic%20content.>

particulates, sulphur dioxide, and air toxins than their fossil-fuel derived counterparts. Biofuel-petroleum blends also generally result in lower emissions relative to fuels that do not contain<sup>18</sup>[OBJ]. The use of HVO (or other biofuels as agreed) and LPG could therefore reduce the emissions associated with energy use.

3.2.9 The Committee therefore concludes that biofuels and LPG, where appropriately certified and with associated supporting information, are accepted as lower emission fuels. For the avoidance of doubt, renewable energy sources and nuclear do not release emissions at the point of use. Hydrogen when used in a fuel cell does not release emissions; however, when combusted in air, NO<sub>x</sub> is released and the impact of this is currently unclear<sup>19</sup>.

### 3.3 Renewable Energy Targets

3.3.1 The States agreed, through the Energy Policy, that the Island should look to set an appropriate target for locally sourced renewable energy to provide GEL with a clear direction of the need to ensure there is on-island renewable capacity. Through the supply pathway work undertaken by Siemens (Section 6) it is demonstrated that the use of solar power is a cost-effective method of generating a proportion of the Island's electricity needs, and is therefore present across all pathways, with 50MW of solar installed by 2050.

3.3.2 The Committee considers that the best way to support this is to set targets that are meaningful and ambitious within a short timeframe, given the starting point of very limited solar in the Island, for the near term. As such, the Committee agreed that an appropriate target would be the installation of a minimum of 5MW by 2025 and 10 MW by 2028 across the Island, including domestic and commercial installations. This target is applicable under all potential supply pathways.

3.3.3 GEL will be the vessel through which Guernsey will look to meet the local renewable energy targets at scale, but that does not mean that they will own all the assets. As such, GEL will need to consider the best approach to support the deployment of solar PV, which may include entering into bilateral agreements with third party operators, or installing assets that are funded, owned and operated by GEL.

3.3.4 Further, there will be a market for domestic and commercial renewables that will be delivered through the energy market. To facilitate this, consideration

---

<sup>18</sup> <https://www.eia.gov/energyexplained/biofuels/biofuels-and-the-environment.php>

<sup>19</sup> [Optimising air quality co-benefits in a hydrogen economy: a case for hydrogen-specific standards for NO<sub>x</sub> emissions \(rsc.org\)](https://pubs.rsc.org/en/content/articlepdf/2021/ea/d1ea00037c) - <https://pubs.rsc.org/en/content/articlepdf/2021/ea/d1ea00037c>

must be given to the acceptable cost of local renewable generation. As it stands, GEL would be unable to purchase and dispatch local renewable electricity if the purchase price requested were more expensive than other sources of supply, such as importation for example. The Committee believes that a balance between the overall price target and increasing the capacity installed must be sought, and so will work with both the Committee for Economic Development and the STSB to establish an agreed framework.

- 3.3.5 Solar PV arrays can be installed on domestic properties, within planning policies, and this is normally done with a capacity that allows for its own energy requirements to be met. If storage technologies are not installed at the property, there are likely to be occasions (mainly in the summer period) where excess electricity is generated through the solar PV array. This excess electricity can be bought by the grid owner (GEL locally) and fed into the network, which is facilitated by the buy-back tariff. The Committee recommends that the buy-back tariff is used as a form of incentive, at least in the short term, to encourage the uptake of renewable energy on a domestic scale and recommends that the STSB update the shareholder objectives for GEL accordingly.
- 3.3.6 The Island Development Plan supports the implementation of renewable energy production, namely through policies IP1 – Renewable Energy Production, OC7 – Redundant Glasshouse Sites Outside of the Centres, and GP9 – Sustainable Development. In addition to this, The Land Planning and Development (Exemptions) Ordinance, 2023<sup>20</sup> was approved earlier this year, which increased the total number of exemptions from the requirement for planning permission. This allows for the installation of solar products and air source heat pumps on both domestic and non-domestic buildings or within their curtilage providing specific conditions are met, without having to apply for planning permission. The Committee is supportive of these changes but would also welcome the opportunity to work with the Development & Planning Authority in order to explore ways to further facilitate the wider development of solar as soon as reasonably practicable.
- 3.3.7 In addition to solar, the Committee is also aware of an ambition, both within the States and the wider population, for large scale renewables such as wind. An offshore wind array is currently deemed to be the most economically viable option to substantially increase renewable energy generation locally. Through this policy letter, the Committee recommends that all options for developing an offshore wind array be explored, including the option to deliver Guernsey's domestic needs as part of a larger, privately owned, array, and detailed proposals are brought back to the States. It is also important that the Electricity

---

<sup>20</sup> [The Land Planning and Development \(Exemptions\) Ordinance, 2023](#)

Strategy remains flexible to allow for alternatives in the future, as technology progresses and should they prove economically viable.

3.3.8 There are also opportunities for large scale renewable developments within our territorial waters that do not supply the Island with electricity. Whilst this goes beyond the scope of the Electricity Strategy, as it would not affect the Island's supply, there are potential synergies to a large development and the Island's energy needs. The Committee is keen that this work continues alongside the implementation of the Strategy.

3.3.9 Through the Strategy, the Committee also wishes to move towards the decarbonisation of the existing on-island plant, through exploring alternative fuels and technologies as they become cost effective and viable. As such, the Committee recommends that the carbon intensity of production to a long run average be limited to 150gCO<sub>2</sub>e/kWh, and that this be updated within the Merit Order.

#### 3.4 Offshore Renewable Energy

3.4.1 The Committee is aware, both through the development of the options for the Island's Electricity Strategy and the exploration of the potential for large scale offshore developments, that there is a need to ensure the licencing of offshore renewable energy can take place.

3.4.2 In 2010 the States of Deliberation approved the "Renewable Energy (Guernsey) Law, 2010"<sup>21</sup> ("the Renewable Energy Law"). This established a legal framework for the licensing of onshore and offshore renewable energy projects, as well as a related health and safety regime. The Renewable Energy Law includes the development of wind, tidal, solar and other renewable activities in Guernsey's territorial waters.

3.4.3 At that time there was particular political interest in the establishment of offshore tidal energy in Guernsey waters. However, the tidal stream technology has not matured to a level where this opportunity has been able to be exploited. As a result, only certain basic provisions of the Renewable Energy Law have been commenced; these provisions relate to the regulations of risk arising from renewable energy (such as health and safety) as well as enforcement and general provisions (The Renewable Energy (Guernsey) Law, 2010 (Commencement) Ordinance, 2012)<sup>22</sup>.

---

<sup>21</sup> <https://www.guernseylegalresources.gg/laws/guernsey-bailiwick/e/energy/renewable-energy-guernsey-law-2010/>

<sup>22</sup> <https://www.guernseylegalresources.gg/CHttpHandler.ashx?documentid=57465>

- 3.4.4 When the remaining parts of the Renewable Energy Law are commenced it will enable the licencing of renewable energy activities to take place. The Renewable Energy Law is drafted in such a way that either a newly established Renewable Energy Commission (“the Commission”) or a Committee of the States could be responsible for issuing the licences. The Law provides for the establishment of the Commission by the States of Deliberation as a body corporate. This will operate independently to the States but be accountable to it.
- 3.4.5 The Renewable Energy Law also lays out the powers, duties and responsibilities of the Commission. Schedule 1 of the Renewable Energy Law provides that the Commission shall consist of a Chairman and at least two (but no more than four) members. The Commissioners are appointed by the Committee *for the Environment & Infrastructure*. The provisions allowing for the creation of the Commission can be commenced by ordinance.
- 3.4.6 In 2015 the States of Deliberation approved the “Renewable Energy (Guernsey) Ordinance, 2015”<sup>23</sup> (“the Licensing Ordinance”) made under the Renewable Energy Law. The Licensing Ordinance provides a comprehensive licensing framework in respect of renewable energy activities. The Licensing Ordinance is drafted on the presumption that the Commission will be responsible for licensing, rather than a Committee of the States. The Licensing Ordinance provides a basis for the Committee *for the Environment & Infrastructure* to exempt defined activity from the general prohibition of unlicensed activities in accordance with Renewable Energy Law. It also provides that the Commission can issue, amend and revoke licences. The Commission can apply conditions to any licence which cover areas such as decommissioning, removal, remedial work on any site to ensure that the long-term interests of the Island are protected. The Ordinance also provides for the requirement for licence applications, such as the need for a detailed and evidence-based environmental statement in relation to any planned renewable energy activity.
- 3.4.7 The Ordinance also provides for powers of investigation and enforcement to ensure that licensed renewable energy operators comply with the terms of their licences.
- 3.4.8 Establishment of the Commission
- 3.4.8.1 The regime that has already been established in statute provides the most effective way to establish a licensing regime, and is scaleable to the opportunity for offshore renewable energy at hand. Should the framework need updating

---

<sup>23</sup> <https://www.guernseylegalresources.gg/ordinances/guernsey-bailiwick/e/energy/renewable-energy-guernsey-ordinance-2015/>

due to issues that have arisen since 2015, the States could seek to modify it in response to any unexpected issue that arises with its operation as part of the normal development process that is undertaken following commencement of any new legislation.

3.4.8.2 Under the Law, the Commission can be established by the Committee for the Environment & Infrastructure. Initial work to determine what the Commission should look like has commenced, but further detailed exploration is needed before returning to the States of Deliberation with specific proposals. This further work will consider the most appropriate size of the organisation, to ensure that it has the collective requisite skills and experience to discharge its functions whilst remaining proportionate. Executive support for the work of the Commission could comprise directly appointed staff, or the Commission could form a relationship for access to Guernsey civil servants to be seconded for strategic, operational and administrative support, or a mix of the two approaches, and it could also potentially use an enforcement officer from another service area that has appropriate experience and capacity.

3.4.8.3 As part of these considerations, the Committee will need to determine what is acceptable in terms of remuneration, expenses and other conditions of service, and include this within their recommendations to the States of Deliberation. The Committee would welcome input from political colleagues to inform this work. The funding model of the Commission will also need to be considered further, although it is anticipated that ultimately it will pay for itself through the fees obtained from licenses.

3.4.8.4 In order to establish the Commission in 2023, some seed funding to cover its start-up costs will be required, and an appropriate allowance may need to be provided in subsequent years. This is anticipated to be in the region of £200,000 over the first two years of the establishment of the Commission. A request for funding will be submitted in due course once the detailed analysis has been completed and recommendations formed. This investment should be prioritised due to the significant economic and fiscal opportunity which exists which cannot be realised without the creation of a Commission, or a licensing regime, for potential developers to work with. Once licencing activity commences, there are provisions within the law for the enactment of regulations to prescribe fees and charges payable to the Commission, which could include annual licence fees.

## **4 Energy Policy Objectives**

### **4.1 Ranking of the Policy Objectives**

4.1.1 The policy objectives set out the framework for the delivery of the Energy Policy vision. Therefore, the development of the Electricity Strategy was based

around these policy objectives, with appropriate prioritisation and balance placed upon them. During the technical consultation exercise, industry representatives and political members were asked to weight the existing Energy Policy objectives in order of importance. The prioritisation of these factors fed into the selection of the preferred pathway and influenced the proposed market structure. Figure 1 below outlines the responses.

Objective	Political			Industry			Combined		
	Mode	Mean	Av ranking	Mode	Mean	Av ranking	Total Mode	Total Mean	Total Average
Security and resilience	1	1.29	1	1	1.67	1	1	1.39	1
Consumer value and choice	2	3.58	3	2	3.00	3	2	3.42	3
Greater energy Independence	1	2.75	2	3	2.89	2	3	2.79	2
Decarbonisation	6	4.58	6	4	3.11	4	4	4.18	5
Equity and fairness	5	4.21	5	6	5.00	6	5	4.42	6
Supporting a vibrant economy	2	3.88	4	6	3.89	5	6	3.88	4

Figure 1 – Average ranking of policy objectives

4.1.2 Therefore, the following priority ranking has been used to help inform the Strategy:

1. Security and resilience of supply
2. Greater energy independence
3. Consumer value and choice
4. Supporting a vibrant economy
5. Decarbonisation
6. Equity and fairness

4.1.3 This feedback clearly indicated that the continued high levels of secure and resilient supply that the Island has enjoyed since the cable between Guernsey and Jersey was installed should be maintained. This is reflected in work that considered the technical levels of security that should be maintained under different scenarios, and identified other potential risks (outlined in Section 6).

4.1.4 Greater energy independence is represented through the uptake of local renewable energy, including the targets as set out in Section 3.3. This acknowledges that renewable electricity is the only truly independent electricity source the Island has access to, once constructed and installed.

4.1.5 Consumer value and choice aligns most closely with affordability in the energy trilemma<sup>24</sup>. The cost of electricity is a key consideration and the modelling undertaken by Siemens sought to identify the most cost-optimal options.

<sup>24</sup> The energy trilemma is the requirement to balance the affordability, reliability, and environmental sustainability of energy systems.

4.1.6 Supporting a vibrant economy is a key aim of the Government Work Plan<sup>25</sup> and the Committee’s view is that secure and affordable energy feeds into this objective.

4.1.7 Decarbonisation was considered under all pathways, as per the direction of the Climate Change Policy, and so has not been used as a differentiator for selecting a strategy pathway. Renewable energy supports this objective, as would cost-effective changes to the fuel for the on-island generation plant.

4.1.8 Equity and fairness is focussed on the charging for, and access to, energy, and this is primarily addressed through the market review. The Committee considers that in delivering a fair and equitable market framework there needs to be a prioritisation of affordability and practicality for the Island.

#### 4.2 Review of the Policy Objectives

4.2.1 Through the development of the Strategy, feedback from both industry and political stakeholders highlighted that there was a level of confusion around the Energy Policy objectives. Stakeholders outlined that some of the policy objectives were hard to define, contain potential conflict within their own category and may have unintended consequences. It was also highlighted that the Energy Policy objectives and their associated descriptions do not mention “affordability” and that there is potential conflict between “value” and “choice”. This feedback was drawn from consideration of the practical implementation of the policy through the Strategy and is likely to reflect, amongst other things, the uncertainties that have impacted the industry marketplace over recent years.

4.2.2 The need to support a vibrant economy is a non-negotiable aim of the Energy Policy. The “Supporting a vibrant economy” is an overarching rather than a stand-alone objective covering the entire energy trilemma rather than a specific element. It is also a non-negotiable aim of the Energy Policy and wider States of Guernsey policies and workstreams. The Committee is therefore incorporating this sentiment into the policy Vision Statement as drafted below:

*“Guernsey will be aligned with global efforts to reduce emissions and develop renewable technologies. The vast majority of Guernsey’s energy supplies will come from clean, low carbon sources by 2050 at the latest, and residual emissions will be offset. Facilitating reliable and affordable renewable energy supplies will act as an economic enabler, providing diversification and vibrancy to the Island’s economy, whilst also improving Guernsey’s credibility and reputation in the green finance*

---

<sup>25</sup> [Government Work Plan | States Of Guernsey \(ourfuture.gg\)](https://www.guernsey.gov.gi/government-work-plan)

*sector. Guernsey’s natural resources will be used appropriately and maintain the unique surroundings, biodiversity and natural beauty of the Island.”*

4.2.3 While the policy objectives were initially developed working with industry, consideration of their practical implementation has highlighted a need to amend them. The Committee therefore intends to update the Energy Policy Objectives as set out in Figure 2 below and explained in Appendix 2.

<b>Existing objective</b>	<b>Proposed version</b>
<p style="text-align: center;"><u>Decarbonisation</u></p> <p>Decarbonisation of the Island’s energy system will be in line with developing and evolving international standards and those set by other jurisdictions to mitigate climate change.</p> <p>This means our aim must be to have an energy system in which our energy supplies come from clean, low carbon sources. The outcome of this will be clean air and a healthy environment in which our community lives.</p>	<p style="text-align: center;"><u>Minimise carbon emissions and environmental impacts</u></p> <p>Decarbonisation of the Island’s energy system will meet or exceed international standards, and those set by other jurisdictions, to mitigate climate change. This will be achieved whilst following environmental best practice and through the efficient use of energy.</p> <p>Our aim is that our energy supplies come from clean, low carbon sources where energy is not wasted, and adverse environmental impacts are avoided or minimised. The outcome of this will be clean air and a healthy environment in which our community lives.</p>
<p style="text-align: center;"><u>Security and Resilience of Supply</u></p> <p>Maintaining the required level of security of supply to withstand simultaneous infrastructure failures within the system and still serve our energy needs.</p> <p>Working on the basis of increased interconnection; the existing N-2 criteria (on-island generation provision) would be updated, as appropriate, to maintain security of supply levels in light of increased connectivity.</p>	<p style="text-align: center;"><u>Security and Resilience of Supply</u></p> <p>Maintaining the required level of security of supply to withstand simultaneous infrastructure failures within the system and still serve our energy needs. Working on the basis of increased interconnection, the Island’s criteria for on-island generation provision will be updated, as appropriate, to maintain security of supply levels in light of increased connectivity.</p>

<p style="text-align: center;"><u>Consumer value and choice</u></p> <p>An approach to competition in the energy market that is aligned with Guernsey’s scale and size, and one where consumers can have a choice over their primary source of energy.</p>	<p style="text-align: center;"><u>Consumer Value</u></p> <p>An energy market where cost-effective procurement of energy, and energy efficiency, are prioritised with the aim of affordable energy for the Island.</p> <p style="text-align: center;"><u>Appropriate Competition and Consumer Choice</u></p> <p>An energy market that encourages investment and competition and provides the consumer with choice over energy sources. Critical infrastructure should not be duplicated.</p>
<p style="text-align: center;"><u>Equity and fairness</u></p> <p>An energy market where all consumers pay a share of the maintenance of the system, and in return receive equal access to the opportunities that come from technological advances.</p> <p>An energy market where all consumers pay a share of the maintenance of the system, and in return receive equal access to the opportunities that come from technological advances.</p>	<p style="text-align: center;"><u>Transparency and fairness</u></p> <p>An energy market where costs of services are well understood and clearly explained, where the maintenance of the system is shared fairly by consumers, and who in return receive equal access to the opportunities that come from technological advances.</p>
<p style="text-align: center;"><u>Supporting a vibrant economy</u></p> <p>A clean, reliable, and affordable energy supply is a fundamental economic enabler. Establishing an environment for the development of on-island (including offshore) renewables will support the diversification and vibrancy of Guernsey’s economy.</p> <p>A shift to decarbonisation in Guernsey will be an essential reputational advantage to support the growth of the green finance sector. Establishing a clean and secure</p>	<p style="text-align: center;"><b>Removed and fed into overarching vision statement</b></p>

<p>energy supply is a significant component of decarbonisation and assists in delivering the credibility and reputation that underpin growth in green finance.</p>	
<p><u>Greater energy independence</u></p> <p>A system where a greater and significant proportion of our community’s energy needs are supplied through local energy sources. This will increase resilience by reducing exposure to external and geopolitical factors.</p>	<p><b>No change</b></p>

*Figure 2 – Energy policy objectives comparisons*

4.2.4 These changes will help with the clarity around the policy objectives moving forward in a practical sense, and will provide a more concise vision statement for the Island that clearly outlines the need to support a vibrant economy.

4.2.5 For the purposes of the Strategy development, the pre-existing policy objectives were used. However, stakeholders (including the energy industry representatives) have been engaged throughout the development of the Strategy and therefore the Committee is of the view that the proposed approach reflects their feedback appropriately.

## **5 Current Island Provision**

5.1 93% of Guernsey’s electricity is currently sourced through the interconnector via Jersey, from France. The interconnector is owned by the Channel Islands’ Electricity Grid (“CIEG”), which is a joint venture between Guernsey Electricity and Jersey Electricity and has a contractual limitation of 60MW. When the Island’s electricity demand exceeds 60MW, the Vale power station is utilised. The mix of local supply is predominantly diesel power generation and a modest level of approximately 350kW of distributed solar PV arrays. Additional solar arrays are anticipated to be commissioned shortly, which would nearly double the amount of electricity generated, to a total of 600kW. The on-island generators also provide part of the back-up electricity available under the security of supply requirements.

5.2 Whilst the newer engines are more efficient and offer improved emissions performance over the rest of the fleet, prolonged running of the on-island generators compromises the environmental credentials of the island’s electricity supply. In addition to carbon emissions, there are other oxide

emissions of nitrogen and sulphur produced when using the on-island plant.

- 5.3 The subsea element of the existing interconnector was replaced in 2019 and has a life expectancy of 30-40 years. However, the land-based elements of switchgear and plant are now 20 years old and are expected to require replacement or upgrading in the 2030s.
- 5.4 Several of the generators at the power station are beyond their expected normal reliable operational life, which presents an increasing risk. It is reasonable to expect that plant of this age will suffer decreasing reliability and increasing maintenance costs as well as increasing difficulties in sourcing specific parts. Five generators are expected to need replacing by 2030, whilst others are expected to be in service to around 2040, as they are newer generators.
- 5.5 Through the Merit Order, GEL are required to dispatch the lowest cost supply source. Currently this is the imported electricity through the interconnector via Jersey, to France, which is sourced from certified hydro, wind and solar generation. This contributes significantly to the overall low carbon content of Guernsey's electricity system. High level conversations with members of the Guernsey business community have highlighted the importance of a low carbon energy supply to the continued economic prosperity of the Island.
- 5.6 Guernsey's electricity prices are affected by two components: the cost of maintaining the generation assets and distribution infrastructure (otherwise known as fixed costs) and the fuel component to run the generators or electricity imported from France (the variable costs). GEL recoup these costs through their tariff system, with a fixed connection charge and a pay-per-unit charge. The fixed costs do not adequately reflect the costs incurred of maintaining the system and security of supply. The vast majority of electricity sales revenue is currently recovered on the basis of units consumed. The remaining amount is recovered through fixed standing charges. However, the fixed costs of operating the generation, transmission and distribution infrastructure equate to approximately 50% of the total costs of the business. The STSB's recent approval for GEL to increase its revenues by 13% from July 2023 has started to address this discrepancy. Further work is still needed. European countries have also experienced similar issues and in response have moved toward tariff structures based upon a higher proportion of fixed charges.
- 5.7 The STSB is currently responsible for determining retail tariffs. GEL has a number of tariffs, primarily in the domestic space including Standard, Super Economy 12 (which consists of a high and low rate), Superheat, and Heat Pump tariffs.

- 5.8 The Committee *for* Economic Development has been directed to undertake a broader review of the tariff structure, but this work has not yet commenced. However, the work is not required as long as the STSB is responsible for the setting of tariffs, as it currently is. GEL made a graduated first step by increasing its fixed standing charges by a higher percentage than its unit charges as part of its approved tariff changes in July 2022, and this will be increased further through the changes coming into force in July 2023.
- 5.9 Of the variable costs, the Island is exposed to market forces in both the procurement of the fuels to run the on-island generators and the electricity imported through the cable. CIEG partake in multi-year contracts, to date with EdF, to secure electricity through the cable with some element of fixed pricing to seek to achieve an order of price stability and mitigation against volatility in wholesale energy market prices.
- 5.10 Maintaining the on-island generators at the power station offers some level of control and resilience; however, there remains a level of risk and reliance on importation associated with maintaining a supply of fuel. Both heavy fuel oil and gas oil need to be imported to the Island, and this is exposed to wider geopolitical risks in terms of availability and price. Specific NAABSA (Not Always Afloat But Safely Aground) vessels that do not exceed a certain size need to be used at St. Sampson's Harbour, where hydrocarbons are currently delivered in bulk, and this is only accessible for a small number of tides every two weeks. This presents risks in itself, where there is a need to ensure that there are suitable vessels operating in the area of northern Europe. Bad weather can also impact on the ability of vessels to dock, resulting in deliveries being missed. The power station must maintain a minimum of four weeks' worth of fuel but has sufficient space to hold fuel for up to eight weeks.
- 5.11 Security of supply
- 5.11.1 GEL currently operate under two security of supply criteria: "N-2" and "the 80/80 criterion". The N-2 criterion relates to the level of generating back up the island maintains whilst the 80/80 criterion attempts to provide a cost control to the on-island plant.
- 5.11.2 The definition of N, for the purposes of the Island's security of electricity supply criterion, is that there is sufficient on-island provision to meet the peak (maximum) electricity demand.
- 5.11.3 The N-2 security criterion requires that GEL should maintain sufficient on-island generation plant such that the Island's maximum demand can still be met with the two largest generators simultaneously unavailable. This is to cover the eventuality where the cable is out of action. The purpose of a security criterion is to provide a margin of redundancy (in other words, back up) to ensure that

there is sufficient generation plant to cope with forecast maximum demand. The existence of the N-2 criterion does not guarantee that supply will be sufficient, as multiple sources of electricity might be unavailable simultaneously at a time that coincides with maximum demand. However, the greater degree of redundancy that is built into the system design, the lower the probability that the system will not be adequate – but the greater the degree of redundancy, the higher the cost, since more capital plant must be installed and maintained.

5.11.4 The 80/80 criterion was a novel security of supply requirement introduced through the 2014 electricity supply strategy. It was designed to mitigate the cost risk impacts of a long-term interconnector outage. It achieves this by requiring there to be adequate on-island generation provision to supply 80% of the Island’s peak demand using plant that does not cost more than 80% of the average electricity retail price to run.

5.11.5 Guernsey customers experienced 21 minutes of downtime over the year 2020/2021<sup>26</sup>. This compares to 5 minutes per customer for Jersey Electricity<sup>27</sup>, and 15.9 minutes per customer in the Isle of Man<sup>28</sup> in the same period. There are notable increases in downtime when the interconnector experiences faults or is taken offline for maintenance. Ensuring technical security of supply is a fundamental concept in the planning and operation of power grids. Other factors affecting the security of supply include the diversity of the existing network and the mix of jurisdictions (including local generation) that electricity is sourced from.

## 5.12 Electricity Network

5.12.1 There is a need to replace and upgrade the existing land-based cables in order to ensure our infrastructure is fit for purpose and can meet the Island’s future demand requirements. Although this will likely cause disruption to road users over the coming years, this investment will better support the energy transition and should also help to reduce the number of faults reported across the grid. 149 general network faults were reported for the year in GEL’s latest annual report for 2020/2021.

5.12.2 Investment in the network has historically been on a reactive approach. However, a replacement plan is now in place which is looking to accelerate the replacement of cabling that is over 60 years old. The plan allows for the

---

<sup>26</sup> [Guernsey Electricity’s 2020/2021 Annual Report](#)

<sup>27</sup> <https://www.jec.co.uk/investors/figures-reports/>

<sup>28</sup> <https://www.manxutilities.im/about-us/annual-reports-financial-statements/annual-reports-financial-statements/>

replacement of around eight kilometres of low voltage cabling per year and high voltage cabling as required. However, this is out of around 1400km of the existing cable network. It is essential that the grid is able to accommodate the transition to increased electrification which is already underway. The Committee is therefore of the view that greater ambition should be added to the replacement plan and that the STSB, in its shareholder function, should work with GEL to overcome the resources and disruption challenges.

5.12.3 There are also around 450 substations that need to be maintained and replaced. GEL has been undertaking a multi-year programme and, as of the latest annual report, ten percent of the secondary substations were maintained or replaced in the previous year.

5.12.4 A detailed and technical explanation of the Island's current provision, including the existing infrastructure and assets, and a comparison of costs between other jurisdictions, can be found in Appendix 3.

## **6 Assessed Pathway Options**

6.1 Electricity systems globally are seeking to move away from a dependence on fossil fuels, driven by the impacts of climate change, whilst managing the impacts of increased electrification. Guernsey's current demand is met primarily through certified renewable energy through the interconnector from France, via Jersey, and when additional supply is required, it is generated on-island at the Vale power station. Unless the way Guernsey sources its electricity changes, based on demand projections, more electricity will need to be generated at the thermal power plant using carbon intensive practices in order to meet local demand, which is counter to the agreed Energy and Climate Change Policies and will impact Guernsey's ability to reach net zero by 2050. Guernsey's level of energy security, cost and independence must also be considered when determining how electricity is supplied.

6.2 The Committee commissioned sector experts, Siemens UK ("Siemens"), to undertake an assessment of potential ways Guernsey could meet its predicted electricity demand up to 2050, which aim to balance the Energy Policy objectives. It is important to recognise that there will be a transition period in any scenario where fossil fuels will still be required, and the rate of renewable energy is increased. Therefore, the potential supply options needed to facilitate this transition whilst allowing for alternative technologies should they become viable in the future.

6.3 The assessment approach looked at the technologies available today, as well as the potential future technologies that are expected to mature within the timeframe of the strategy review, to identify realistic options. The same methodology for costing and assessing the supply options was used across all

pathways. This allows for direct comparison between the options, whilst acknowledging that the modelling provides a best assessment of the options based on today's understanding. All of the options were based on the same assumptions and are therefore comparable for the purpose of agreeing a strategic direction. Therefore, should any of these assumptions change, it would apply across all potential pathways.

- 6.4 The aim of the assessment that has taken place was to establish the best long-term strategic approach for the Island's electricity supply. The pathway is not a fixed delivery plan or a direct roadmap for exactly when technologies should be implemented. Therefore, it is important to understand that supporting an approach does not commit any specific spend or technological solution or scale at this time. Whilst the proposed pathway references specific technologies, the pathway does not commit Guernsey to using those specific technologies (or to a specific cable destination); rather the pathway recommends solutions that provide the most cost-optimal options as understood today. There is flexibility to use alternative technologies should they become viable in alignment with existing States' policies. Investment decisions would be undertaken on their own merit in line with the strategic approach.
- 6.5 Six potential supply pathways were considered in detail, including continuing the current supply mix to the Island. An explanation of each potential supply pathway and additional information based on the detailed analysis and modelling exercise can be found in Appendix C of the Future Electricity Supply and Demand Strategy (Appendix 1). A high-level summary and comparison of each pathway is provided in Figure 3, along with considerations around assessing the preferred pathway. Costs outline within Figure 3 are based on the modelling exercise and are directly comparable across the pathways.

<b>Supply Pathway</b>	<b>Pathway Description</b>	<b>Indicative Lifetime Costs to 2050</b>
Base Case (A)	The Base Case is the continuation of supply in the way that it is delivered today. This is the approach that would be taken in the event no decision is made regarding the future supply of electricity. This pathway has the joint highest estimated costs overall over the period modelled and second highest associated carbon emissions (83ktCO <sub>2</sub> e/year in 2050), although it has the lowest estimated capital expenditure. The pathway would outline the intent to continue the current operational set up where Guernsey's	<b>Total:</b> £1,910m  <b>Capital:</b> £380m  <b>Operational:</b> £1,540m

	<p>electricity supply is provided through the GJ1 interconnector and use of the local thermal power plant, which would be required to meet future increases in demand. Equipment would be replaced on a like for like basis. Solar PV would be progressed and fed into the network where viable. On-island generators at the power station would continue to be required at existing security of supply levels, for top-up and back-up, where there is capability on-island to meet peak demand with the two largest generators out of action (N-2).</p>	
<p>Greater Independence (B)</p>	<p>Greater independence considers supply without interconnection. This pathway has the third highest estimated total cost and has the highest estimated capital expenditure and associated carbon emissions (131ktCO<sub>2</sub>e/year in 2050). The pathway is based on ceasing the importation of electricity from France but would outline the intent to continue to require the importation of hydrocarbons for use at the thermal power plant. Electricity would also be supplied from local solar PV and offshore wind arrays, with energy storage facilities, as they become viable, used to balance demand and supply. On-island generators at the power station would continue to be required, for balancing, top-up and back-up, at existing security of supply levels where there is capability on-island to meet peak demand with the two largest generators out of action (N-2).</p>	<p><b>Total:</b> £1,890m</p> <p><b>Capital:</b> £640m</p> <p><b>Operational:</b> £1,250m</p>
<p>Renewables First (C)</p>	<p>Renewables First considers delivering renewable energy supply without additional interconnection. This pathway was the lowest estimated cost pathway, with estimated capital costs in the middle of the cost range and associated carbon emissions less than half of the base case</p>	<p><b>Total:</b> £1,620m</p> <p><b>Capital:</b> £510m</p> <p><b>Operational:</b></p>

	(21ktCO <sub>2</sub> e/year in 2050). The pathway would outline the intent to maintain a single interconnector supply and on-island thermal power plant, whilst substantially increasing the amount of local renewable energy generation through both solar PV and large-scale renewable development, potentially in the form of an offshore wind array. Energy storage, when it becomes viable, would be used to manage supply and demand levels. On-island generators at the power station would continue to be required at existing security of supply levels, for top-up and back-up, where there is capability on-island to meet peak demand with the two largest generators out of action (N-2).	£1,110m
<b>Dual Interconnectors with Offshore Wind (D)</b>	<b>Dual Interconnectors with Offshore Wind considers both additional interconnection and large-scale renewables. This pathway was the joint second lowest estimated total cost, similar in estimated operational costs Renewables First but with greater estimated capital requirements, but it also provides greater flexibility and resilience and has the lowest associated carbon emissions (1ktCO<sub>2</sub>e/year in 2050). The pathway would outline the intent for additional interconnection, with initial work indicating the most appropriate approach being direct interconnection with France, plus large-scale renewable development, potentially in the form of an offshore wind array. This pathway would allow for increased importation levels as well as the potential for surplus generation being ‘spilt back’ onto the French grid, should this be agreed in the contract, which could create the opportunity for revenue generation. Additional generation from solar PV arrays would also be delivered. On-island generators at the power station would</b>	<b>Total: £1,730m  Capital: £630m  Operational: £1,100m</b>

	<p><b>continue to be required for back up purposes, and top-up in time in the event that both cables could not be run simultaneously, but this could be reduced to 'N' which would match generation capacity to peak demand once the additional interconnector is operational.</b></p>	
<p>Dual Interconnectors without Offshore Wind (E)</p>	<p>Dual Interconnectors without Offshore Wind considers additional interconnection, but with only solar as a local renewable component. This pathway has the joint highest estimated total cost, with higher estimated capital costs compared to the Base Case offset by lower estimated operating costs. The pathway has both the second lowest estimated capital costs and associated carbon emissions (14ktCO<sub>2</sub>e/year in 2050). The pathway would outline the intent to establish additional interconnection, with direct interconnection with France appearing most appropriate at this stage, to complement the existing interconnection and on island plant. Increased generation through solar PV would also be sought. On-island generators at the power station would continue to be required for back-up, and top-up over time if importing through both interconnectors simultaneously is not possible, purposes but this could be reduced to 'N', which would match generation capacity to peak demand once the additional interconnector is operational.</p>	<p><b>Total:</b> £1,910m</p> <p><b>Capital:</b> £420m</p> <p><b>Operational:</b> £1,490m</p>
<p>Lighthouse (F)</p>	<p>Lighthouse considers utilising alternative supply sources. This pathway has the third highest estimated capital expenditure, although the total estimated expenditure over the period is expected to be similar to dual interconnection with offshore wind and associated carbon emissions are similar to renewables first (21ktCO<sub>2</sub>e/year</p>	<p><b>Total:</b> £1,730m</p> <p><b>Capital:</b> £590m</p> <p><b>Operational:</b> £1,150m</p>

	<p>in 2050). The pathway would outline the intent to provide strategic investment in innovative technologies mixed with proven commercially viable technologies such as solar and offshore wind, with the aim of supporting economic growth. Energy storage assets would be required to manage supply and demand along with a continued use of the existing interconnector and thermal power plant. On-island generators at the power station would continue to be required at existing security of supply levels, where there is capability on-island to meet peak demand with the two largest generators out of action (N-2).</p>	
--	---	--

*Figure 3 – Summary of potential supply pathways*

6.6 In modelling the cost implications of the pathway options, Siemens have provided a cost breakdown estimate of both the timeline for expenditure and the impact upon the “average electricity system price”. This price estimate provides a guide to the unit price of electricity (in £/MWh) considering all costs associated with generating, operating and maintaining the electricity system (together known as the system cost) up to 2050, but excludes expenditure attributed to customer services and billing, profit margins, historical investments in electricity generation and network ad taxes and other levies. The system cost is therefore not exactly the same as the price consumers pay, but it is a significant factor, so comparing system costs provides a good insight into consumer price differences. Figure 4 below outlines the average electricity system cost at 5 yearly intervals to 2050 for the six assessed pathways. Prices are expected to rise in all pathways; however in Pathways C and D they are expected to peak around 2030 and then decrease, whilst for all other pathways they are expected to continue to increase. The cost estimates, calculated as the most cost-optimal approach for consumers, are on the basis that the assets are owned by the electricity provider utilising borrowing at an average cost of capital of 6%.

Average electricity system price (£/MWh) to 2050 for the six assessed supply pathways								
	2021	2025	2030	2035	2040	2045	2050	Overall 2021-2050
A - Base Case	75	93	131	135	152	153	156	130
B - Independence	75	90	165	129	135	135	135	126
C - Renewables First	75	89	128	111	119	119	121	110
D - Dual Interconnector with Offshore Wind	75	89	143	113	118	116	118	112
E - Dual Interconnector without Offshore Wind	75	89	143	138	149	147	150	129
F - Lighthouse	75	89	128	125	130	130	131	117

Figure 4 – Average Electricity System Price Comparison to 2050 for the six assessed supply pathways

6.7 The Energy Policy has six policy objectives which need to be balanced against each other and prioritised to inform the most appropriate supply pathway for the Island, as set out in Section 4. Figure 5. below illustrates how the pathway options compare to each other against the policy objectives, based on an independent assessment by Siemens, on a scale from 1 to 5. The total expenditure is as outlined in Figure 3.

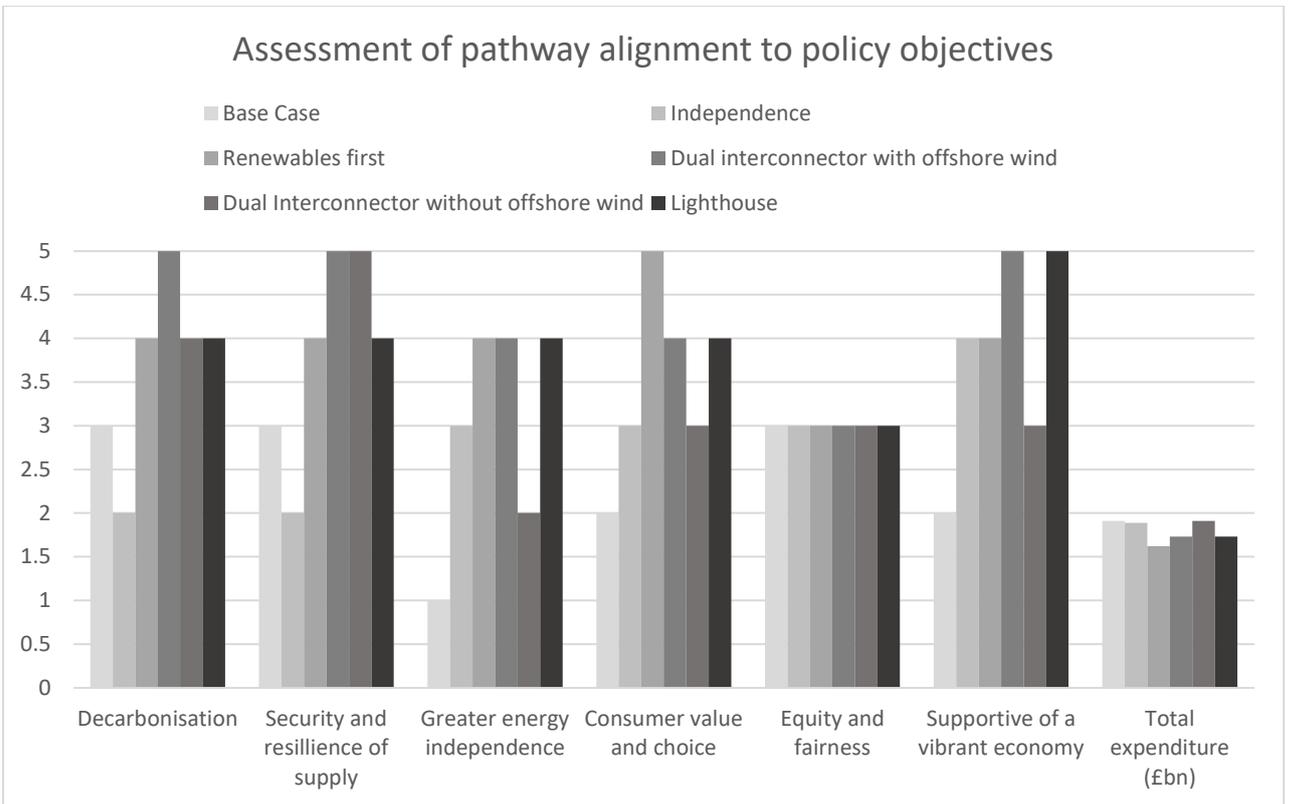


Figure 5 - Assessment of pathway alignment to policy objectives

6.8 The industry and political responses were closely aligned, with “Security and resilience” rated clearly first and “Greater energy independence” second by both stakeholder groups. This indicates that there is a strong preference for Guernsey’s future electricity supply to provide both energy security and increase the self-sustainability of the Island’s supply. Of all the pathways,

Pathway D – Dual Interconnectors with Offshore Wind – provides the closest alignment to the priorities identified having been independently assessed as joint highest scoring against both security and increased independence.

6.9 The Committee understands that technology is evolving and what is in development now may become commercially viable in the future. Therefore, when analysing the potential supply pathways, a consideration was that they provided flexibility and adaptability to enable technologies to be implemented should the viability change. The Committee is also aware that there is ongoing interest in large scale renewable energy generation that could provide substantially more electricity than needed locally, and nothing proposed through this policy letter would prohibit this should it prove to be advantageous for the Island. As there are potential benefits to Guernsey's electricity provision, the Committee will continue to explore the potential for large scale development in Guernsey's waters. The recommended supply pathway recognises the potential advantages that the development of a large renewable energy asset could bring. If such a project were to be developed, it could be structured and financed in a number of ways.

#### 6.10 Preferred Pathway

6.10.1 Pathway D – Dual Interconnectors with Offshore Wind – is the recommended supply pathway for Guernsey as it best meets the Energy Policy objectives as shown in Figure 5. It also provides access to the most diverse number of supply sources, including a higher rated interconnector to meet increased peak power demand up to 2050, while producing the lowest level of emissions. The pathway is not a fixed delivery plan or a direct roadmap for exactly when technologies should be implemented, but instead is a direction for the Island to follow. Whilst the proposed pathway references specific technologies, the pathway does not commit Guernsey to using those specific technologies (or indeed to a specific cable destination); rather, the pathway recommends solutions that provide the most cost-optimal solutions as understood today. There is flexibility to use alternative technologies should they become viable in alignment with existing States' policies. There is also flexibility in the other direction: Pathway D would allow for a transition to either Pathway C or Pathway E should either the second interconnector or the offshore wind component no longer prove viable for whatever reason, and as proposed it provides access to the largest variety of supply sources.

6.10.2 Demand for electricity is already increasing and this is anticipated to further increase by 57% by 2050, to 625GWh from 397GWh in 2021. This has potential benefits in decarbonising the economy; however, in order to realise these benefits, the supply of electricity must continue to be low carbon, which will require investment in low carbon technologies as well as infrastructure upgrades.

- 6.10.3 In order to meet this demand, Pathway D explores the establishment of a second interconnector and an offshore wind component whilst also substantially increasing the amount of local solar PV generation. Under this pathway, it is proposed that the existing interconnector, via Jersey, to France and the on-island thermal power plant are retained for back up generation – and potentially top up generation if both cables are able to run simultaneously – and for security of supply purposes. The analysis completed by Siemens (Appendix 1) shows that at this time the most viable option (both economically and technically) would be to install a second interconnector directly to France. However, should circumstances change, landing points in other countries could be investigated. Both interconnectors would allow access to low-carbon energy sources from European markets in addition to local renewable generation which would contribute to the energy mix.
- 6.10.4 Although not modelled, based on information provided at the start of the process by GEL, recent discussions suggest that both GJ1 and GF1 *could* be run simultaneously. This would be beneficial over the longer term in meeting peak demand as it would increase the possible importation amount beyond that of GF1. Therefore, how this could be enabled should be explored as part of the work looking into additional interconnection.
- 6.10.5 Additional interconnection removes the single point of technical failure for the importation of electricity – in other words, our reliance on the GJ1 interconnector – and, due to the increase in dispatchable electricity it provides, it also lowers the supply risk for on-island plant. Under a dual interconnector scenario, whilst an unexpected failure would still result in a period of loss of power to the Island, the ability to import via an additional cable would allow for relatively quick re-establishment of importation. Should the cables be able to operate in parallel, there would be additional benefits for security of supply to Guernsey.
- 6.10.6 Through the adoption of the strategic direction outlined within this policy letter, it is expected that GEL will investigate the possibility of an additional interconnector, with the aim of it being operational in 2030 at the latest.
- 6.10.7 The Energy Policy directs that on-island (including within the Island’s territorial waters) renewable energy generation should be supported and implemented where possible. This direction has been a fundamental consideration for all the potential supply pathways and the work in developing Pathway D identified that establishing offshore wind provision with a capacity in the region of 65MW, either as a specific development for the Island or as part of a larger development in Guernsey’s waters, to provide a proportion of the Island’s energy requirements along with continued solar PV growth would be a cost-optimal approach based on current understanding and assumptions. The

purpose of the suggested wind development is solely to meet the Island's needs. Should other opportunities which may allow for export options arise then it is expected these would be considered on their merits. The proposed strategic direction would enable the options for local renewable energy to be explored, with the ambition of delivering a proportion of the Island's electricity needs, and potentially broader energy needs, through this method. Therefore, the suggested sizing of 65MW is only an indication of an option, and through further investigations an optimal approach would be established.

6.10.8 In Pathway D, consideration was given to the potential for the export of surplus electricity being spilt back into the French grid. Spill export is the ability to sell excess electricity generation in Guernsey back to France via an interconnector where there is no obligation to supply set amounts or at specified times. However, the ability to spill back needs to be explored contractually and has not been agreed. Formal negotiations will commence following the endorsement of the strategic approach from the States of Deliberation. The inability to export has been modelled through a zero-revenue option, equivalent to curtailment<sup>29</sup>, which still recommends that a second interconnector is established with offshore wind if export is not viable.

6.10.9 When calculating the costs of Pathway D, and the other pathways, the cost-optimal approach assumes that the Island, probably through GEL, owns and manages the assets, including an offshore wind development of 65MW (or a 65MW part of a larger development, of course). This is because, as a general rule, public ownership offers the lowest cost to the consumer, whilst private ownership offers the lowest cost to Government, but will likely have a higher cost for consumers. Partnerships offer a trade-off between the approaches. Therefore, further work will be required to identify the most appropriate approaches with respect to ownership and the funding of the assets required for the Island's electricity provision.

6.10.10 Due to the fact that a wind array is an intermittent (rather than dispatchable) source, there will be times when an offshore wind array does not produce enough electricity to meet demand, either because it is not a windy day, or the peak demand has increased beyond the maximum that can be produced. Despite this, generation from the wind and solar arrays would allow for the majority of the predicted energy demand to be met from on-island renewable generation with additional interconnection being used to balance the demand and provide additional electricity at peak times.

6.10.11 As discussed in Section 3, the Committee has proposed solar targets of

---

<sup>29</sup> Curtailment is the deliberate reduction in output below what could have been produced in order to balance energy supply and demand or due to transmission constraints.

5MW by 2025 and 10 MW by 2028, which are applicable under all potential supply pathways. The modelling of Pathway D predicts that solar would provide 53.7MWp by 2050, which should supply between 8%-10% of Guernsey's electricity needs.

6.10.12 GEL is able to source electricity from renewable energy sources through the existing interconnector from France, via Jersey. Establishing a second direct interconnector would increase this capability further and allow the local thermal power plant to be used predominantly for back up purposes. If alternative low, or lower, carbon fuels are cost effective, these would be used to operate the thermal power plant, reducing emissions further.

6.10.13 Energy storage options are not prohibited under the preferred pathway but have not been specified in the pathway's technology mix because the demand balancing would be met through the second interconnector. Currently energy storage would be a more costly approach than additional interconnection, and the modelling outlined that grid scale batteries are not cost optimal under any pathway assessed. Should the additional interconnection not come to fruition, then energy storage would be a necessary tool to ensure demand is met and to provide grid balancing. Additionally, should storage become viable in the future in addition to interconnection, the preferred pathway would facilitate this use as part of the on-island security provision.

6.10.14 The Pathway D approach offers a high level of technical security, with dual interconnection and on-island plant, and only requires the use of dispatchable assets locally to meet the anticipated peak demand load up to 2050 should the simultaneous running of the interconnectors not prove viable, and for back up purposes. It is important to note the correlating relationship between security of supply and energy costs: requiring assets to be maintained for back up purposes that are mostly redundant in the system comes at an increased cost to the consumer.

6.10.15 As outlined in Section 5, the States currently directs a security of supply criterion of N-2 for on-island generation assets. This means that the security of supply criterion does not take into account the existing cable link via Jersey to France, and is based on the Island being able to provide power at peak times when the two largest generators are inoperable. This level of security has provided for a resilient system that has been able to maintain supply during periods of disruption during cable outages.

6.10.16 In moving to a dual interconnector system, the advice received from Siemens is that due to the additional resilience offered by having more than one source of failure from diverse supply points (i.e. connecting via different routes to different parts of the French network) through an additional cable,

the security of supply criterion could be reduced from N-2 to N. A security of supply criterion of N would require the retention of sufficient generating capacity to meet peak demand. This reduced on-island capacity would be based on the likelihood that both interconnectors would be simultaneously unavailable is low. Under this security of supply criteria, the level of dispatchable electricity increases due to the provision of two interconnectors as well as the on-island plant. The Committee therefore recommends that the security of supply criterion be reduced from N-2 to N once a second interconnector is installed and operational.

6.10.17 By way of comparison, Jersey has three interconnectors with France and their on-island levels of available back up generation is lower than the peak demand. However, with three cables, there is further additional resilience which allows for this. The reserve nature of Jersey's power plant would be mirrored in Guernsey under a dual interconnector system.

6.10.18 Currently it is anticipated that GEL will replace the ageing fossil fuel plant with modern equivalents as the basis for the ongoing on-island dispatchable generation. However, Siemens have identified that in the future alternative dispatchable technologies, such as hydrogen fuel cells, may become economically viable forms of providing dispatchable generation. It is expected that, where appropriate, alternative generation and fuel options will be utilised by GEL as part of the on-island dispatchable generation and that this would be considered in the same way as fossil fuel plants for security of supply purposes.

6.10.19 Siemens' modelling, based on the most cost-optimal approach, has outlined that under any approach, including continuing to provide electricity in the way that GEL currently do so, there is a large cost for increasing the provision of electricity. However, it is important to understand that the indicative costs outlined are neither being committed to in totality through agreeing the strategic approach, nor would they all be realised at the same time. Based on this modelling, an estimated £1,730m of total expenditure would be required in delivering Pathway D to 2050. An estimated £630m of this is capital costs, for the purchase of generation assets, and an indication of how this level of investment could be split over the period is outlined in Figure 6. Investment decisions affecting the States will be taken by the States on the best approach as appropriate (i.e. this is not a commitment to the capital investment) which includes options for funding/financing the investments. There is also an estimated £1,100m for operational costs (including the fuel component). As outlined in paragraph 6.8.9, the capital costs are estimated on the basis of ownership by GEL of both the second interconnector and the offshore wind array (or 65MW of a larger wind array). Third party ownership of the offshore wind array would reduce the capital investment required by GEL but would increase the operational costs, potentially with higher prices for customers when purchasing the electricity, due to the returns that would be

delivered to the third-party owner.

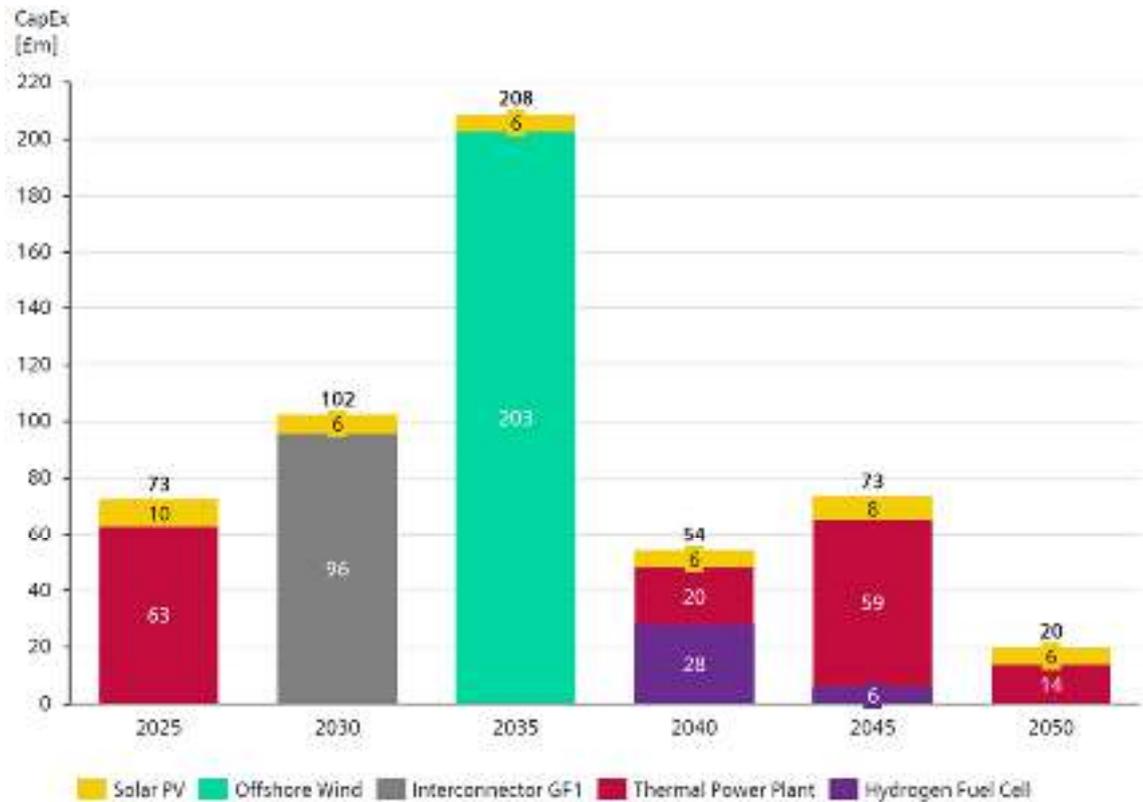


Figure 6 – Capital investment expenditure on generation assets up to 2050

6.10.20 The modelling anticipates that residual emissions directly associated with the provision of electricity by 2050 would equate to 1 ktCO<sup>2</sup>e, with offsetting costs estimated at £25-85k per annum. This amount is the lowest of all the pathways. It should be noted that the cost estimate is highly uncertain, and costs may be higher, if offsets remain available. This element would apply to any pathway.

6.10.21 As touched upon in Section 5.12, there is a need for investment in the network as well as in the supply assets, and that this needs suitable levels of ambition to accommodate the anticipated increase in the Island’s demand. This investment is required under any scenario, although the precise investment will be shaped by the Island’s strategic approach. The work by Siemens outlines that an estimated £30m would be required as part of network infrastructure upgrades to deliver on the pathway ambition. This investment has not been factored into the total expenditure outlined above, but the need for it is common across all pathways.

6.10.22 The Committee is of the view that the direction outlined through Pathway D – Dual Interconnectors with Offshore Wind – balances the need to

decarbonise by increasing the amount of renewable energy generated locally, improving Guernsey's independence, and maintaining suitable security of supply. Alongside this, it provides flexibility and allows for Guernsey to adapt its Strategy to Renewables First or a Dual Interconnector Without Offshore Wind should technologies no longer prove viable. It is therefore recommended that additional interconnection, likely direct to France, and offshore renewable energy, likely through an offshore wind array, is endorsed as the strategic direction by the States of Deliberation.

## 6.11 Other Assessed Pathways

6.11.1 Pathway A – Base Case – would maintain the current operational practice with maintenance and like-for-like replacement of assets within the thermal power plant, and this is the Island's default position. This pathway would require the thermal power plant to generate electricity when the existing interconnector (GJ1) has reached its maximum importation limit, which is expected to increase in frequency over the coming years. This is the direction GEL will continue to follow in the absence of further direction.

6.11.2 The Base Case pathway was not selected as a preferred pathway following the consultation period as it had the highest total expenditure of the six proposed pathways and did not present best value for money for the Island in the long term. Consultees were also not supportive of implementing Pathway A as it does not support a move to renewable energy generation and would result in the highest cost for the consumer. The re-carbonisation of the economy was an additional negative factor.

6.11.3 Pathway B – Independence – would be made up of on-island renewable energy and hydrocarbon generation only. As a result, this pathway reduces the reliance on external electricity supplies, but would require increased reliance upon fossil fuel imports to operate the thermal power plant.

6.11.4 Although Pathway B would allow for Guernsey to meet its own demand for electricity and remove the perceived reliance on France and single point of failure through the GJ1 interconnector, this pathway was discounted because of the significant increase in fossil fuel use to counter offshore wind intermittence and the associated carbon emissions along with the comparative cost to consumers. In addition to this, the 'Independence' pathway would not provide a secure and resilient supply of electricity, which was deemed the highest priority for the Island as a result of removing the diversification of supply provided through interconnection.

6.11.5 Pathway C – Renewables First – would prioritise electricity supply through local renewable generation in addition to the existing GJ1 interconnector. Solar generation and offshore wind would make up a large portion of the energy

demand, along with the continued importation from the European market.

- 6.11.6 The Renewables First pathway balances the Energy Policy objectives, providing a solution that would facilitate a high proportion of renewable energy and in turn, enable Guernsey's emissions to significantly reduce compared with the Base Case (although emissions would still be higher than the pathways featuring dual interconnectors as there would be more need to generate electricity on-island at the power station). Pathway C *could* also enable the security of supply criterion to reduce to N-1 whilst providing consumers with choice as to their preferred energy source at the lowest cost. As a result, both industry and political members strongly supported this pathway.
- 6.11.7 However, this pathway did not provide flexibility or opportunities for additional revenue streams and spill back into the European market. Overall security and resilience of supply would be lower than in Pathway D and decarbonisation was lower than other options. It also relies on the advancement of storage technologies in order to reduce the environmental impact, and there is a cost risk to this not maturing as predicted. Therefore, it was not selected as the preferred pathway.
- 6.11.8 Pathway E – Dual Interconnectors Without Offshore Wind – is a variation on Pathway D (discussed above). It would retain the existing GJ1 interconnector with a second interconnector for increased technical security of supply but does not include large scale local renewable generation as a primary source.
- 6.11.9 Pathway E only uses imported electricity from France and solar PV to meet the Island's demand. It is likely that a preferential contractual rate would be applicable as Guernsey would remain a consistent and predictable customer. However, this pathway would result in higher operational costs than Pathway D (Dual Interconnector with Offshore Wind) because of the higher reliance on imported electricity, rather than a higher proportion of local renewable energy, which is forecast to be lower cost than imported energy in the long term. This pathway would also have lower levels of energy independence which was prioritised by consultation respondents. Therefore, this pathway was not recommended as the preferred option for Guernsey.
- 6.11.10 Pathway F – Lighthouse – would utilise innovative renewable energy technologies in order to meet Guernsey's electricity demand. This pathway would require strategic investment from the States of Guernsey in innovative energy technologies with the intention of increasing the size of the local industry and supporting economic growth.
- 6.11.11 The consultation feedback showed an appetite for emerging and developing technologies but that the States itself should not invest in novel technologies. The Committee agrees with this approach and therefore

discounted this pathway, acknowledging that the preferred pathway must be flexible and allow for new technologies to be implemented once commercially viable.

## 6.12 Pathway Implementation

6.12.1 The fundamental success of the Strategy is reliant on the government working closely with, and supporting, the energy industry to evolve and adapt as required. As part of the Supply and Demand Strategy (Appendix 1, Section 5), Siemens have recommended 11 specific initiatives to be carried out, which will enable the successful implementation of the Strategy. These initiatives cover aspects of network development and operation, demand management, generation planning and enabling the energy transition, and will principally be led by either the States of Guernsey or GEL. A description of each initiative is provided, along with a set of actions that make up the initiative, and a proposed timeline for when they should be undertaken. It should be noted that the initiatives are not listed in a sequential order, but it is recommended that those which have a longer lead-in or development time are prioritised.

6.12.2 Human resources from both the States of Guernsey and GEL will be needed to carry out these initiatives. However, additional work is needed in order to quantify the resource requirement and determine the most efficient way to use resources to deliver the proposed initiatives. It is the Committee's understanding that there is availability within existing resources to undertake these initial investigatory steps, but it is anticipated that this will show that additional resources will be needed to fulfil the initiatives. There are also ongoing, resourced, workstreams that will capture some elements of this work. For example, Initiative 5.1.2 – Improve energy efficiency standards across all sectors in connection with electricity sector – will in part be picked up in the Energy Efficiency of Buildings workstream currently being undertaken by the Committee.

6.12.3 The States of Guernsey will be required to provide funding in order to carry out and facilitate the initiatives. The Committee recommends that the initiatives are prioritised and allocated the necessary resources given the importance to the Island of the Strategy. Costs realised by GEL will, ultimately, form part of the whole system price of electricity and will be appropriately recovered from customers in the setting of tariffs.

6.12.4 The need for local personnel to be trained and qualified in the designing and fitting of renewable energy products was strongly emphasised by the Energy Partnership group throughout the development of the Strategy. Without facilitation of training provision locally, the Energy Partnership group highlighted that local providers will be less able to meet the Island's needs and we will be more reliant on bringing in the expertise from off-island. Initiative

5.4.1 in Appendix 1 support this requirement. The Committee is of the view that the approach needs to be considered thoroughly and holistically, as part of wider plans to ensure Guernsey's workforce is equipped for the opportunities and challenges of the global economy.

6.12.5 With this in mind, a discussion was held with members of the Human Capital Development Plan ("HCDP") team, who confirmed that there is already some training provision available locally, including an electrician apprenticeship at Level 3, and a five-day solar panel installation course. Representatives from both the Committee *for* Education, Sport & Culture and Committee *for* Economic Development confirmed that the principles of the HCDP align with the Energy and Climate Change policies. It is therefore able, within existing constraints, to support to some extent developing industries including the energy industry and adapt the training provision as the exact needs are identified. This could include working in partnership with off-island providers.

6.12.6 Through this policy letter, the Committee formally request that the training needs of the energy industry are considered when developing the Human Capital Development Plan.

## **7 Market Framework review**

### **7.1 Existing Market**

7.1.1 The Island's electricity market is currently controlled by licence, issued by the Guernsey Competition and Regulatory Authority ("GCRA"), and the sector is subject to economic regulation.

7.1.2 The electricity market in Guernsey is regulated and licensed for three components: generation, conveyance, and supply. A generation licence or exemption is required "to generate electricity for the purpose of giving a supply to any premises or enabling a supply to be so given". A conveyance licence is required "to convey electricity for that purpose in that person's Authorised Area<sup>30</sup>". A supply licence or exemption is required "to supply electricity in that person's Authorised Area" or "to supply electricity to any premises specified or of a description specified in the licence".

7.1.3 Both "supply" and "conveyance" are defined in The Electricity (Guernsey) Law, 2001. In broad terms, under the current legislation, "supply" can be understood as meaning the supply of electricity through electric cables other than to premises occupied by the electricity licensee. "Conveyance" can be understood as the transportation of electricity by means of an electricity network.

---

<sup>30</sup> GEL's "Authorised Area" for Public Supply is the island of Guernsey.

7.1.4 GEL currently operates as the sole electricity importer, generator, operator and retail supplier for Guernsey and is wholly owned by the States. GEL is required to meet commercial, environmental, and social objectives set by the shareholder executive function that is overseen by the STSB.

7.1.5 In September 2021 (Billet XVII<sup>31</sup>), the States of Guernsey agreed that the responsibility for determining retail tariffs would be transferred from the GCRA to the STSB. This interim arrangement was agreed to address a period of regulatory vacuum that had persisted since 2012, created through the decision to remove GEL from regulation which was later put on hold, pending the outcome of the Energy Policy and the changes in the marketplace by the issuing of new generation licences.

7.1.6 GEL is licensed to generate electricity and had protected exclusivity in the supply and conveyance sections of the electricity market until 2022. This has subsequently been extended to allow for the development of the Electricity Strategy. In 2017, a generation licence and supply exemption were granted to another entity, the International Energy Group (“IEG”). Subsequent to this licence, two further generation licences have been issued; however, the Committee note that GEL remain the only front of meter generator on the Island. There are also four extant generation licences issued under the law by the GCRA. Only GEL hold supply and conveyance licences in addition to the generation licence; however, the other holders of generation licence hold supply licence exemptions.

## 7.2 Market Intent

7.2.1 A core element of updating the Electricity Strategy was to analyse the existing market and advise upon an appropriate framework to deliver and complement the preferred pathway. The framework outlines the role of competition in the marketplace and its appropriate use locally, the role of GEL moving forward and provides a direction on how regulation should be considered further.

7.2.2 In line with the existing Energy Policy objectives of greater energy independence and decarbonisation, the Market Framework must be flexible and allow for renewable and alternative technologies to be implemented in the future as they become cost-effective. Similarly, the Framework is required to incorporate competition where it is appropriate and enable consumer value and choice. The Framework must also consider mechanisms to ensure fair

---

<sup>31</sup> Policy letter - GUERNSEY ELECTRICITY – INTERIM ARRANGEMENTS FOR TARIFF REGULATION - <https://gov.gg/CHttpHandler.ashx?id=140081&p=0>

access whilst also encouraging efficiency and investment for the benefit of the Island.

7.2.3 Price Waterhouse Coopers (“PwC”) were commissioned to undertake an analysis of the existing market and put forward a recommended Market Framework to support the preferred pathway, whilst considering international best practice and local circumstances. This work provided a steer for the direction of the market and is included in full in as Appendix 4 (“Further analysis of a proposed electricity market framework”).

7.2.4 This work highlighted that consideration needs to be given to the complexity and how comprehensive a framework is needed, and the trade off this creates between costs of implementation and costs for investors. These considerations include competition, regulation and the requirements on GEL.

#### 7.2.5 Competition

7.2.5.1 Competition in the Guernsey electricity sector should facilitate situations where multiple, qualified, parties can bid to provide a service, or services, at a lower cost, higher quality of service, or both, than others. This should be run with the intention of delivering the aims of the Electricity Strategy.

7.2.5.2 It is recognised that levels of on-island renewable energy generation need to increase and to manage this, PwC recommended that competition is allowed in the generation section of the industry where this can provide reduced costs or increased service levels. It is important that Independent Power Producers (“IPPs”) have the opportunity to bid to provide electricity and have the option to partner with equipment providers and GEL to fairly participate in the process to build new assets. In order to facilitate this, there is a need to clearly define the costs associated with the different elements of the GEL operations, and this is explored further in Section 7.2.6.

7.2.5.3 Areas where targeted competition should be facilitated include:

- Seeking investment for building and operating large-scale renewable generation,
- Building and operating large-scale renewable generation funded by either the States of Guernsey or GEL,
- Providing back-up generation services to support grid balancing, and
- Providing meter installation and network support.

7.2.5.4 Solar (and other) installations for self-supply will also be encouraged, with excess generation spilled back into the grid. In addition, it was recommended

that community-based self-supply generation projects should also be supported where viable.

7.2.5.5 Due to the size of the Island, the Energy Policy identified the advantages of a single network grid as is currently in place. PwC were supportive of this approach as the costs and operational complexity of introducing competition in this area would outweigh the benefits. Therefore, the Committee would not recommend introducing competition in this area.

7.2.5.6 PwC also recommended that retail supply over the network remains with GEL only and competition is not introduced in this area. To facilitate this, PwC recommend that GEL should establish a Single Buyer function that is separate to the generation element of the business, to ensure transparency and openness across all market participants and demonstrate that the network owner is not prioritising their own generation or investment/maintenance based on their requirements.

7.2.5.7 As directed through the Energy Policy, PwC reiterated the need for tariffs to be reviewed to ensure they are cost-reflective and provide increased consumer choice whilst allowing consumers to shift their demand in line with tariffs.

## 7.2.6 Requirements on GEL

7.2.6.1 GEL is a vertically integrated utility (“VIU”) meaning that generation, transmission, retail sales and system operation functions are all owned and operated by one entity. It is possible to run a competitive market for generation without undertaking unbundling. In these cases, the VIU is the counterparty to the IPP contract typically, so the introduction of a single buyer-type role within the VIU is useful. It is therefore recommended by the Committee that a single buyer role is established within the networks function of GEL to be the counterparty for internal contracts, for internal cross-department transfers or for contracting with 3<sup>rd</sup> parties.

7.2.6.2 Unbundling a VIU involves introducing some level of separation between the different elements of the utility provider. Unbundling is primarily focused on supporting the introduction of competition. PwC recommends that where competition is limited, as it is likely to remain in Guernsey, accounting unbundling may be sufficient to provide comfort to investors, with appropriate contracts. Following analysis of each type of unbundling, which included the requirements and associated benefits and challenges and is available in section 5 of Appendix 4, the Committee recommends that accounting unbundling is most appropriate as it has the lowest cost and complexity to implement whilst providing the necessary cost information to support competition.

## 7.2.7 Regulation

7.2.7.1 The purpose of regulation is to protect consumers in respect of the prices, quality of service levels and variety of utility services. Utility regulation is in place in Guernsey to secure, as far as practicable, the provision of utility services to Islanders and ensure utility activities are carried out in a way that best serves and contributes to the economic and social development and wellbeing of the Bailiwick. The role of the regulator is also to introduce, maintain and promote fair competition where appropriate, and improve the quality of utility services.

7.2.7.2 GEL is currently licenced by GCRA with the setting of tariffs managed by the STSB.

7.2.7.3 Any updates or changes to the regulatory oversight need to consider:

- The electricity sector's journey to net zero (aligned with the strategic direction and principles of the Electricity Strategy);
- The scale of the sector;
- The ability to manage oversight of third parties through contract terms;
- The opportunity to merge cross-industry requirements with other sectors (e.g. consumer protection); and
- The regulatory oversight actions that need to be independent of the States of Guernsey as GEL's shareholder.

7.2.7.4 Given that the regulatory oversight will be focussed on GEL, there is limited need to monitor and manage third party investments. Oversight should be focused on tariff setting, long-term network investment plans, customer service levels, making use of micro-generation and, assuming agreement is reached with the French counterparties, granting access to a second interconnector for excess generation (spill or export volumes). The primary regulatory requirements are transparency (which will afford comfort to third parties) and independence, which requires separation of the functions of the States of Guernsey as shareholder and as regulator. Transparency can be managed through market rules (without placing an undue burden on GEL). Regulatory reporting will be simplified through the accounting unbundling that has been proposed. There will be a need for changes to the regulatory reporting requirements to allow for the existence of a single buyer, and to provide clarity on the costs underpinning cost-reflective tariffs.

7.2.7.5 The Committee has given some consideration to options for streamlining the regulatory regime, potentially by incorporating some functions within the States of Guernsey. Indeed, the States has already agreed, through the policy

letter on interim tariffs considered in September 2021<sup>32</sup>, that the setting of tariffs can be undertaken by the STSB. The Committee's view is that this should continue.

## 7.2.8 Implementation

7.2.8.1 The Committee is aware that there are a number of options for the regulation of the market. The Committee has focused on the strategic aims for the market, principally the ability for targeted competition and transparency with restrictions on retail and network ownership. The development of the Electricity Strategy has identified the need for any future regulatory framework to be proportionate and suitable for the scale of the sector, and to be implemented incrementally as and when the market requires.

7.2.8.2 In order that this may be delivered, the Committee has outlined a series of interim measures in Section 11 which would enable the delivery of the Strategy within the existing regulatory setup. The Committee would also highlight that, whilst termed interim measures, if they deliver the aims of the Strategy effectively and efficiently, they could become permanent measures.

7.2.8.3 Whilst the Committee is aware that there may be alternative approaches to regulation, this falls within the mandate of the Committee *for* Economic Development to provide direction on. The Committee would recommend that, as part of the ongoing work on regulation, the Committee *for* Economic Development give consideration to ensuring the Island has the most appropriate regulatory framework.

## 8 Energy demand management

8.1 Guernsey's electricity demand profile varies with the seasons. Peak demand generally occurs during the colder winter months, when demand for heating is at its maximum. In 2021, peak demand reached 94 MW. In the warmer summer months, the power demand remains consistently below the GJ1 interconnector's limit. A baseload power demand of 22 MW was observed in 2021, which includes electrical consumption that is needed all year round. The total annual electricity demand in 2021 was 397 GWh.

8.2 As part of the work in the development of the supply strategy, Siemens undertook an electricity demand forecast to 2050. Based on the assumptions as outlined in the Strategy document (Appendix 1), which included the States' agreed target of net migration of +300 people per year to Guernsey, along with increased electrification of both transport and heating, total annual electricity

---

<sup>32</sup> Billet d'État No XVII, 2021 - <https://gov.gg/CHttpHandler.ashx?id=140081&p=0>

demand in 2050 is predicted to increase 57% to 625 GWh. Peak demand is similarly expected to increase to 157 MW if there are no measures implemented to manage peak demand.

- 8.3 There are two main ways in which electricity demand can be managed: demand reduction and demand smoothing. The focus of demand reduction is to reduce the overall power requirements of customers over the long-term. Examples include implementing energy efficiency solutions or improving building standards. Demand smoothing is when customers are encouraged to use electricity at different times in order to manage peak demand loads. By effectively reducing the size of the peak, this can help to keep demand levels within the capacity of the cable and therefore avoid, or reduce, the need to generate electricity at the power station. Both options can reduce peak power demand; however, demand smoothing does not impact overall power demand.
- 8.4 There are methods available to manage peak power demand, such as smart or variable consumer electricity tariffs that encourage the flexible use of smart appliances, EVs or electric heating, or decentralised energy storage technologies, such as battery systems or hot water tanks. GEL already provide a flexible use tariff, the economy 12 tariff<sup>33</sup>, to encourage load shifting from peak times to times when demand is lower.
- 8.5 With the introduction of further flexible consumer tariffs and load shifting mechanisms, smart consumption patterns could offer a significant reduction in the peak Island demand. By way of an example, if 42% of all predicted EV charging processes could be delayed by up to nine hours and 61 MWh of predicted heating demand could be shifted by up to one hour, the peak power demand in 2050 would be reduced to 125 MW. It should be noted that this is looking to shift demand from peak times rather than reducing load and so total annual electricity demand would remain unaffected by these changes. When considering investment needs, the Strategy has based the modelling on meeting peak power demand without demand management initiatives.
- 8.6 When considering demand management, Siemens have outlined a number of recommended initiatives for both the States of Guernsey and GEL to pursue. In line with the Energy Policy, there are recommendations to phase out ICE vehicles in the Island and encourage the uptake of EVs. There are also recommendations relating to energy efficiency of buildings, which is something the Committee *for the* Environment & Infrastructure is working on in parallel and will bring recommendations to the States later in 2023. The concept of smart grids should also be explored, as they have been recognised to help consumers understand their true electricity consumption, which in turn has

---

<sup>33</sup> <https://www.electricity.gg/electricity/tariffs/>

helped reduce costs.

- 8.7 Managing energy consumption has multiple benefits to Islanders, both directly and indirectly. By making changes to the way energy is consumed, including the time at which energy is consumed, at an Island scale the requirements placed upon the generation system can be reduced, ultimately leading to a lower overall cost to Guernsey consumers. The potential benefits of this have been highlighted in the work undertaken by Siemens, with the difference in peak load required for the island being reduced by 20% with the shifting of usage patterns. Although there is no effect on the overall energy usage of the island, the reduction in peak load offers potential savings on capital investments in the future.
- 8.8 Of greater impact to consumers are initiatives that will reduce the overall demand through improvements in efficiency. Whilst these initiatives will have an impact on the overall Island requirements, the reduction in energy use associated will save consumers money in the longer term. This dual benefit makes energy efficiency measure increasingly important. The Committee is committed to working with the Energy Partnership, as set out in the Energy Policy, to explore and develop energy efficiency measures.

## **9 Financial Implications**

- 9.1 The work carried out by the Committee has focussed on the strategic approach and the comparative costs of the options available to the island. However, it is acknowledged that through the work required to deliver on the Strategy, further detail on the specific costs will become clearer. The Strategy is not a specific commitment to the expenditure outlined within the pathway; however, some levels of investment will be required, and this needs to be considered as part of the States' overall expenditure requirements. It is important that whilst the investments should not be considered in isolation, all options for financing are appropriately explored.
- 9.2 There are implications of any Strategy approach for the States of Guernsey and for GEL. It is important that the States of Guernsey agree an in-principal approach to the financing mechanisms available to GEL. Indeed, almost all other jurisdictions which are looking at the provision of power and net zero strategies, which involve significant infrastructure investment, are seeking to solve similar financing challenges.
- 9.3 When assessing the financing of the long-term electricity provision for Guernsey, consideration must be given to what the costs of any given option are and how it is best to fund those options. Part of the work undertaken by the Committee through the development of the Electricity Strategy has been the commissioning of Siemens to undertake an economic appraisal of the different

options (see section (6) and Appendix 1 for more detail).

- 9.4 The pathway options considered and modelled by Siemens were undertaken on a cost optimisation basis<sup>34</sup>, with some constraints set around certain technologies for some of the pathways. It is accepted that no option comes without cost implications and the costs were therefore modelled for a continuation of the existing system (Pathway A – Base Case), effectively a no change scenario, as well as for the optional alternatives. This looked at both the operating costs (“OpEx”) and the capital costs (“CapEx”) for the generation assets.
- 9.5 When considering the costs of the options, they have had to forecast future prices for fuels of all types, import prices for electricity, technology costs and capital investment replacement costs. This is against the background of unprecedented uncertainty in the energy supply market over the previous 12 months and increasing demand for renewable energy production and associated cable services.
- 9.6 When considering the expenditure required, especially around cable investments, previous modelling undertaken by GEL suggests that tariff evolution required to fund an additional interconnector, with security of supply reduced to N from N-2, was not materially different from maintaining the status quo. This expenditure provides the Island with the required levels of security of supply and resilience to support the adoption of local intermittent generation. The work undertaken by Siemens to independently assess pathway options adds further support to this approach.
- 9.7 In total expenditure terms for generation, maintaining the estimate for the existing system is the most expensive option considered, with total expenditure (TotEx) estimated at £1.91bn to 2050. However, although there is a requirement for immediate capital expenditure under this pathway, this is required under all pathways. The capital expenditure is the lowest at an estimated £380m. The estimated operating costs, of fuel and purchased electricity, for continuing with the existing single interconnector and on-island generation to meet the Island’s needs are estimated at £1.54bn to 2050.
- 9.8 The recommended option, Pathway D, which offers significant flexibility and security, has a total estimated expenditure of £1.73bn to 2050 (90% of the TotEx of maintaining the existing system). However, due to the inclusion of both an additional cable to France, a large-scale renewable energy

---

<sup>34</sup> This process allowed the model to select the supply mix and scale based on the most cost-effective way of delivering within any technology constraints, but without setting limitations on the scale of any developments.

development and the required short-term investment in on-island plant, the estimated CapEx is comparatively high at £630m. It is important to outline that there are options for funding much of this capital investment without the requirement for States backing.

- 9.9 The modelling also outlined indicative timings for investments to be made, in five yearly periods, for both the OpEx and CapEx. From a CapEx perspective, this outlines for Pathway D that capital expenditure would be spread over the period between now and 2050, with the largest expenditure associated with the development of offshore wind as shown in Figure 6 in Section 6.
- 9.10 Under all scenarios there will also be the requirement to invest in the distribution network. An estimated £30m is required to deliver network upgrades to enable the pathway. As outlined in section 5.12, there is already a replacement plan in place, but in order to meet the transition to electricity under all scenarios this will need accelerating.
- 9.11 The 2014 Guernsey Electricity Supply – Future Strategy reaffirmed the decision that costs to the electricity system should be borne by the consumers. The Committee notes the practice of electricity infrastructure being funded entirely by electricity users, and not the taxpayer, has previously been agreed by the States with electricity tariffs covering the costs of the provision of electricity to consumers. However, from a funding perspective, it would be possible, where appropriate and desirable, for the States to undertake capital investment and recover the cost over time through payments from GEL.
- 9.12 The cost modelling that Siemens undertook assumed that the cost of capital would be procured on the financial markets, and that Guernsey, most likely through GEL, would be the ultimate owner of any given asset. This was considered the cost optimal approach to financing the purchase of assets and the cost of capital is included in the estimates. This state ownership structure is particularly important when considering strategic assets for security of electricity supply provision, with assets such as the interconnectors, grid and power station assets being critical to maintaining the appropriate level of market control. Alternative approaches may need to be considered in order to finance the required investment. When considering a large-scale renewable development, this approach was assumed only to extend to a proportion that would serve the Island's needs, and alternative approaches can be pursued. Any larger scale development would be expected to be financed through a third-party owner with Guernsey's needs being secured through the appropriate contractual arrangements.
- 9.13 However, the ability for GEL, or indeed the States, to finance or underwrite, also needs careful consideration. The States has a large capital plan and portfolio which is required for funding of necessary projects across

government. The Committee is aware that any funding or backing would need to be considered in line with wider States commitments and, if all capital investment outlined in the Strategy were to be funded through States funding or backing, this may be unaffordable or impact upon the ability to deliver other vital required investment. Similarly, GEL may be able to fund a proportion of the required investment; however, the ability to fund all of the capital projects outlined would not be possible, through borrowing, on the basis of the strength of their balance sheet.

- 9.14 It is therefore hugely important that there is suitable flexibility in the approach to financing and ultimate ownership of the assets outlined to allow GEL to make appropriate decisions relating to capital investments. This should include, where the shareholder deems appropriate, GEL having the ability to pursue collaborative working practices that may involve third party asset ownership or public private partnerships with appropriate Power Purchase Agreements and contractual arrangements.
- 9.15 The STSB's current approach to seeking dividend is on the basis of commercial profitability, currently meaning no dividend is sought from GEL. The existing approach to dividend appears sensible in a scenario where greater borrowing may be required to facilitate the capital expenditure, noting that there are limitations on GEL's ability to borrow, required in all pathways. There will be a requirement for long term return on the investment to be realised and it is key that the shareholder is able to provide decision making on financing options and ensure that any dividend sought remains based on profitability, including the consideration of debt.
- 9.16 The STSB is able to provide approval for the approach to the acquisition of funding for a project without the need to return to the States for debate where the financial impact of the decision does not impact upon the States. This is essential so that the States does not become burdened with individual investment decisions, rather that the Shareholder and the Board of Guernsey Electricity Limited are enabled to make commercial decisions.
- 9.17 Therefore, the STSB should consider all financing options available to GEL including the borrowing of funds, third party investment or alternative approaches as appropriate, so long as investment is in line with the agreed Strategy and does not impact upon the States' own ability to undertake investment. Where expenditure does impact upon the States' ability to undertake investment, further consideration should be given working with the Policy & Resources Committee. Alternative approaches could include, but not be limited to, creating special purpose vehicles ("SPV") to own specific assets on the States' behalf, for example the interconnector assets with a use of system charging agreement with GEL. There may also be further opportunities to strengthen and optimise state-owned asset balance sheets to support more

efficient borrowing to fund the investments.

- 9.18 There are also financial considerations to the States of the proposed approach, with initial work around the proposed review by the Committee *for* Economic Development to confirm the most appropriate form of regulation (section 7) and the work of the Committee *for the* Environment & Infrastructure (Appendix 1, Section 5), including working with the Energy Partnership, should be deliverable within existing budgets. However, further work in developing these workstreams may highlight the need for additional funding in the future, which would require consideration by the States.
- 9.19 In order that approaches for offshore wind, including large scale developments and for domestic consumption, there will be a need to ensure the licencing of renewable energy can be undertaken. This would require the establishment of the Renewable Energy Commission, as outlined in section (4.4), with initial estimates suggesting this could require funding of £200,000 over the first 2 years.

## **10 Role of Guernsey Electricity**

- 10.1 As outlined through the work on market structure (Section 7) it is the intention that GEL are the sole retailer of electricity on the Island and will maintain sole ownership of the electricity network. This means that GEL have a vital role to play in the ongoing provision of electricity to Guernsey.
- 10.2 Through the process of accounting unbundling (as outlined in Section 7), the allocation of costs across the business will become clearer and will allow for other potential electricity providers to provide local renewable energy for island consumption, on a clear understanding of costs. GEL will be the vessel through which the Island will look to meet the local renewable energy targets, but that does not mean that they will own all the assets. GEL will need to consider the best approach to support the deployment of solar PV, which may include entering into bilateral agreements with third party operators, or installing assets that are funded, owned and operated by GEL.
- 10.3 GEL are currently under shareholder direction to refrain from the installation of new renewable energy systems, however the associate review of the Merit Order<sup>35</sup> to support the purchase of local renewables has not occurred. Given the objective to support local renewable energy, the review of both tariffs and the Merit Order need to be undertaken as quickly as possible.

---

<sup>35</sup> Resolution 2.c -GUERNSEY ELECTRICITY – INTERIM ARRANGEMENTS FOR TARIFF REGULATION - <https://gov.gg/CHttpHandler.ashx?id=144198&p=0>

- 10.4 When reviewing the Merit Order, the following principles should be followed to guide the effective dispatch of electricity generation:
- Energy already purchased should be dispatched before flexible generation, regardless of past cost incurred. In essence, if it has already been paid for, then it should be used;
  - Energy with an existing commitment to purchase should also be dispatched before flexible generation, regardless of cost to be incurred. In essence, if it is going to have to be paid for anyway, then it should be used;
  - On-island renewable generation should be prioritised ahead of flexible dispatchable production; and
  - Further 'load following' flexible generation required to make up the difference and match supply to demand should be dispatched last in ascending order of price.
- 10.5 As an overriding consideration of the Merit Order, it is recommended that the carbon intensity of production should be limited to a long run average of 150gCO<sub>2</sub>e/kWh, save for unforeseeable operational demands.
- 10.6 Consideration should also be given to the principles on which electricity would be curtailed. This would occur in a period of oversupply of renewable energy.
- 10.7 GEL is currently mandated to dispatch the lowest cost supply source. Therefore, if the purchase price for renewable energy that is being requested of GEL is higher than that paid for imported electricity, GEL would be unable to purchase and dispatch it. Moving forward, the acceptable cost of local renewable generation needs be considered carefully, balancing the cost, enabling growth in increase local renewable generation to stimulate the industry, and meet the proposed targets. Siemens' work has highlighted that local generation should be lowest cost; however, that is on the basis that GEL are the owner of all developments, which the Strategy is not recommending. The extent of which the average production price of electricity should be permitted to increase in pursuit of achieving the renewable energy targets needs to take a balanced approach. The Committee recommends that this is explored collaboratively with both the Committee *for* Economic Development and the STSB, to enable further guidance to be issued to the STSB.
- 10.8 There is already a market in Guernsey for the provision of small-scale renewable generation and the expansion of this market should be facilitated by GEL. To help deliver this, the stand-by charge, in its current form, should be revised for renewable energy installations. The current standby charge, at the time of writing, limits installations to below 25kW installed before applying a £3.07 charge per kW per month. Although this is unlikely to impact upon most

domestic applications, for larger premises this may act as a blocker. Whilst this could be undertaken through a more general review of tariffs, given the Committee's view that solar should be developed as quickly as possible, the removal of this barrier for renewable energy installations should be prioritised.

- 10.9 As well as the generation of power, GEL are responsible for the maintenance and upgrading of the network. This is a key element given the predicted increase in electrification of vehicles and heating. Therefore, investment in the grid infrastructure to enable the continued uptake of increased electrification is important. The report by Siemens (Appendix 1) has outlined the need for additional infrastructure to support the implementation of the Strategy. However, there is also the need to invest in the existing network. It is therefore important that any shareholder objectives around capital plans align with the Strategy.
- 10.10 In addition to the maintenance and upgrades, GEL should also be enabled to extend the grid to connect licensed IPPs as and when required. It is recommended that GEL should be able to recover connection costs, charging appropriately to all connecting generation assets. The basis and circumstances when connection costs will be recovered needs to be established and made publicly available.
- 10.11 The Committee encourage the STSB, in its shareholder role, to update the shareholder objectives to GEL in line with strategic direction agreed through this policy letter as soon as practically possible.

## **11 Interim measures**

- 11.1 Regardless of market approach and the selected pathway for the Island's electricity supply, there are a number of actions that will be required immediately. These will be enabling actions that facilitate the agreed approach and predominantly relate to the mandates of the Committee *for* Economic Development and the STSB.
- 11.2 The need for some interim measures has already been touched upon within this policy letter and include:
- The need for GEL to continue exploring the possibility that both cables could run simultaneously;
  - The recommendation that buy-back tariffs be used as a form of incentive to encourage the uptake of renewable energy at a domestic scale, and that the shareholder objectives of GEL are updated accordingly (Section 3);
  - The need for the Committee to work collaboratively with the STSB and

the Committee *for* Economic Development to explore the extent of which the average production price of electricity should be permitted to increase in pursuit of achieving the renewable energy targets (Section 10);

- The existing standby charge, as outlined in paragraph 10.8, should be removed for the purposes of renewable energy installations, and that the shareholder objectives of GEL are updated accordingly. This takes account of both the ambition of the Strategy to accelerate uptake, and the intermittency of this form of energy;
- That updated shareholder objectives should be given to GEL clarifying that connection cost can be recovered where justified; and
- A direction to the Committee *for* Economic Development, as resolved through the Energy Policy, to review and amend the Merit Order in line with the aims of the Electricity Strategy (Section 10).

11.3 Through the Energy Policy, the Committee *for* Economic Development was directed to undertake a review of cost-reflective tariff structures and bring back proposals to the States of Deliberation. However, this work has not yet been undertaken. Subsequently, as explained in Section 3, the regulation relating to the setting of tariffs was transferred to the STSB in 2021, and the Committee is aware that the STSB has since commissioned work that should facilitate the review of cost-reflective tariffs. It is therefore recommended that Resolution 12 of the Energy Policy, that directs the Committee *for* Economic Development to undertake a review of structures for cost-reflective tariffs (including reflecting fixed and variable costs), be rescinded, as this now falls under the remit of the STSB.

11.4 As set out in Section 7 above, the Market Framework review has identified that there are opportunities to introduce competition into the market, excluding the retail aspect. As a result, changes to the licencing and regulatory set up will be required. The Committee recognises that this falls within the mandate of the Committee *for* Economic Development, but through discussions with industry representatives and the STSB (as shareholder of GEL), areas for consideration have been identified. These include:

- Continued licence exclusivity of GEL in the provision of conveyance and supply of electricity to the authorised area in accordance with the strategic direction provided within the Strategy;
- Change to conveyance licence conditions to remove the right for any other entity with an electricity undertaking to use the conveyance system, and therefore only have the right to connect in accordance with the strategic direction provided through the Strategy;
- Review the existing exemption to hold a supply licence to align with the Market Framework provided within the Strategy;

- Once the Merit Order has been amended, change the conveyance licence(s) to reflect the agreed order of dispatch; and
  - Amending the definitions within the Electricity (Guernsey) Law, 2001, relating to generation, conveyance and supply in order that the single electricity grid is adequately protected.
- 11.5 The Committee therefore recommends that the Committee *for* Economic Development investigates the direction needed to the GCRA, of both a strategic and general nature, to ensure alignment to the Electricity Strategy, and bring back proposals to the States for such direction that may be required. The Committee would encourage the consideration of the interim measures mentioned above.
- 11.6 With the introduction of competition in the generation sector, and the establishment of a single buyer function, it is more important than ever to ensure that GEL have an adequate and robust long-term network investment plan which supports the agreed strategic direction and delivery of the energy transition, including increased renewable energy capacity. The process of updating the plan will enable GEL to identify and clarify what the organisation's needs are and provide transparency to other users in regard to where network investment is needed. The long-term investment plan will also contribute towards the creation of cost-reflective tariffs. GEL should begin work to update their investment plan for the existing electricity network as soon as possible.
- 11.7 In addition to investment plan, it is essential that that strategic direction and principles of the Strategy are embedded into GEL's planning, including but not limited to the level of ambition around local renewable energy, the provision of additional interconnection, allocation of costs and the requirement for on-island security of supply provision.
- 11.8 Operationally, it is expected that GEL will continue to explore the potential for additional interconnection (subject to States agreement) and the potential for exporting as well as importing electricity. Similarly, GEL should seek to further understand the potential for running two cables simultaneously, in order to cover future peak load expectations.
- 11.9 There will also be a need for GEL to work collaboratively with the States of Guernsey, and other industry partners where appropriate, to investigate the potential for the development of offshore wind in the Island's territorial waters in line with the Strategy and the revised Merit Order approach. The requirement for the involvement of GEL is due to its role as the Island's retail supplier of electricity. That is not to say that GEL will be the lead or sole contracting party in the investigations, but will have a role to play.

## 12 Legislation

- 12.1 This policy letter sets out the overarching strategic direction for the Island in relation to electricity supply, demand and market framework. As such, there are no direct requirements to undertake any changes under existing laws, nor to enact additional laws.
- 12.2 The Committee would like the States to note that there may be a requirement for legislative activities following the completion of the propositions. For example, there may be a requirement for legislative changes once further proposals for regulation of the electricity market have been agreed.
- 12.3 Should the Committee propose the establishment of the Renewable Energy Commission, following work with the Committee *for* Economic Development, then there would be a requirement to enact the remaining parts of the Renewable Energy (Guernsey) Law, 2010 and the Renewable Energy (Guernsey) Ordinance, 2015.

## 13 Extant Resolutions

- 13.1 The Committee has identified that if the States approves the Electricity Strategy for Guernsey, the following extant resolutions will no longer be required and therefore, the Committee proposes, should be rescinded as follows:

Extant States' Resolutions for Rescission	
<b>Resolution Date</b>	4 <sup>th</sup> June 2020
<b>Billet and Article</b>	Billet d'État XI of 2020, Article VIII
<b>Original Sponsor</b>	The Committee <i>for the</i> Environment & Infrastructure
<b>Title</b>	States of Guernsey Energy Policy 2020-2050
<b>Resolution</b>	8) To approve the cable strategy set out in 8.17 and agree in principle the need for a second interconnector, subject to the consideration of a full business case; and to direct the States Trading Supervisory Board via Guernsey Electricity Limited to revert to the States of Deliberation with the full business case, the cost of developing which can be reflected and recovered by Guernsey Electricity Limited through its charges.
<b>Update</b>	Through the debate and decisions made

	<p>around this policy letter, this resolution will become superseded by the direction agreed. Part of the agreement on direction will provide the strategic direction around additional interconnection, and the States Trading Supervisory Board shall consider any request based upon its merit.</p> <p>The Committee therefore considered that, through the adoption of a pathway, the States will have agreed the strategic decision on whether to proceed with additional interconnection, and through the strategy it is outlined that the development of a second interconnector will require full feasibility assessment prior to implementation.</p>
<b>Resolution Date</b>	4 <sup>th</sup> June, 2020
<b>Billet and Article</b>	Billet d'État XI of 2020, Article VIII
<b>Original Sponsor</b>	The Committee <i>for the</i> Environment & Infrastructure
<b>Title</b>	States of Guernsey Energy Policy 2020-2050
<b>Resolution</b>	12) To direct the Committee <i>for</i> Economic Development to undertake a review of structures for cost reflective tariffs (including reflecting fixed and variable costs), to bring proposals to the States of Deliberation to give directions to the relevant regulator by Q4 2020.
<b>Update</b>	Through the policy letter titled "Guernsey Electricity - Interim Amendments For Tariff Regulation", the States agreed to transfer the responsibilities for determining the tariffs and prices charged by Guernsey Electricity Ltd from the Guernsey Competition & Regulatory Authority to the States of Guernsey, acting by and

	<p>through the States Trading Supervisory Board. This removed the requirement for the Committee <i>for</i> Economic Development to return to the States to with proposals for further direction as the responsibility currently resides with the States Trading Supervisory Board.</p> <p>The Committee recommends continuing to have the responsibility and prices residing with the States Trading Supervisory Board, and therefore considers that the need for further direction to the regulator is not required at this time.</p>
--	--

**14 Compliance with Rule 4**

- 14.1 Rule 4 of the Rules of Procedure of the States of Deliberation and their Committees sets out the information which must be included in, or appended to, motions laid before the States.
- 14.2 In accordance with Rule 4(1)(a) the Committee confirms that the recommended strategic direction is in line with the priorities set out in the Government Work Plan, specifically to secure future energy requirements.
- 14.3 In accordance with Rule 4(1)(b), the Committee consulted with energy industry and business representatives through the Energy Partnership Group throughout the development process, which helped to inform the preferred strategic direction. In recognition of the impact the Electricity Strategy would have on other mandates within the States of Deliberation, the Committee established a Steering Group with representation from the Policy & Resources Committee, Committee *for* Economic Development and the States’ Trading Supervisory Board through Deputies Le Tocq and Moakes respectively, along with Deputy Haskins and external expert advisor, Mr Jeremy Thompson. A draft iteration of the policy letter was shared with the Policy & Resources Committee, the Committee *for* Economic Development, and the States’ Trading Supervisory Board and their feedback has been considered and acted upon in this final version.
- 14.4 In accordance with Rule 4(1)(c) the Propositions have been submitted to His Majesty’s Procureur for advice on any legal or constitutional implications. She

has advised that there is no reason in law why the Propositions should not be put into effect.

- 14.5 In accordance with Rule 4(1)(d) the financial implications are set out in Section (9) of the policy letter.
- 14.6 In accordance with Rule 4(2)(a), the Propositions relate to the duties of the Committee to advise the States and to develop and implement policies on matters relating to energy.
- 14.7 In accordance with Rule 4(2)(b) it is confirmed that the propositions above have the unanimous support of the Committee.

Yours faithfully  
H L de Sausmarez  
President

A Gabriel  
Vice-President

A Cameron  
S Fairclough  
A D S Matthews

J Niles  
Non-States Member  
M Palfrey  
Non-States Member



**PROJECT REFERENCE: 76-1297**

# **Future Electricity Demand and Supply Strategy for Guernsey**

# Contents

<b>Abbreviations</b>	<b>4</b>
<b>Glossary</b>	<b>5</b>
<b>1.0 Executive summary</b>	<b>6</b>
<b>2.0 Introduction</b>	<b>11</b>
2.1 Context and scope	11
2.2 Drivers for change and success factors	11
2.3 Strategic objectives	11
2.4 Vision for Guernsey’s future electricity system	12
2.5 Electricity strategy development process	12
<b>3.0 Guernsey’s existing electricity system</b>	<b>17</b>
3.1 Electricity demand profile	17
3.2 Electricity supply, mix and profile	18
3.3 Emissions from electricity generation	19
3.4 Electricity distribution network	20
3.5 Electricity system operation	20
3.6 Existing requirements for investment	20
<b>4.0 Future electricity demand and supply strategy and transition</b>	<b>21</b>
4.1 Future electricity supply pathway: demand, supply and pricing	21
4.2 Capital investment and operating cost profile	26
4.3 Emissions from electricity generation	31
4.4 Electricity network assessment: capacity and performance considerations	32
4.5 Future electricity system operation: skills, security and digitalisation considerations	33
<b>5.0 Initiatives to enact the future electricity demand and supply strategy</b>	<b>35</b>
5.1 Electricity demand initiatives	36
5.2 Electricity supply and network initiatives	39
5.3 Electricity transition initiatives	45
<b>6.0 Conclusions and recommendations</b>	<b>47</b>
<b>Appendix A – Technology exclusions</b>	<b>48</b>
<b>Appendix B – Key assumptions</b>	<b>49</b>
<b>Appendix C – Electricity supply mix for six possible electricity supply pathways up to 2050</b>	<b>55</b>
<b>Appendix D – Considerations for stakeholder engagement and communication</b>	<b>59</b>

## Figures

Figure 1 - Future electricity demand and supply strategy for Guernsey.....	7
Figure 2 - Peak power demand profile in 2021.....	17
Figure 3 - Electricity supply split 2021. Source: Guernsey Electricity Limited.....	18
Figure 4 - Change in Guernsey's total annual emissions 1990-2020. Source: States of Guernsey .....	19
Figure 5 - Typical GHG emissions split by source in Guernsey (2021). Source: States of Guernsey.....	20
Figure 6 - Total annual electricity demand .....	22
Figure 7 - Peak power demand projection with and without peak load management.....	23
Figure 8 - Total annual electricity import, generation and spill export .....	24
Figure 9 - Capital investment expenditure up to 2050 .....	27
Figure 10 - Annual operating expenditure up to 2050 .....	28
Figure 11 - Total expenditure up to 2050 for electricity system and whole energy system.....	29
Figure 12 - System prices for electricity system – supply pathways A and D.....	30
Figure 13 - Levelized cost per technology type.....	31
Figure 14 - Annual and total emissions in relation to 2030 and 2050 targets.....	32
Figure 15 - Electricity supply mix for six possible future electricity pathways .....	55

## Tables

Table 1 - Electricity generation technology installed nominal operational capacity.....	9
Table 2 - Average electricity system price for six possible future electricity supply pathways .....	9
Table 3 - Carbon emissions for six possible future electricity supply pathways .....	10
Table 4 - Six possible future electricity supply pathways comparing supply technologies, emissions and expenditure.....	15
Table 5 - Six possible future electricity supply pathway options ranked against Energy Policy objectives .....	16
Table 6 - GJ1 interconnector expected end-of-life .....	18
Table 7 - On-island large-scale electricity generators .....	19
Table 8 - Electricity generation technology installed nominal operational capacity.....	25
Table 9 - Technologies excluded from the future electricity supply pathway assessment.....	48
Table 10 - Electricity generation technology installed nominal operational capacity for six future electricity pathways .....	56
Table 11 - Considerations for stakeholder engagement and communication .....	59

### Document log

Version	Name	Author	Date
V0.1	Draft Strategy	Siemens PTI UK&I	17/02/2023
V1.0	Final Strategy	Siemens PTI UK&I	24/03/2023
V1.1	Final Strategy with revisions	Siemens PTI UK&I	06/04/2023
V1.2	Final Strategy with variation order revisions	Siemens PTI UK&I	27/04/2023
V1.2.1	Final Strategy with final amendments	Siemens PTI UK&I	05/05/2023
V1.2.2	Figure 3 updated	Siemens PTI UK&I	05/06/2023

## Abbreviations

£bn	Billions of pounds
£k	Thousands of pounds
£m	Millions of pounds
AC	Alternating Current
CapEx	Capital Expenditure
CHP	Combined Heat and Power
CIEG	Channel Islands Electricity Grid
CNI	Critical National Infrastructure
CO <sub>2e</sub>	CO <sub>2</sub> equivalent
DMZ	De-Militarised Zone
EDF	Électricité de France
EPC	Energy Performance Certificate
eHeating	Electric Heating
EV	Electric Vehicle
GF1	Guernsey-France interconnector
GHG	Green House Gases
GIS	Geographical Information Services
GJ1	Guernsey-Jersey1 interconnector
GW	Gigawatts
GWh	Gigawatt hours
GWh/a	Gigawatt hours per annum
GWp	Gigawatt peak
HFO	Heavy Fuel Oil
HVDC	High Voltage Direct Current
ICE	Internal Combustion Engine
IoT	Internet of Things
km	Kilometres
ktCO <sub>2e</sub>	Kilotonnes of CO <sub>2</sub> equivalent
kV	Kilovolts
kWh	Kilowatt hours
LCOE	Levelized Cost of Electricity
MW	Megawatts
MWh	Megawatt hours
MWp	Megawatt peak
N	Dispatchable on-island operating reserve to cover peak demand
N-1	Dispatchable on-island operating reserve to cover peak demand with the largest generator unavailable
N-2	Dispatchable on-island operating reserve to cover peak demand with the two largest generators unavailable
OpEx	Operational Expenditure
PV	Photovoltaics
RTE	Réseau de Transport d'Électricité
SCADA	Supervisory Control and Data Acquisition
TotEx	Total Expenditure
V	Volts
V2G	Vehicle to Grid
VPP	Virtual Power Plant
WACC	Weighted Average Cost of Capital

## Glossary

**Baseline Demand:** Actual total annual electricity demand in 2021 (GWh) supplied by Guernsey's electricity grid, which includes behind the meter generation (assumed negligible for modelling purposes with no impact on peak) and the then existing demand for electric vehicles and heating. Going forward, the baseline demand is projected forward to 2050 based on the expected change in Guernsey's population level with consideration to expected power efficiencies over time, and additional demand for newly adopted electric vehicles and heating systems is shown separately.

**Capacity Margin:** The level by which available electricity generation capacity exceeds the expected peak demand, expressed as a percentage.

**Channel Islands Electricity Grid (CIEG):** Joint company between Guernsey Electricity and Jersey Electricity that operates and manages the submarine cables between mainland Europe and the Channel Islands.

**CO<sub>2</sub> equivalent (CO<sub>2</sub>e):** Covers all greenhouse gas emissions that contribute to climate change, including carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), and refrigerant gases like hydrofluorocarbons (HFCs).

**Demand Side Management (DSM):** Digital infrastructure and tariffs that encourage consumers to reduce consumption and/or adjust the timing of electricity consumption, resulting in optimised total and/or peak electricity demand levels.

**Dispatchable Assets:** Energy generators, such as international interconnectors, thermal power plants and hydrogen fuel cells, that are responsive and can be switched on or ramped up to meet changing demand as needed. Dispatchable assets are crucial for the grid balancing, resilience and securing supply.

**Flexibility Services:** Allows consumers to be incentivised for voluntarily flexing the time when they use their energy.

**Guernsey-France (GF1) Interconnector:** Proposed new interconnector direct to France, used to import and potentially spill export surplus electricity with an expected nominal operational capacity of 100 MW.

**Guernsey-Jersey (GJ1) Interconnector:** Existing interconnector via Jersey with France, used to import electricity, with a 73 MVA rated cable and a contractual capacity of 60 MW with nominal operational capacity of 57 MW.

**Hydrogen Fuel Cell:** A generator using an electrochemical process to convert hydrogen and oxygen into electricity for dispatchable use.

**Levelized Cost of Electricity (LCOE):** The average cost required to generate one unit of electricity for a given asset (in £/MWh), including capital and operating expenditures associated with the asset used to produce the electricity.

**Non-dispatchable Assets:** Energy generators, often associated with renewable energy sources such as solar PV, wind turbines etc., that supply variable amounts of generation that needs to be balanced with the use of Dispatchable Assets.

**Renewable Energy:** Energy derived from natural sources that are replenished at a higher rate than they are consumed, including from sunlight and wind.

**Spill Export:** Excess on-island generated electricity that is sold to France via a Guernsey-France (GF1) interconnector under an assumed agreement that Guernsey Electricity Limited will be under no obligation to supply electricity at specified times. It may also be referred to as simply "Export" within the document.

**Supply Pathway:** The technologies and energy mix modelled, during the period 2021 to 2050, to meet the Island's electricity demand and the States of Guernsey's objectives, notably stated in the Energy Policy 2020-2050 and Climate Change Policy.

**System Price of Electricity:** The unit price of electricity (in £/MWh) considering all costs associated with generating, operating and maintaining the electricity system up to 2050, excluding expenditure attributed to customer services and billing, profit margins, taxes and other levies, and historical investments in electricity generation and network.

**System Price of Whole Energy System:** The unit price of electricity (in £/MWh) considering all costs associated with the System Price of Electricity mentioned above, as well as residual costs associated with the operation of non-electrified vehicle transport and heating.

**Vehicle to Grid (V2G):** Electric Vehicle (EV) charging infrastructure which allows EVs to support the grid by discharging electricity from their battery within technical and financial limits.

**Weighted Average Cost of Capital (WACC):** The percentage of average annual additional cost paid to finance the acquisition of assets based on the expected lifetime of the asset, and the weighted proportions of all sources of capital, including debt, equity, and others.



## FUTURE ELECTRICITY DEMAND AND SUPPLY STRATEGY FOR GUERNSEY

# 1.0 Executive summary

Globally, the way electricity is generated, distributed and used is changing. Transitioning from fossil-fuel dependency towards cleaner energy sources, by growing and integrating large-scale and distributed renewable technologies, is introducing complexity to once simple and linear electricity generation and distribution systems. This document sets out a realistic electricity strategy that will enable Guernsey to achieve a secure, clean and affordable electricity future for all and enable the Island to transition to net-zero.

Electricity generators and grid operators are obligated to provide dependable electricity at every moment of every day whilst navigating a rapidly changing and highly challenging energy landscape. On-boarding large-scale and distributed renewable technologies, scaling and modernising electricity grids, and enabling the electrification of transport and heat are transformational programmes that necessitate high levels of coordinated investment, planning and execution. Headwinds of energy market volatility, labour and goods shortages, and price inflation add risk to investment decisions and delivery programmes. With most of Guernsey's power generators at their original end-of-life or reaching their anticipated end-of-life, investment is required to continue with the existing electricity supply. For Guernsey, not acting will increase risk to energy security, resilience and affordability in the short-term and expose the Island to economic and climate threats over the long-term.

The States of Guernsey's Committee *for the Environment & Infrastructure*, working with Guernsey Electricity Limited as the Island's electricity supplier, commissioned Siemens to define a *future electricity demand and supply strategy* for Guernsey, which considers how best to meet the States of Guernsey's Energy Policy<sup>1</sup> 2020-2050 objectives and reduce emissions defined in the States of Guernsey's Climate Change Policy<sup>2</sup>.

Six possible future electricity supply pathways were identified, each utilising a different mix of renewable and traditional technologies with and without interconnection. In-depth techno-economic modelling of the supply pathways was conducted using digital twin software, which determined detailed energy, cost and emissions during the period 2021 to 2050, and model results were produced at five-yearly intervals.

<sup>1</sup> [Committee for the Environment & Infrastructure – Energy Policy 2020-2050 \[P.2020/47\]](#)

<sup>2</sup> [Committee for the Environment & Infrastructure – Climate Change Policy & Action Plan \[P.2020/127\]](#)

The six possible future electricity supply pathways were published in a technical consultation report<sup>3</sup> in August 2022. Following a review of consultation feedback and additional analysis by Siemens<sup>4</sup>, a **Dual Interconnectors with Offshore Wind (D)** supply pathway, which also includes solar PV growth, was selected by the States of Guernsey’s Committee for the Environment & Infrastructure for the *future electricity demand and supply strategy* and a network study. This document sets out the *future electricity demand and supply strategy* for Guernsey based on the Dual Interconnectors with Offshore Wind (D) supply pathway – a supply pathway that will most positively contribute towards the Island’s targets and priorities in connection with Energy and Climate Change policies – and identifies the necessary initiatives and next actions to enact the Strategy.

**Low carbon electricity strategy and summary benefits**

The Strategy proposes a combination of **offshore wind and solar PV deployment, coupled with an additional interconnector as the best solution** for the Island. It is recommended that this should be comprised of an offshore windfarm in the region of 65 MW, a second interconnector direct to France with 100 MW nominal operational capacity – used as the primary interconnector for electricity import and spill export – and continued solar PV growth across the Island in domestic, commercial and agricultural settings. An updated thermal power plant, which could be complemented by hydrogen fuel cells in time, should be able to provide dispatchable electricity for backup and security of supply purposes. An overview of the *future electricity demand and supply strategy* is summarised in Figure 1.

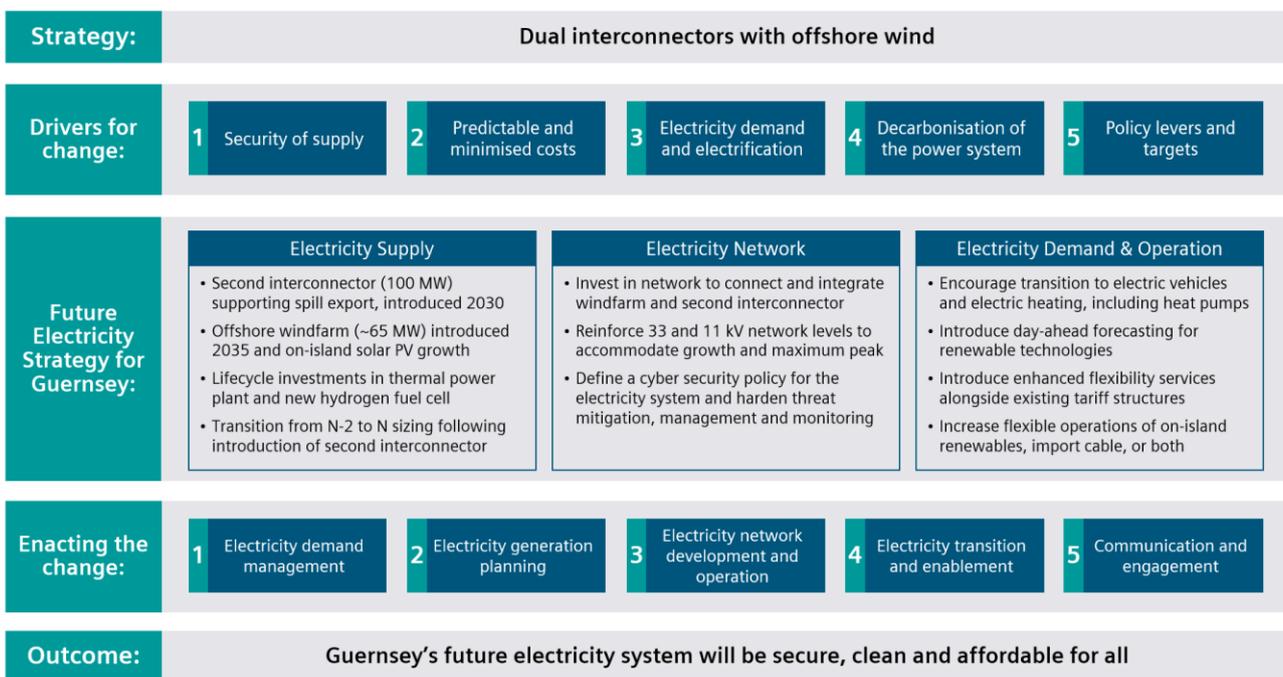


Figure 1 - Future electricity demand and supply strategy for Guernsey

In connection with the States of Guernsey’s **Energy Policy** objectives, the Dual Interconnectors with Offshore Wind (D) supply pathway ranks highly when assessed against the decarbonisation, security and resilience of supply, and economic growth objectives. In connection with the States of Guernsey’s **Climate Change Policy**, the Dual Interconnectors with Offshore Wind (D) supply pathway will significantly reduce emissions, requiring 1 ktCO<sub>2e</sub> to be offset from 2050 onwards – attributed to the electricity generation only (excluding residual use of fossil fuels in conventional vehicles and heating systems).

The **Dual Interconnectors with Offshore Wind (D) supply pathway offers the most flexibility**. It provides a realistic target to transition from the Base Case (A) supply pathway (a continuation of the existing electricity supply) and may comprise elements of other possible electricity supply pathways that were considered during the consultation process, should future circumstances necessitate a change in direction for Guernsey’s electricity supply mix.

Implementing this *future electricity demand and supply strategy* will enable Guernsey to be recognised for its commitment to low carbon electricity, facilitating the transition to net-zero and achieving a **secure, clean and affordable electricity future for all**. This will have the effect of boosting energy security, offering the potential to unlock economic growth opportunities across the Island, and playing a valuable role in protecting Guernsey’s unique surroundings for future generations.

<sup>3</sup> 2022.08.17 Electricity Strategy Technical Consultation Document (1).pdf

<sup>4</sup> 76\_1297\_SoG\_InterconnectorVariationOrderReport\_v1.01\_Final.pdf

## Electricity demand

Based on the States of Guernsey's Population and Immigration Policy Review<sup>5</sup> and using an average net-migration scenario of +300 inhabitants per year, the Island **population is expected to increase from 63.2k to close to 68.0k inhabitants** by 2050. An estimated 35% of residential and commercial heating is already electric<sup>6</sup> and 4% of cars and commercial vehicles are plug-in hybrid or electric<sup>7</sup>. By 2050, it is expected that almost all heating systems and road vehicles will be electric – projected to increase to 90% and 95% adoption levels, respectively. The possibility of higher levels of electric vehicle and electric heating system adoption was also considered when sizing electricity supply technologies.

Modelling results showed that after taking account of efficiency-related reductions in baseline demand and expected adoption of electric vehicles and heating systems, Guernsey's **electricity demand** will increase from 397 GWh (2021) to 625 GWh by 2050, a 57% increase, and the corresponding **peak power demand** will increase from 94 MW (2021) to 157 MW by 2050, a 67% increase.

## Electricity supply and sizing

Guernsey's electricity demand is currently supplied by a **single interconnector via Jersey with France**, with on-island dispatchable **oil-fired generators** that supply peak electricity demand and provide security of supply, and small-scale distributed **solar PV** installations that are installed in domestic and commercial environments.

A **Guernsey-France (GF1) interconnector with 100 MW nominal operational capacity**, active from 2030, will be the primary interconnector used to import electricity and enhance security of supply. Following the completion of offshore wind deployment in 2035, the Guernsey-France (GF1) interconnector will supply between 37% and 43% of Guernsey's electricity needs, operate for balancing and enable surplus electricity to be spill exported to France.

The existing **Guernsey-Jersey (GJ1) interconnector** will remain in place as an alternative means of supply to provide a stable and secure electricity system for Guernsey should the Guernsey-France (GF1) interconnector require planned or un-planned maintenance. Modelling assumed electricity flows across a single interconnector at any point in time. Subject to implementing the necessary commercial and operational agreements with stakeholders and applying engineering configuration changes, the simultaneous running of the interconnectors may be possible and could be explored.

Guernsey's waters offer significant offshore wind capacity potential, which provides an opportunity to generate electricity at an attractive Levelized Cost of Electricity (LCOE). An **offshore windfarm in the region of 65 MW capacity**, once fully operational in 2035, will supply between 46% and 55% of Guernsey's electricity needs.

Continued **growth in solar PV capacity**, from 2.2 MWp in 2021 to 53.7 MWp in 2050, in commercial (33.9 MWp or 63%), domestic (12 MWp or 22%) and agricultural (7.8 MWp or 15%) settings, will supply between 8% and 10% of Guernsey's electricity needs. 7.4 hectares (18.3 acres or 73.2 verges) will be required to implement solar PV in agricultural settings.

An **updated thermal power plant**, which, in the long term, could be supported by hydrogen fuel cells, will provide dispatchable generation capacity for backup and security of supply purposes, with **peak capacity sized in line with a worst-case demand scenario** to provide full resilience.

The States of Guernsey mandates Guernsey Electricity Limited to operate an on-island generation 'N-2' security of supply model, which means having sufficient on-island generation capacity available to meet peak electricity demand if the two largest generators are both unavailable<sup>2</sup>. When the Guernsey-France (GF1) interconnector is operational, it is recommended that **on-island generation security of supply sizing is reduced from N-2 to N**. This means that the capacity of the on-island dispatchable generators will only need to increase by 5% (to 157MW), despite a 57% increase (to 625 GWh) in annual electricity demand by 2050.

Electricity generation technologies with sizing and phasing for the electricity supply pathway are shown in Table 1 with additional detail shown in Table 8 and Table 10.

<sup>5</sup> [Committee for Home Affairs – Population & Immigration Policy Review \[P.2022/81\]](#)

<sup>6</sup> Information provided by Guernsey Electricity Limited

<sup>7</sup> [Guernsey Facts & Figures 2022](#)

Table 1 - Electricity generation technology installed nominal operational capacity

		Installed nominal operational capacity (MW)						
Technology		2021	2025	2030	2035	2040	2045	2050
Interconnector	Current interconnector GJ1	57	57	57	57	57	57	57
	Additional interconnector GF1	-	-	100	100	100	100	100
Renewable electricity generation	Solar PV	2	13	25	36	46	52	54
	Offshore wind	-	-	-	65	65	65	65
Dispatchable generators	Thermal power plant	149	138	138	138	91	88	97
	Hydrogen fuel cell	-	-	-	-	47	60	60
<b>Total installed capacity (MW)</b>		<b>208</b>	<b>209</b>	<b>320</b>	<b>396</b>	<b>405</b>	<b>421</b>	<b>432</b>
Dispatchable on-island capacity (% of total)		72%	66%	43%	35%	34%	35%	36%

To enable the future *electricity demand and supply strategy* for Guernsey, the 33/11kV **electricity distribution network will require reinforcements** to connect and integrate the second interconnector and offshore windfarm, and to accommodate growth in electricity demand and maximum peak demand. Flexibility services for peak load management should additionally be considered.

### Total expenditure

The Dual Interconnectors with Offshore Wind (D) supply pathway incurs **£1.73bn of total expenditure up to 2050**, which is £0.14bn (7%) lower than the Base Case (A) supply pathway (£1.87bn), and which is comprised of:

- **£625m of capital expenditure**, including £94m (6%) Weighted Average Cost of Capital (WACC) up to 2050 to cover, for example, the cost of borrowing for the offshore windfarm (38%), thermal power plant (29%), GF1 interconnector (18%)<sup>8</sup>, solar PV (8%) and hydrogen fuel cells (6%). Solar PV investments would continue to be implemented by Guernsey's homeowners, landowners and organisations, and Guernsey Electricity Limited would need to identify investment sources for the other technologies.
- **£1,103m of total operating expenditure** for the electricity system, which includes maintenance, fuel and imported electricity costs with offset revenue from spill export.

Considering a total of 15,445 GWh produced up to 2050, the **system price of electricity will average £112/MWh (11.2p/kWh)** for the Dual Interconnectors with Offshore Wind (D) supply pathway. This compares favourably with £130/MWh for the Base Case (A) supply pathway (a £18/MWh or 14% reduction) and £110/MWh for the Renewables First (C) supply pathway (a £2/MWh or 2% increase). Table 2 shows the average system price of electricity changes for six possible future electricity supply pathways.

Table 2 - Average electricity system price for six possible future electricity supply pathways

Average Electricity System Price (£/MWh)	2021	2025	2030	2035	2040	2045	2050	Overall 2021-2050
A – Base Case	75	93	131	135	152	153	156	130
B – Independence	75	90	165	129	135	135	135	126
C – Renewables First	75	89	128	111	119	119	121	110
D – Dual Interconnectors with Offshore Wind	75	89	143	113	118	116	118	112
E – Dual Interconnectors without Offshore Wind	75	89	143	138	149	147	150	129
F – Lighthouse	75	89	128	125	130	130	131	117

<sup>8</sup> WSP, Revised Cable Investment Strategy, 2018

## Total emissions

Imported electricity is already sourced from certified low carbon generators across Europe via the GJ1 interconnector and this is expected to continue when the GF1 interconnector becomes operational. An energy mix comprised of a high proportion of on-island renewables and two interconnectors means that the thermal power plant will not be required to operate routinely.

The Dual Interconnectors with Offshore Wind (D) supply pathway will produce **emissions from power generation totalling 187 ktCO<sub>2</sub>e**. This compares favourably with 1,167 ktCO<sub>2</sub>e for the Base Case (A) supply pathway (a 980 ktCO<sub>2</sub>e or 84% reduction) and 437 ktCO<sub>2</sub>e for the Renewables First (C) supply pathway (a 250 ktCO<sub>2</sub>e or 57% reduction), see Table 3.

Table 3 - Carbon emissions for six possible future electricity supply pathways

Carbon Emissions (ktCO <sub>2</sub> e)	2021	2025	2030	2035	2040	2045	2050	Total 2021-2050
A – Base Case	13	16	26	40	55	70	83	<b>1,167</b>
B – Independence	13	16	241	98	99	117	131	<b>3,028</b>
C – Renewables First	13	16	26	10	5	14	21	<b>437</b>
D – Dual Interconnectors with Offshore Wind	13	16	8	1	1	1	1	<b>187</b>
E – Dual Interconnectors without Offshore Wind	13	16	8	3	6	9	14	<b>274</b>
F – Lighthouse	13	16	26	10	5	14	21	<b>437</b>

In 2050, annual emissions of **1 ktCO<sub>2</sub>e will be released from power generation** – requiring offsetting at a cost of between £25k and £80k per year<sup>9</sup>. This compares favourably with an offsetting cost of between £2.1m and £6.6m for the Base Case (A) supply pathway and between £525k and £1.7m for the Renewables First (C) supply pathway.

Additional annual emissions of **8 ktCO<sub>2</sub>e will be released from conventional vehicles and heating systems** if 5% of vehicles and 10% of heating systems remain fossil fuel based in 2050 – requiring additional offsetting at a cost of between £200k and £640k per year.

If offsetting is not possible in future, a shortfall on achieving net-zero would require an alternative intervention, such as generating more renewable energy than is being consumed.

## Initiatives to enact the future electricity demand and supply strategy and immediate next actions

The successful implementation of the *future electricity demand and supply strategy* will require a multi-year programme that includes electricity demand, supply and transition enablement initiatives. Integrated workstreams and initiatives, supported with an extensive and ongoing stakeholder communication and engagement plan, will need to bring together key industry players on the Island with off-island technology and delivery specialists. Initiatives to be included in each workstream, each with a step-by-step sequence of activities, are set out in section 5.0 Initiatives to enact the future .

Prompt decisions and priority actions are required to initiate the *future electricity demand and supply strategy* for Guernsey. Within the next six months, the following initiatives should be initiated and expedited:

1. Communicate the *future electricity demand and supply strategy* for Guernsey to key **stakeholder groups**, along with a clear call to action for their participation.
2. Decide how a **second interconnector** should be contracted, initiate commercial negotiations and commence preliminary works.
3. Develop a procurement strategy, process and timeline for an **offshore windfarm**, commission a detailed feasibility study and engage with offshore wind developers.
4. Develop a programme for the phased replacement of **thermal power plant** assets.
5. Initiate a **multi-year programme** of works to implement the Strategy, along with a structured engagement with Energy Partnership organisations and a communication plan covering key stakeholder groups.
6. Carry out **skills and experience** gap analysis and consider options to develop, attract and procure the necessary skills and experience for each stage of the Strategy.

<sup>9</sup> Costs based on low (~£25) to high (~£80) estimates per tonne CO<sub>2</sub>. Ref: [Future Demand, Supply and Prices for Voluntary Carbon Credits – Keeping the Balance](#)

## FUTURE ELECTRICITY DEMAND AND SUPPLY STRATEGY FOR GUERNSEY

# 2.0 Introduction

Globally, the way electricity is generated, distributed and used is changing. Transitioning from fossil-fuel dependency towards cleaner energy sources, by growing and integrating large-scale and distributed renewable technologies, is introducing complexity to once simple and linear electricity generation and distribution systems.

The Island of Guernsey, located in the English Channel 48 kilometres (30 miles) west of Normandy, France, is home to approximately 63,000 inhabitants. The Island's electricity demand is primarily supplied by an interconnector from France via Jersey, supported by on-island dispatchable oil-fired generators, with small-scale distributed solar PV installations in domestic and commercial environments.

This document sets out a future electricity supply pathway – Dual Interconnectors with Offshore Wind – for Guernsey that will contribute positively to the Island's ambitions and targets in connection with Energy and Climate Change policies, and identifies the necessary initiatives and next actions to enact the future electricity supply pathway.

## 2.1 Context and scope

The States of Guernsey's Committee for the Environment & Infrastructure commissioned Siemens to develop a *future electricity demand and supply strategy* for Guernsey, aligned to the States of Guernsey's Energy Policy and Climate Change Policy objectives. A consultation report, highlighting six possible future electricity supply pathways, was presented to stakeholders. After shortlisting two leading scenarios and additional analysis undertaken by Siemens<sup>10</sup>, the 'Dual Interconnectors with Offshore Wind (D)' supply pathway was chosen as the preferred supply pathway by the States of Guernsey's Committee for the Environment & Infrastructure.

The purpose of this document is to set out the nature of the Dual Interconnectors with Offshore Wind (D) supply pathway, along with its sizing and performance characteristics, and further set out initiatives and actions that are necessary to enact the supply pathway.

The scope of this document considers technologies, expenditure and emissions in connection with the Dual Interconnectors with Offshore Wind (D) supply pathway – considering Guernsey's existing and future electricity demand, existing and future electricity supply (generation, import, storage, spill export, management) and initiatives to enact the supply pathway. The scope does not concern itself with market structures e.g., ownership, competition, regulation, trading, tariffs etc., which is covered in PwC's Electricity Market Framework assessment<sup>11</sup>.

## 2.2 Drivers for change and success factors

Working to mitigate the effects of and adapting to the impacts of climate change is a global challenge and the need for urgent and meaningful action on climate change is widely recognised.

The decarbonisation of the whole energy system means that electricity systems must move away from a dependence on fossil fuels toward large-scale and decentralised, and digitally enabled electrification technologies – meeting existing baseline electricity demand and enabling the electrification of road vehicles and heat in buildings.

For Guernsey and its citizens, this unprecedented transition presents challenges – notably a significant investment in infrastructure assets and risks associated with change over a lengthy period. However, it also presents opportunities to diversify electricity sources at a reduced Levelized Cost of Electricity (LCOE), grow the Island's economy, and contribute to achieving Guernsey's targets and objectives – as set out in Energy and Climate Change policies.

## 2.3 Strategic objectives

The Energy Policy requires, by 2050 at the latest, most of Guernsey's energy supplies to come from clean, low carbon sources with residual emissions offset. The *future electricity demand and supply strategy* for Guernsey will need to balance the following objectives:

<sup>10</sup> 76\_1297\_SoG\_InterconnectorVariationOrderReport\_v1.01\_Final.pdf

<sup>11</sup> PwC, Further analysis of a proposed electricity market framework – Final Version, March 2023

- Decarbonisation
- Security and resilience of supply
- Greater energy independence
- Consumer value and choice
- Equity and fairness
- Supportive of a vibrant economy

The Island's Climate Change Policy sets a target for whole-island emissions to be carbon neutral by 2050 and sets an interim target to reduce emissions by 57% on 1990 levels by 2030.

The States of Guernsey's Committee for the Environment & Infrastructure has an ambition to increase renewable generation locally and is proposing targets of 5 MW of installed solar PV capacity by 2025 and 10 MW by 2028.

With approximately 5.4% of Guernsey's CO<sub>2</sub>e emissions attributed to electricity generation, reducing emissions in the power generation sector will require investment in electricity supply technologies that are from renewable sources.

## 2.4 Vision for Guernsey's future electricity system

**Guernsey's future electricity system will be secure, clean and affordable for all.**

Guernsey will be recognised for its commitment to low carbon electricity, facilitating the transition to net-zero and achieving a secure, clean and affordable electricity future for all. The future electricity system will not only boost energy security but offer the potential to unlock economic growth opportunities across the Island, and play a valuable role in protecting Guernsey's unique surroundings for future generations.

Guernsey's growing electricity demand will be matched with renewable capacity that is derived from large-scale renewable energy and/or other low carbon systems, with flexible services introduced to help match electricity demand and supply.

Base and peak load electricity demand will be balanced with the use of subsea interconnector cables that provide technical import resilience and may offer opportunities for spilling excess electricity generated back to France.

A modernised and more efficient thermal plant will offer last-resort dispatchable generation and could provide back-up power services for uses such as datacentres.

## 2.5 Electricity strategy development process

Following a discovery process that involved data gathering, literature review and stakeholder workshops, a digital-twin modelling tool was used to select and size suitable technologies that were cost-optimal – considering lifetime capital, operating, fuel and electricity costs. Some technologies and fuel sources were considered and excluded during the study and were not modelled due to restricted availability, technical limitations, or excessively high costs (see Table 9 in Appendix A).

Six possible future electricity supply pathway options between 2021 and 2050 were assessed against the Energy Policy objectives and published in August 2022 as part of a technical and targeted stakeholder exercise, which included representatives from the local energy industry. The six possible supply pathways were:

- Base Case:** A continuation of the existing electricity supply with maintenance and like-for-like replacement of assets.
- Independence:** A strong focus on Island energy independence with no international electricity interconnector.
- Renewables First:** Scaled on/off-shore renewable generation with the current Guernsey-Jersey (GJ1) interconnector.
- Dual Interconnectors with Offshore Wind (chosen supply pathway):** Investment in offshore wind and an additional interconnector direct to France (GF1), providing capacity, security of supply and spill export.
- Dual Interconnectors without Offshore Wind:** The current Guernsey-Jersey (GJ1) interconnector plus a second Guernsey-France (GF1) for improved security of supply as the primary source of electricity supply.
- Lighthouse:** A complementary scenario that involves strategic investment in innovative energy technologies, such as tidal, to develop economic growth opportunities.

For the six possible future electricity supply pathway options that were published in the technical consultation<sup>12</sup>, suitable electricity supply technologies were selected, an electricity supply mix was modelled over a time series, and comparative emissions and total expenditure were derived for each future electricity supply pathway option. Each supply pathway option

<sup>12</sup> 2022.08.17 Electricity Strategy Technical Consultation Document (1).pdf

was assessed for its contribution towards achieving the objectives of the Energy Policy and the targets set out in the Climate Change Policy.

Following a review of consultation feedback, the Committee *for the Environment & Infrastructure* shortlisted two of the six possible future supply pathways – Renewables First (C) and Dual Interconnectors with Offshore Wind (D). Further information was requested to compare the advantages, disadvantages and risks of each shortlisted scenario and identify how well they would respond if several external ‘what-if’ circumstances occurred. Following a review of the further information that was provided, the Committee selected a preferred supply pathway – Dual Interconnectors with Offshore Wind (D).

Sensitivity analysis was carried out to ascertain impacts to the Dual Interconnectors with Offshore Wind (D) supply pathway under a range of high and low demand, supply and price scenarios. In parallel, a network study was conducted to model the Island’s electricity network in further detail and understand what upgrades will be needed to implement the Dual Interconnectors with Offshore Wind (D) supply pathway.

Following changes to the configuration parameters in the digital-twin modelling for the Dual Interconnectors with Offshore Wind (D) supply pathway, the model results of the other possible future supply pathways were updated to allow a direct comparison (see Appendix B for key assumptions that have been used in the digital-twin modelling). Key changes to configuration parameters included:

- Higher population level.
- Reduced uptake of electric vehicles and electric heating systems.
- Quicker uptake of solar PV installed capacity.
- Higher capital expenditure for the offshore windfarm, a 5-year deployment delay and a single capacity calculation.
- Increased weighted average cost of capital applied to all capital expenditure.

With the updated parameters applied, the capacities, expenditures and emissions for all six possible future electricity supply pathways differ from those originally presented in the technical consultation report<sup>13</sup>. Based on the updated parameters:

- The Independence (B), Renewables First (C), Dual Interconnectors with Offshore Wind (D) and Lighthouse (F) supply pathways now have a reduced proportion of wind generation, and all supply pathways have a higher reliance on external energy sources.
- Grid-scale battery storage is no longer economically viable in the Independence (B), Renewables First (C) and Lighthouse (F) supply pathways, which is because the amount of excess renewable electricity has reduced significantly.
- The Renewables First (C) supply pathway remains the lowest with regards to total expenditure up to 2050 and the difference, compared to the Dual Interconnectors with Offshore Wind (D) supply pathway, has increased.
- The Dual Interconnectors with Offshore Wind (D) supply pathway is now the only supply pathway with annual emissions of 1 ktCO<sub>2e</sub> in 2050, which is at least 20 ktCO<sub>2e</sub> less than supply pathways without a second interconnector
- The Dual Interconnectors with Offshore Wind (D) supply pathway continues to provide access to the most diverse number of supply sources and avoids an interconnector single point of failure risk.
- The Dual Interconnectors with Offshore Wind (D) supply pathway remains the one with the highest level of supply capacity and is best able to meet projected population growth.

The total expenditure has increased for all supply pathways due to the projected growth in demand and higher cost of capital. The values in Table 4 show the expenditure associated with the electricity system and excludes cost of residual fuels for operating conventional vehicle transport and heating systems. The Dual Interconnectors with Offshore Wind (D) supply pathway remains the second lowest in terms of total expenditure, and will now be £110m (or 6.8%) higher compared to the least expensive supply pathway up to 2050, which is the Renewables First (C) supply pathway.

The Dual Interconnectors with Offshore Wind (D) and Dual Interconnectors without Offshore Wind (E) supply pathways both now meet the 57% target reduction in GHG emissions by 2030 if other emission sources remain unchanged, which is due to the earlier assumed deployment of on-island solar PV. Delaying offshore windfarms to become operational in 2035 means that all other supply pathways will not be able to meet this target (see Figure 15 in Appendix C).

With regards to security of supply, the N-sizing considerations per supply pathway have not changed, as shown in Table 5. The increased population growth together with the higher capital cost for offshore wind increases the amount of imported electricity and fuels required to operate Guernsey’s electricity system. The Dual Interconnectors with Offshore Wind (D) remains the most independent supply pathway with 284 GWh (previously 170 GWh) of imported energy in 2050.

<sup>13</sup> 2022.08.17 Electricity Strategy Technical Consultation Document (1).pdf

The change in population growth projection increased the total supply capacity required in all supply pathways. The Dual Interconnectors with Offshore Wind (D) remains the supply pathway with the highest level of capacity at 432.2 MW (previously 430.7 MW) in 2050 (see Table 10 in Appendix C), which will best support a higher population growth and electrification rate and avoid a need to use the thermal power plant to meet the associated increase in peak power demand up to 2050.

The Dual Interconnectors with Offshore Wind (D) supply pathways continues to be the recommended electricity supply pathway. It best meets the Energy Policy and Climate Change Policy objectives as shown in Table 5 by notably providing access to the most diverse number of supply sources, including a higher rated interconnector to meet increased peak power demand up to 2050, and producing the lowest level of emissions.

As a result of the process, changes and deliverables summarised in the preceding paragraphs, this document – a *future electricity demand and supply strategy* for Guernsey – sets out how Guernsey’s strategic objectives can be achieved with the Dual Interconnectors with Offshore Wind (D) supply pathway, together with sizing and expenditure, and recommended initiatives and actions.

Table 4 - Six possible future electricity supply pathways comparing supply technologies, emissions and expenditure

		Base Case	Independence	Renewables First	Dual Interconnector + O/S Wind	Dual Interconnector - O/S Wind	Lighthouse
		A	B	C	D	E	F
Interconnector	GJ1 (Current)	•		•	•	•	•
	GF1 (New)				•	•	
Renewable electricity generation	Solar PV	•	•	•	•	•	•
	Offshore wind		•	•	•		•
	Tidal stream						•
Energy storage	Grid-scale battery <sup>14</sup>						
	Hydrogen		•	•			•
Dispatchable generators	Thermal power plant	•	•	•	•	•	•
	Hydrogen fuel cell		•	•	•		•
Emissions from electricity system <sup>15</sup>	2030 emissions (ktCO <sub>2</sub> e / year)	26	241	26	8	8	26
	2050 emissions (ktCO <sub>2</sub> e / year)	83	131	21	1	14	21
	Range of 2050 annual offsetting costs <sup>16</sup>	£2.1m-£6.6m	£3.3m-£10.5m	£525k-£1.7m	£25k-£80k	£350k-£1.1m	£525k-£1.7m
Expenditure for electricity system (up to 2050) <sup>17</sup>	Capital expenditure <sup>18</sup>	£380m	£640m	£510m	£630m	£420m	£590m
	Operating expenditure <sup>19</sup>	£1,540m	£1,250m	£1,110m	£1,100m	£1,490m	£1,150m
	<b>Total expenditure (excl. carbon offsetting)</b>	<b>£1,910m</b>	<b>£1,890m</b>	<b>£1,620m</b>	<b>£1,730m</b>	<b>£1,910m</b>	<b>£1,730m</b>

<sup>14</sup> Grid-scale battery storage was included in the modelling for the Independence (B), Renewables First (C) and Lighthouse (F) supply pathways but model results with the updated assumptions showed that they are no longer economically viable

<sup>15</sup> Emissions values are for power generation only. Note that emissions from residual use of conventional heating and vehicles are equal in all pathways, i.e., 96 ktCO<sub>2</sub>e in 2030 and 8 ktCO<sub>2</sub>e in 2050

<sup>16</sup> Costs based on low (~£25) to high (~£80) estimates per tonne CO<sub>2</sub>. Ref: [Future Demand, Supply and Prices for Voluntary Carbon Credits – Keeping the Balance](#)

<sup>17</sup> All figures rounded to the nearest £10m

<sup>18</sup> Values shown include 6% WACC for the asset life up to 2050

<sup>19</sup> Including equipment operating expenditure, and fuel and electricity import costs. Note that operational expenditure from residual use of conventional heating and vehicles are equal in all pathways, i.e., £560m in 2050

Table 5 - Six possible future electricity supply pathway options ranked against Energy Policy objectives

	Base Case	Independence	Renewables First	Dual Interconnector + O/S Wind	Dual Interconnector - O/S Wind	Lighthouse
	A	B	C	D	E	F
Decarbonisation	Rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
	Key points	<ul style="list-style-type: none"> <li>High emissions from fossil fuel thermal power plant – 83 ktCO<sub>2</sub>e / year in 2050</li> </ul>	<ul style="list-style-type: none"> <li>Despite renewable generation, very high emissions from fossil fuel thermal power plant – 131 ktCO<sub>2</sub>e / year in 2050</li> </ul>	<ul style="list-style-type: none"> <li>Low 2050 emissions (21 ktCO<sub>2</sub>e / year) due to local generation and import of renewable electricity</li> </ul>	<ul style="list-style-type: none"> <li>Very low 2050 emissions (1 ktCO<sub>2</sub>e / year) due to local generation and import of renewable electricity</li> </ul>	<ul style="list-style-type: none"> <li>Low 2050 emissions (14 ktCO<sub>2</sub>e / year) due to import of low carbon electricity</li> </ul>
Security and resilience of supply	Rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
	Key points	<ul style="list-style-type: none"> <li>GJ1 is a single point of connection failure risk</li> <li>Least amount of capacity installed in 2050</li> <li>Needs to operate with back-up thermal power plant (N-2)</li> </ul>	<ul style="list-style-type: none"> <li>No interconnector</li> <li>Reliant on thermal power plant for system balancing (N-2) – geopolitical risk</li> <li>Moderate level of hydrogen storage</li> </ul>	<ul style="list-style-type: none"> <li>GJ1 is a single point of connection failure risk</li> <li>Back-up thermal power plant (N-1)</li> </ul>	<ul style="list-style-type: none"> <li>Interconnectors result in the avoidance of single point of connection failure, but still exposed to geopolitical risks</li> <li>Back-up thermal power plant (N)</li> </ul>	<ul style="list-style-type: none"> <li>Interconnectors avoid single point of connection failure but still exposed to geopolitical risks</li> <li>Back-up thermal power plant (N)</li> <li>No native energy generation capability</li> </ul>
Greater energy independence	Rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
	Key points	<ul style="list-style-type: none"> <li>Reliant on 419 GWh/a imported electricity (via GJ1) and 361 GWh/a of fuels to meet demand</li> </ul>	<ul style="list-style-type: none"> <li>High proportion of renewable energy self-generation</li> <li>Reliant on 608 GWh/a of imported fuels to balance supply-demand</li> </ul>	<ul style="list-style-type: none"> <li>High proportion of renewable energy self-generation</li> <li>Reliant on 248 GWh/a imported electricity and 109 GWh/a of fuels to balance supply-demand</li> </ul>	<ul style="list-style-type: none"> <li>High proportion of renewable energy self-generation</li> <li>Reliant on 284 GWh/a imported electricity balance supply- demand</li> </ul>	<ul style="list-style-type: none"> <li>Heavily reliant on imported electricity – 538 GWh/a</li> </ul>
Consumer value and choice	Rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
	Key points	<ul style="list-style-type: none"> <li>Access to European energy markets</li> <li>Highest cost per kWh</li> </ul>	<ul style="list-style-type: none"> <li>Limits choice and ability to purchase energy from European markets</li> <li>Stronger internal market due to hydrogen storage</li> <li>High cost per kWh</li> </ul>	<ul style="list-style-type: none"> <li>Access to European energy markets</li> <li>Access to local renewable energy generation</li> <li>Lowest cost per kWh</li> </ul>	<ul style="list-style-type: none"> <li>Access to European energy markets</li> <li>Access to local renewable energy generation</li> <li>Low cost per kWh generated</li> </ul>	<ul style="list-style-type: none"> <li>Access to European energy markets</li> <li>Little access to local renewable energy generation</li> <li>High cost per kWh</li> </ul>
Equity and fairness	Rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
	Key points	Objective is dependent on market structure				
Supportive of a vibrant economy	Ratings	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
	Key points	<ul style="list-style-type: none"> <li>High total expenditure with very high operational costs</li> </ul>	<ul style="list-style-type: none"> <li>High total expenditure with high capital costs for renewables and moderate</li> <li>Wider economic benefits – novel industries</li> </ul>	<ul style="list-style-type: none"> <li>Low total expenditure with moderate capital cost and low operational costs</li> </ul>	<ul style="list-style-type: none"> <li>Moderate total expenditure with high capital cost and low operational costs</li> <li>Enables growth in population and offshore electricity projects</li> </ul>	<ul style="list-style-type: none"> <li>High total expenditure with very high operational costs</li> <li>Enables growth in population and future offshore electricity projects</li> </ul>

## FUTURE ELECTRICITY DEMAND AND SUPPLY STRATEGY FOR GUERNSEY

## 3.0 Guernsey's existing electricity system

Guernsey's electricity demand is primarily supplied by a single interconnector via Jersey from France, supported by on-island dispatchable oil-fired generators, and with small-scale distributed solar PV installations in domestic and commercial environments.

Emissions from power generation significantly reduced in 2001 when a 60 MW interconnector, GJ1, was commissioned to supply low carbon electricity supply from France via Jersey. The subsea section of the GJ1 interconnector was replaced in 2019 and the land-based assets of the GJ1 interconnector are halfway through their anticipated life. This supply is considered very low carbon as procured generation is entirely from certified renewable energy sources. With approximately 5.4% of the Island's emissions currently attributed to electricity generation, more action is required to further reduce emissions.

When electricity demand exceeds the import capacity of the interconnector, mainly during winter months and at peak times, on-island power generators are utilised. Most of the Island's thermal power plant generators are at their original end of life or reaching their anticipated end of life.

The Island's electricity transmission and distribution network is comprised of a 33kV transmission system connecting five key 33/11kV substations. From those substations, power is distributed to numerous small 11kV/415V substations from which power is distributed to customers. The electricity system is comprised entirely of underground cable circuits.

Energy resilience and security is a concern for the Island. Guernsey Electricity Limited operates an on-island generation 'N-2' security of supply model, which means that if the interconnector is unavailable, on-island generators can meet peak demand and additional generators are available as a back-up in case of the two largest generators failing or during periods of longer running when downtime for maintenance is required.

### 3.1 Electricity demand profile

The Island of Guernsey has an area of approximately 24 square miles. The Island is home to 63,155 inhabitants, 27,206 residential buildings and 18,030 companies<sup>20</sup>. It is estimated that 35% of residential and commercial heating is electric and 4% of cars and commercial vehicles are plug-in hybrid or electric.

Guernsey's electricity demand profile varies with the seasons and, using 2021 as a recent indicative year, this is shown in Figure 2. Peak demand generally occurs during the colder winter months, when demand for heating is at its maximum, which reached 94 MW in 2021. In the warmer summer months, the power demand remains consistently below the GJ1 interconnector's capacity, with the lowest peak being 37 MW. A baseload power demand of 22 MW was observed, which includes electrical consumption that is needed all year round, such as for industrial processes or appliances.

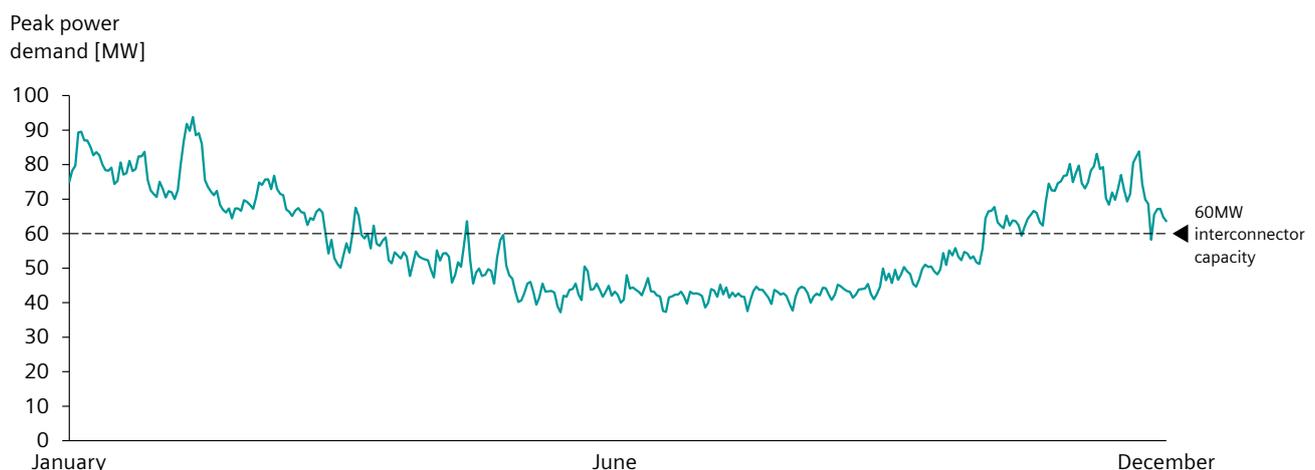


Figure 2 - Peak power demand profile in 2021

<sup>20</sup> [Guernsey Facts & Figures 2021](#)

### 3.2 Electricity supply, mix and profile

Most of Guernsey’s electricity is supplied by an interconnector from France via Jersey (‘GJ1’). The GJ1 cable is rated at 73 MVA with the contracted import level currently set at 60 MW and without an export arrangement. When import capacity is exceeded, mainly during winter months, on-island power generators are utilised to meet the Island’s peak electricity demand. There are low levels of solar PV generation capacity on the Island, which is estimated to be ~2 MW, making up less than 0.1% of the total supply mix. Figure 3 shows the composition of total demand in 2021.

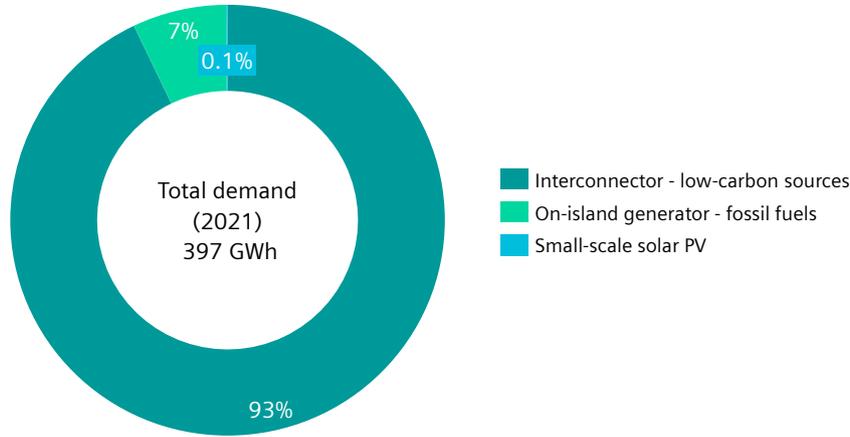


Figure 3 - Electricity supply split 2021. Source: Guernsey Electricity Limited – Hourly Demand Data

Guernsey’s GJ1 electricity supply forms part of the Channel Islands Electricity Grid (CIEG) which also includes three subsea cables (N1, N2 and N3) that connect Jersey to France. This supply is very low carbon as generation is entirely from certified low carbon energy sources. The GJ1 subsea cable was replaced in 2019. The operational lifetime of GJ1 will exceed 2050 with lifecycle maintenance and replacement investments required to plant and switchgear by 2040 (see Table 6).

Table 6 - GJ1 interconnector expected end-of-life

Connection	Land cable	Plant and switchgear	Sea cable
GJ1	Beyond 2050	2040	Beyond 2050
N1	Beyond 2050	2040	Beyond 2050
N2	Beyond 2050	2040	2035
N3	Beyond 2050	Beyond 2050	Beyond 2050

Most of the Island’s large power generators are at their original end-of-life or reaching their anticipated end-of-life and the need for replacement is imminent (see Table 7). The intermittent requirement for running the power generator assets over the past 20 years, since the cable was installed, has allowed the life of these assets to be extended. However, there is an increasing risk of unavailability as they run beyond their retirement dates. To maintain the security of supply, a decision on future power sources is of critical importance.

Table 7 - On-island large-scale electricity generators

Type	ID	Operating capacity (MW)	Fuel type	Anticipated end-of-life	Energy generated in 2021 (MWh)
Reciprocal engine	1C	11	HFO	2025	18
	2C	11	HFO	2025	213
	3C	11	HFO	2025	680
	4C	12	HFO	2025	4
	1D	12	HFO	2030	477
	2D	16.7	HFO	2037	12,411
	3D	16.7	HFO	2042	8,150
Gas turbine	GT2	18.5	Gas Oil	2040	3
	GT3	18.5	Gas Oil	2040	24
	GT4	10.5	Gas Oil	2040	253

Guernsey Electricity Limited operates an on-island generation ‘N-2’ security of supply model, which means that if the interconnector becomes unavailable as well as the two largest on-island generators, the peak demand can be met with the remaining generators.

### 3.3 Emissions from electricity generation

There has been steady progress toward the 2030 and 2050 targets, as set out in the Climate Change Policy (Figure 4). In 2001, overall emissions significantly reduced because of a low carbon electricity supply from France via Jersey. However, more action is required to further reduce emissions. The *future electricity demand and supply strategy* must enable Guernsey to meet its decarbonisation commitment and ensure that future infrastructure and service provision meets the needs of stakeholders on the Island – as set out in the Energy Policy.

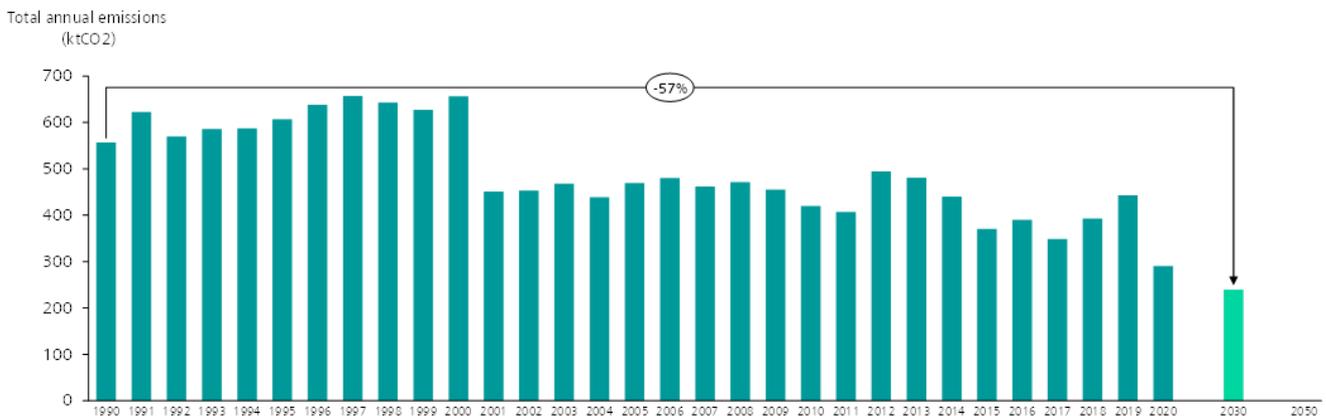


Figure 4 - Change in Guernsey’s total annual emissions 1990-2020. Source: States of Guernsey

Emissions values vary year-on-year depending on consumption profiles. It is estimated that 5.4% of total Island emissions are attributed to electricity generation (see Figure 5).

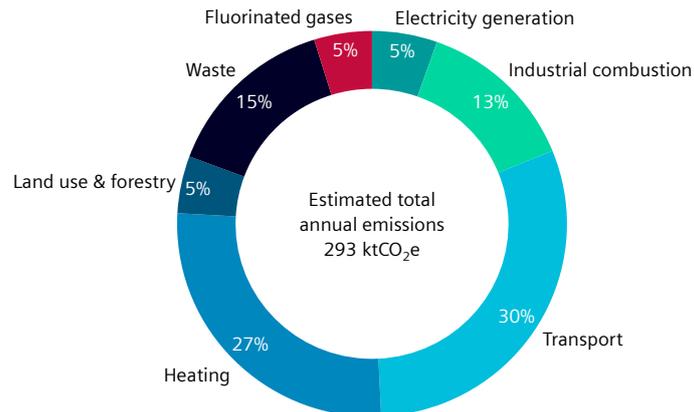


Figure 5 - Typical GHG emissions split by source in Guernsey (2021). Source: States of Guernsey

### 3.4 Electricity distribution network

The distribution network is a conventional high-integrity network comprising 33kV and 11kV 3-phase 50Hz AC cable networks supplying customers mostly at low voltage (400/230V AC). The network is slightly unusual in that it contains no overhead line circuits, and this contributes towards its resilience to adverse weather events such as storm conditions and vegetation growth.

The network is of an interconnected nature, meaning that each electrical demand centre is generally supplied from at least two or more cables or substations. This arrangement enhances the security of supply seen by individual demand centres and facilitates the regular and safe maintenance of substation equipment and cable circuits without the requirement to disconnect consumer supplies on a frequent basis. It also enhances the network's ability to accommodate changes in demand profiles over time, and the connection of embedded generation (e.g., solar PV). However, it is likely that the distribution network will require extension and reinforcement over the coming years to accommodate the anticipated large-scale adoption of electric vehicles, electric heating and renewable generation.

Guernsey's electricity network is interconnected with Jersey via the GJ1 sub-sea cable, which is a 73 MVA rated cable with a contractual limit to transfer up to 60 MW of power. Further subsea cables connect Jersey to France. The Guernsey-Jersey and Jersey-France cables are technically capable of power transfer in either direction (e.g., import or export of power to/from Guernsey), but commercial and operational limitations prevent the use of the Jersey interconnector for the export of power from Guernsey. This limitation could be removed subject to implementing the necessary commercial and operational agreements with stakeholders and applying engineering configuration changes – with engineering changes including modifications to the protection system.

### 3.5 Electricity system operation

The existing electricity system is operated in such a way as to minimise the cost of electricity supplied to consumers. The on-island electrical demand is generally satisfied by imports on the GJ1 cable, but this is supplemented by on-island dispatchable generation (fossil-fuelled) when required, such as for periods when the electrical demand on the Island exceeds the technical or commercial capability of the GJ1 interconnector for any period of time.

Guernsey Electricity Limited maintains sufficient on-island dispatchable generation to satisfy the Island's entire power demand should the Jersey interconnector, or Jersey-France interconnectors, be unavailable or constrained for any technical or commercial reason. In this way, the security of supply for Guernsey is maintained at its current level, in line with international standards and norms.

Tariff incentives have been put in place by Guernsey Electricity Limited to help manage the electricity demand profile and shift consumption from peak times. For example, the Economy12 tariff incentivises use outside of peak demand hours.

### 3.6 Existing requirements for investment

Guernsey Electricity Limited has an ongoing programme of maintenance and replacement for all its equipment. Irrespective of any of the demand and generation developments presented in this report, the following key works will be needed:

- Investment in network upgrades and replacement of existing network infrastructure.
- Maintenance and replacement of on-island equipment associated with the GJ1 interconnector.
- Replacement of end-of-life dispatchable generation (diesel and/or gas turbine) sets.
- Extension of the 33kV network.

## FUTURE ELECTRICITY DEMAND AND SUPPLY STRATEGY FOR GUERNSEY

## 4.0 Future electricity demand and supply strategy and transition

Guernsey can decarbonise its electricity system by investing in renewable generation. Large-scale offshore wind and solar PV deployment, coupled with additional interconnection offers the best solution for the Island because it offers diverse and secure electricity supply, using proven technologies that will result in an overall lower system price of electricity. The **Dual Interconnectors with Offshore Wind (D)** supply pathway, comprised of large-scale offshore wind, second interconnector and continued solar PV growth, ranks highly when assessed against the decarbonisation, security and resilience of supply, and economic growth objectives of the Energy Policy.

The Dual Interconnectors with Offshore Wind (D) supply pathway involves installing an offshore wind array (in the region of 65 MW capacity) and a second interconnector (100 MW nominal operational capacity, bi-directional) direct to France, with continued solar PV growth across the Island in domestic (rooftop), commercial (rooftop and car parks) and agricultural/horticultural (ground-mount) settings. An updated thermal power plant with improved efficiency provides dispatchable generators for backup and security of supply purposes and the use of alternative fuels and hydrogen fuel cells later in the supply pathway timeline should be considered.

An additional interconnector provides increased dispatchable supply capacity and a high level of security of supply, particularly when complemented with traditional thermal power plant or hydrogen fuel cell generators. Whilst the interconnector also provides an opportunity to spill export surplus generation from renewables, this is not a requirement for its financial viability. Guernsey's waters offer significant wind capacity potential, which provides an opportunity to generate electricity at an attractive Levelized Cost of Electricity (LCOE). A feasibility study of offshore windfarm potential identified eight near- and far-shore 30 MW array options, each with 5 x 6 MW turbines<sup>21</sup>. The Island is also open to exploring opportunities with other local jurisdictions to install more than 500 MW of offshore wind capacity in Guernsey's waters, which would exceed the Island's electricity demands.

The Dual Interconnectors with Offshore Wind (D) supply pathway ranks highly when assessed against the decarbonisation, security and resilience of supply, and economic growth objectives of the Energy Policy (see Table 5 in Section 2.5) and contributes towards achieving the targets set out in the Climate Change Policy.

The Dual Interconnectors with Offshore Wind (D) supply pathway offers the most flexibility. It provides a realistic target to transition from the Base Case (A) supply pathway and may comprise elements of the Renewables First (C), Dual Interconnectors without Offshore Wind (E) and Lighthouse (F) supply pathways, should future circumstances necessitate a change in direction for Guernsey's electricity supply mix. Changes in circumstances, for example, might include windfarm construction at even greater capacity levels, unforeseen tariff structures on Guernsey-France (GF1) interconnector, or technology advances significantly improving the commercial viability of emerging solutions, such as tidal and hydrogen etc.

In the following sections, the composition of the Dual Interconnectors with Offshore Wind (D) supply pathway is set out over a time series, including capacities, mix, expenditure and emissions. Consideration is also given to demand, supply and price sensitivities, all of which have been derived from digital-twin modelling and techno-economic analysis.

### 4.1 Future electricity supply pathway: demand, supply and pricing

#### Electricity demand, peak and flexibility

From a starting population of 63,155 inhabitants in 2021, the Island's population, with an average net-migration level of +300 per year, is expected to total 68,000 inhabitants by 2050 - as presented in the States of Guernsey's Population and Immigration Policy Review (2022) forecast<sup>22</sup>. Based on the expected change in population, electricity demand is predicted to increase by 57% up to 2050, caused by population growth and the electrification of road transport and heating systems, with an underlying efficiency-related decline in baseline demand (see Figure 6). It is expected that almost all residential and commercial heating systems and road vehicles, such as cars, vans, buses, and light goods vehicles, will be electric by 2050.

<sup>21</sup> [Xodus Group, Offshore Wind – Preliminary Feasibility – Final Report, L500042-500, 2016](#)

<sup>22</sup> [Committee for Home Affairs – Population & Immigration Policy Review \[P.2022/81\]](#)

Traditionally, electricity is supplied to customers to power appliances, consumer electronics, lighting, and ventilation systems, as well as other equipment. Although many electrical appliances are becoming more efficient and using less energy, the electrification of other aspects of daily life will increase demand significantly, most notably the adoption of electric vehicles (EVs) and electric heating (eHeating). In addition, the baseline demand will vary with population changes. Figure 6 illustrates current usage and how projected trends will impact energy demand up to 2050. Electricity demand is expected to increase by 57% and, as a result, will require new electricity generation capacity.

The baseline demand in 2021 includes the charging of approximately 1,178 electric vehicles, motorcycles, and light vans present in Guernsey<sup>23</sup>, as well as the heating of an estimated 35% of properties that already have electric heating systems<sup>24</sup>. Based on a +300 net-migration scenario and assumed efficiency savings of up to 14%, the baseline demand is expected to reduce by 29 GWh over the coming years - attributed to thermal efficiency improvements in new and existing buildings, technical advances in appliances, equipment and lighting, and adoption of intelligent controls for power and heat.

The EV and eHeating load growth forecast takes account of forward-looking change in rolling stock and building services equipment, with the underlying assumption that, by 2050, 95% of cars and 90% of heating systems will be electric. More than 20% of the eHeating demand will be from heat pumps. As a result, 85 GWh and 172 GWh of electricity will be required to charge EVs and power eHeating systems, respectively.

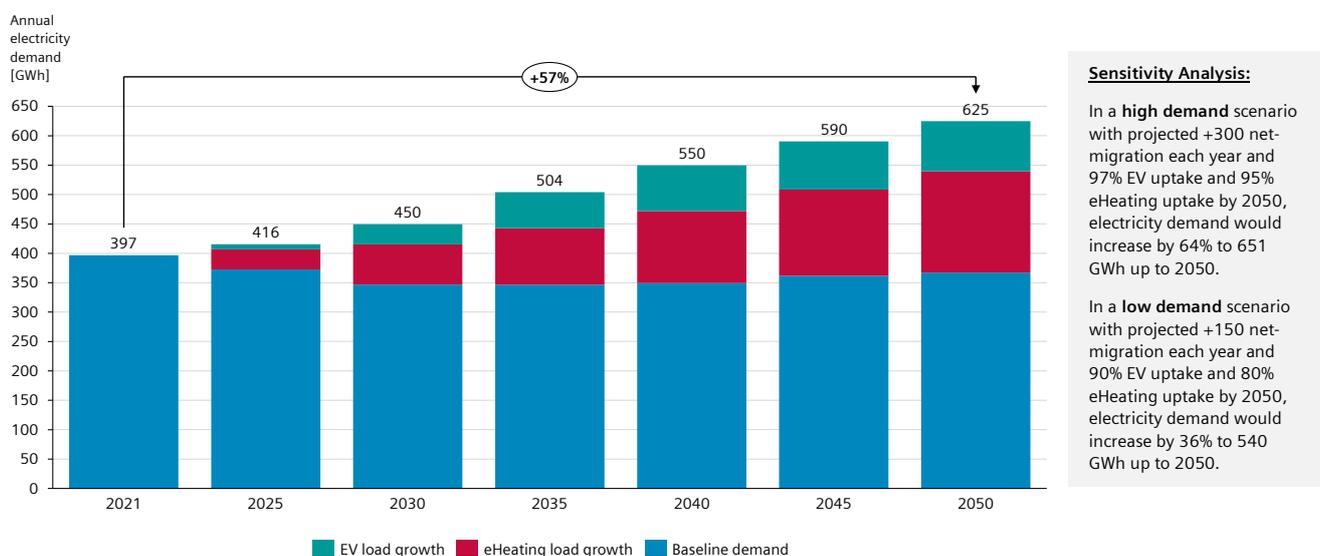


Figure 6 - Total annual electricity demand

In addition to overall electricity demand, it is important to consider the peak power demand because it dictates the sizing of electricity network components, including new electricity generation equipment and reinforcements to electricity distribution networks. In 2021, the peak power demand was 94 MW (see Figure 7), which occurred during a cold winter's evening. The peak power demand is expected to increase to 157 MW by 2050.

Measures are available to reduce peak power demand, such as smart consumer electricity tariffs that encourage the flexible usage of smart appliances, EVs or eHeating, or decentralised energy storage technologies, such as battery systems or hot water tanks. Some of these measures are already present in Guernsey, with an estimated 5% of baseload energy being shifted by Super Economy12 tariff users to off-peak time<sup>20,25</sup>. With the introduction of more flexible consumer loads, a customer awareness shift and new digitally enabled incentive mechanisms, as considered in PwC's Electricity Market Framework assessment<sup>26</sup>, smart consumption patterns will offer significant additional peak load shaving potential. If, for example, 42% of all EV charging processes could be delayed by up to 9 hours and 61 MWh of heating demand could be shifted by up to 1 hour, the peak power demand in 2050 would be reduced to 125 MW (see Figure 7).

For network and asset sizing purposes, the *future electricity demand and supply strategy* considers a worst-case scenario, where consumers choose not to operate their EVs and eHeating in a flexible manner – with peak power demand increasing to 157 MW by 2050. Sizing the network at this level provides an opportunity, from 2030 onwards, to achieve additional reserve margins of between 13% to 22% (see Figure 7) with greater use of peak load management, and therefore accommodate steeper electrification rates or population changes.

<sup>23</sup> [Guernsey Facts & Figures 2022](#)

<sup>24</sup> Information and consumption profiles provided by Guernsey Electricity Limited

<sup>25</sup> [Tariffs | Guernsey Electricity](#)

<sup>26</sup> PwC, Further analysis of a proposed electricity market framework – Final Version, March 2023

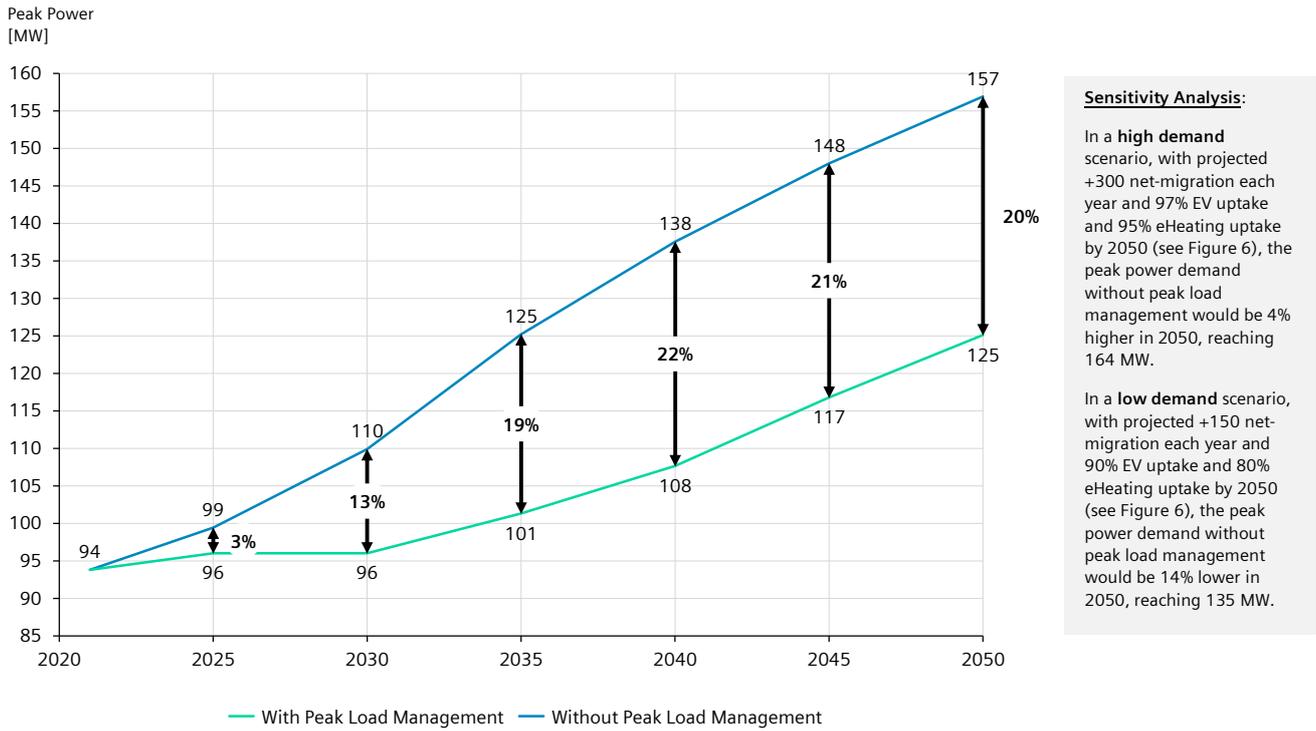


Figure 7 - Peak power demand projection with and without peak load management

### Electricity supply and security

To meet a growing electricity demand and reduce overall emissions, the *future electricity demand and supply strategy* for Guernsey requires new electricity generation technologies to be implemented. When the *future electricity demand and supply strategy* is fully realised, an offshore windfarm will supply between 46% and 55% of Guernsey’s electricity needs, a GF1 interconnector – operating primarily for top-up and balancing from 2035 – will supply between 37% and 43% of Guernsey’s electricity needs, and decentralised solar PV systems across the Island will supply between 8% and 10% of Guernsey’s electricity needs. An updated thermal power plant with improved efficiency provides dispatchable generators for backup and security of supply purposes and the use of alternative fuels (possibly earlier in the supply pathway timeline) and hydrogen fuel cells (later in the supply pathway timeline) should be considered. It should be noted that low carbon fuels are currently deemed uncompetitive and uneconomical, as shown in Appendix A.

Figure 8 illustrates how the energy supply mix in the *future electricity demand and supply strategy* for Guernsey should transition during the period 2021 to 2050.

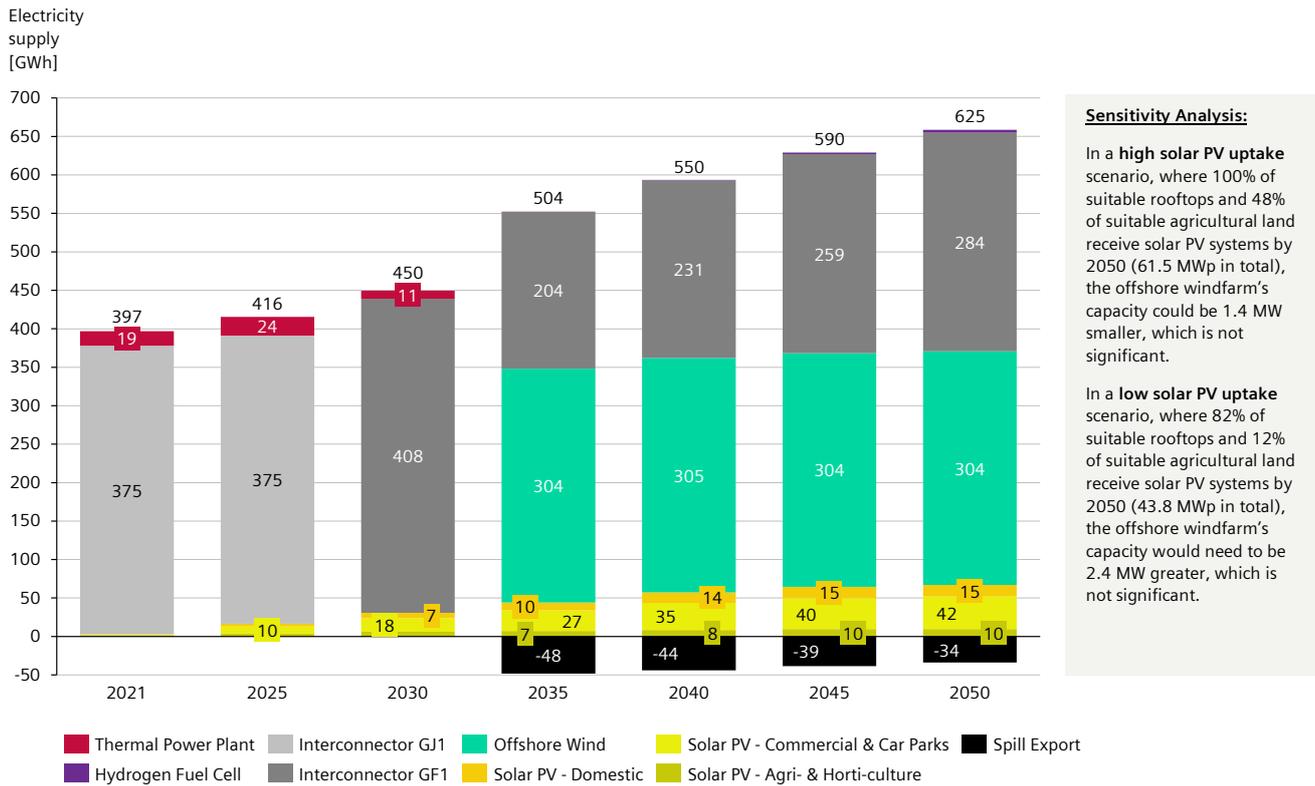


Figure 8 - Total annual electricity import, generation and spill export

To achieve the energy supply mix in the *future electricity demand and supply strategy* for Guernsey, Table 8 identifies the required installed capacity of different generator assets during the period 2021 to 2050. The total installed capacity increases with peak demand from 207.9 MW to 432.2 MW.

To maintain security of supply, an N-2 on-island generation sizing is currently used. This means sufficient dispatchable and dependable on-island generation from the thermal power plant is available to meet peak demand if the two largest generators become unavailable. It is recommended that with the addition of a second interconnector in 2030, the government mandate could be revised with the view to reduce it to N, meaning that the back-up on-island generation capacity is sized to on-island peak electricity demand. Table 8 shows the 'total dispatchable capacity' and the 'total on-island dispatchable capacity', dependent on whether the interconnectors GJ1 and GF1 are considered to form part of the security supply mandate. If progressed, the total on-island dispatchable generation capacity can remain within -8% and +5% of the current level, despite the projected 57% increase in overall electricity demand.

Table 8 - Electricity generation technology installed nominal operational capacity

		Installed nominal operational capacity (MW)						
	Technology	2021	2025	2030	2035	2040	2045	2050
Interconnector	Current interconnector GJ1	57	57	57	57	57	57	57
	Additional interconnector GF1	-	-	100	100	100	100	100
Renewable electricity generation	Solar PV	2.2	13.3	24.6	35.5	46	51.7	53.7
	Offshore wind	-	-	-	64.6	64.6	64.6	64.6
Dispatchable generators	Thermal power plant (of which new)	148.7	138.4 (40.5)	138.4 (-)	138.4 (-)	90.5 (50)	88 (38)	96.9 (8.9)
	Hydrogen fuel cell (or alternative)	-	-	-	-	47	60	60
<b>Total installed capacity (MW)</b>		<b>207.9</b>	<b>208.7</b>	<b>320</b>	<b>395.5</b>	<b>405.1</b>	<b>421.3</b>	<b>432.2</b>
Capacity margin (%)		96	110	139	170	153	146	139
Total dispatchable capacity (MW)		205.7	195.4	295.4	295.4	294.5	305	313.9
Total on-island dispatchable capacity (MW)		148.7	138.4	138.4	138.4	137.5	148	156.9

Large infrastructure projects, including the new GF1 interconnector and the offshore windfarm, require substantial planning and implementation time periods. It is recommended that both are initiated immediately.

It is recommended that the installation of the GF1 interconnector is prioritised, particularly as the associated tariff negotiation will influence the business case for the offshore windfarm and its sizing. Higher spill export prices would result in a clear financial case for a larger windfarm.

#### **GF1 and GJ1 interconnectors:**

The primary role of the new GF1 interconnector will be to provide low carbon electricity from France with certainty and security, as well as balancing the demand and supply in Guernsey. An additional benefit of implementing GF1, as explored during the optioneering process for the consultation report, is the ability to plan for electricity sell-back arrangements, where surplus renewable energy generated on-island could be exported back to France through a spill arrangement. As no significant amount of energy storage capacity forms part of this Strategy, a spill export type arrangement could be negotiated with RTE and EDF, which limits the financial benefit per unit sold, as it will coincide with renewable generation in the wider European electricity market. It is worth noting that a spill export arrangement is not critical to the delivery of this pathway and that the predicted amount of renewable electricity generated from both, solar PV and offshore wind, will not exceed GF1's nominal operational capacity, with model results forecasting a maximum of 56 MW for one day in summer 2050.

With the addition of GF1 and it being the primary interconnector from 2030 onwards, GJ1's purpose will change to being a back-up option, when GF1 has a scheduled or unscheduled outage. Unless agreed with the French electricity providers, electricity cannot be imported from both interconnectors simultaneously, hence GJ1 could not provide top-up electricity when GF1 is at maximum capacity. Subject to implementing the necessary commercial and operational agreements with stakeholders and applying engineering configuration changes, the simultaneous running of the interconnectors may be possible and could be explored. A long-term solution for GJ1's operation should be discussed with the CIEG, in line with their electricity strategy and ambitions.

#### **Offshore wind:**

A single offshore windfarm in the region of 65 MW is required to deliver the majority of Guernsey's renewable electricity and to drive down the overall cost of the electricity system. The increasing maturity of offshore wind turbines will provide the option to install 12 MW or larger turbines by 2035, and an array of 5 to 6 turbines could be located at one of the sites previously identified<sup>27</sup>, requiring an area of ~3 square miles.

Offshore windfarm projects take between 5 and 10 years to implement, with considerable time required to carry out pre-development assessments<sup>28</sup>, and should therefore be initiated as soon as practically possible.

<sup>27</sup> [Xodus Group, Offshore Wind – Preliminary Feasibility – Final Report, L500042-500, 2016](#)

<sup>28</sup> [Offshore Renewable Energy Catapult – Interactive guide to an offshore windfarm](#)

The exact size of the offshore windfarm will be determined by several factors as the project develops. The interconnector contract negotiations will be a determining factor in the optimal sizing, as high import tariffs, and to a lesser extent high spill export tariffs, would result in a significantly increased windfarm size being suitable. Further, the sizing should be optimised to the site conditions and engineering constraints, which will be identified during the design and survey activities.

#### **Solar PV:**

Solar PV capacity is anticipated to grow from the current estimate of 2.2 MWp to 53.7 MWp by 2050, with 63% of that being deployed in commercial and car park areas, 22% on domestic rooftops, and 15% in agricultural settings. Some of the main underlying assumptions include:

- 219 ha. of commercial roof and car park areas are deemed suitable for a total capacity of and 33.9 MWp.
- 15% of domestic roof areas are deemed suitable for a total capacity of 12 MWp.
- 1% of Guernsey's agricultural land and redundant glasshouse sites could accommodate 32.4 MWp of solar PV – with the assumption that only 24% of those are suitable, 7.8 MWp of ground-mount solar PV could be deployed, which will require an area of 7.4 hectares (18.3 acres or 73.2 verges).

A natural growth in distributed solar PV capacity is assumed in line with decentralised decision makers, such as land and property owners. In addition, an accelerated increase over the coming years is anticipated, particularly for rooftop installations, meaning that 46% of the full capacity is already deployed by 2030 (24.6 MWp). A sensitivity analysis of different uptake rates and maximum capacities showed that the impact on other supply technologies is minimal, see Figure 8.

#### **Dispatchable generation:**

Guernsey is currently reliant on dependable and dispatchable fossil fuel electricity generators in the eventuality of GJ1 failing, as described in section 'Guernsey's existing electricity network'. They also provide top-up and balancing services when the interconnector is at capacity. In 2021, all generators combined operated for 2,078 hours, which is equivalent to an aggregated utilisation rate across all 10 generators of ~2.4%.

When the GF1 interconnector and the offshore windfarm are installed, their balancing services will no longer be required, and they will primarily act as security of supply back-up generators. Their peak capacity is sized in line with a worst-case demand scenario, where no flexibility is considered, to provide full resilience.

From 2040 onwards, hydrogen fuelled generators or other technologies that become available should be considered, including hydrogen fuel cells, and converting the existing thermal power plant. It is anticipated that the hydrogen industry will have sufficiently matured by that time to allow this low carbon fuel to be readily available. Hydrogen fuel cells offer limited scalability, hence provision for only 60 MW is made by 2045, and this should be evaluated as the technology advances. Similarly, to the thermal power plant, their utilisation rate is anticipated to be close to zero, and the hydrogen fuel cells will primarily act as a security of supply back-up generator and, occasionally, balancing services.

The use of alternative fuels should be considered, although low carbon fuels are currently uneconomical for use in dispatchable generation, as shown in Appendix A.

The dispatchable assets will need to be aligned to demand changes and the security of supply mandate set by the States of Guernsey.

## **4.2 Capital investment and operating cost profile**

### **Capital expenditure profile**

The Dual Interconnectors with Offshore Wind (D) supply pathway will require £531m of capital expenditure by 2050, excluding Weighted Average Cost of Capital (WACC), with investment comprised of offshore windfarm (£203m, 38%), thermal power plant (£156m, 29%), GF1 interconnector (£96m, 18%)<sup>29</sup>, solar PV (£42m, 8%) and hydrogen fuel cell (£34m, 6%). Investments in the thermal power plant, the interconnector and the offshore windfarm occur in the next 10 years, with investments in hydrogen fuel cell or similar technology being required from 2040 onwards. Solar PV related capital spending occurs throughout the time series, as shown by the composition and phasing of CapEx in Figure 9<sup>30</sup>. It should be further noted that CapEx associated with the Island's electricity network is excluded.

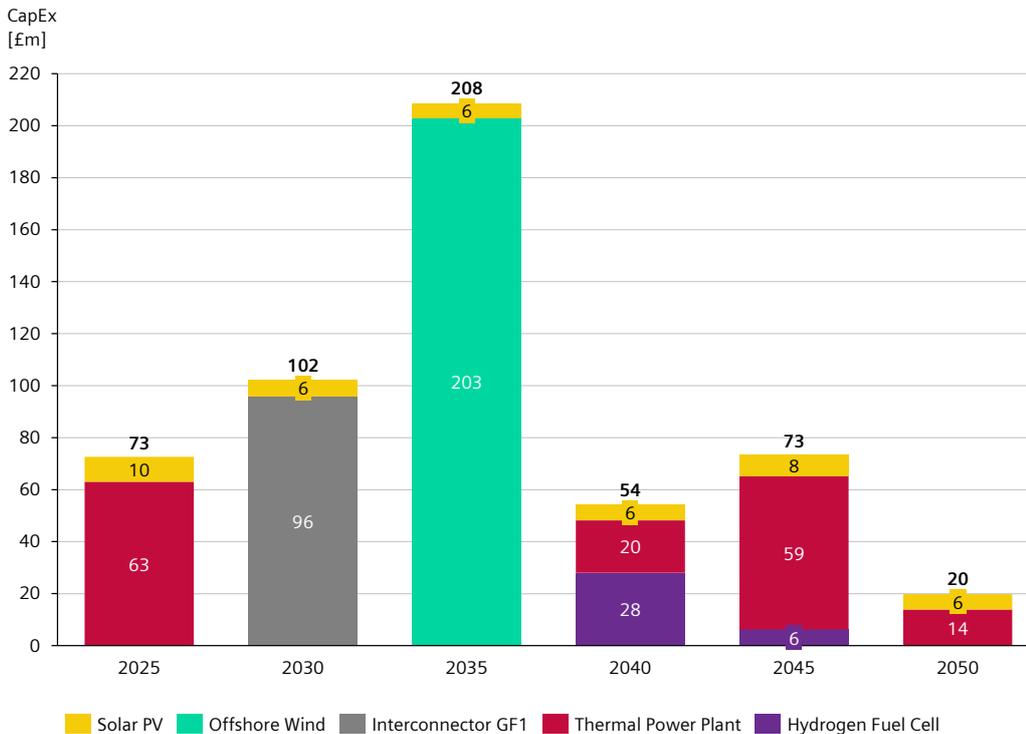
Together with solar PV generation, the offshore windfarm and GF1 interconnector will provide most of Guernsey's electricity. The 65 MW offshore windfarm and new GF1 (100 MW) interconnector are critical infrastructure programmes that will necessitate extensive mitigation and management of supply chain and delivery risks to ensure timely completion and

<sup>29</sup> WSP, Revised Cable Investment Strategy, 2018

<sup>30</sup> Prices shown are indicative and include \$ to £ exchange rate assumptions.

activation. Detailed individual business cases with predicated rates of return should be created for each investment. For the offshore windfarm, a single installation in the region of 65 MW capacity should be implemented.

In addition to investments in offshore wind and a second interconnector, the fuel-based on-island generators will need to be decommissioned and replaced with new reciprocal engines totalling £136m CapEx and new gas turbines totalling £20m CapEx (see Table 8 for capacity and Figure 9 for capital expenditure and phasing). An investment in hydrogen-based fuel cells, which will provide additional back-up supply from 2040 onwards will require an additional £34m CapEx. The primary purpose of these generators is to provide resilience in the event of interconnector failure. A detailed business case will need to be established and technical performance, such as ramp rates and grid formation capabilities rather than continuous electricity supplied, will need to be specified and validated during vendor selection and asset commissioning processes.



**Sensitivity Analysis:**

In a **high demand** scenario with projected +300 net-migration each year and 97% EV uptake and 95% eHeating uptake by 2050 (see Figure 6), a higher capital investment of £556m by 2050 would be required due to the increased generation capacity needed.

In a **low demand** scenario with projected +150 net-migration each year and 90% EV uptake and 80% eHeating uptake by 2050 (see Figure 6), a lower capital investment of £457m by 2050 will be required due to the reduced generation capacity needed.

Figure 9 - Capital investment expenditure up to 2050<sup>31</sup>

**Operating expenditure profile**

The Dual Interconnectors with Offshore Wind (D) supply pathway will incur £1,103m of total operating expenditure up to 2050 for the electricity system operation, which includes maintenance costs, fuel costs, imported electricity, and revenues from spill exported electricity. It should be noted that adverse economic impacts caused by the current energy crises are assumed to be temporary in nature and are therefore not factored into future price projections. It should be further noted that OpEx associated with the Island’s electricity network is excluded.

Figure 10 shows in-year operating expenditure at each five-yearly interval of the time series up to 2050. For clarity, fuel costs for non-electricity type systems, such as ICE vehicles or conventional heating are not shown.

Up to 2030, 85% of the operating expenditure is incurred by GJ1, which is primarily associated to the electricity import cost, and a further 9% is required to import fuels for the thermal power plant.

From 2030, when the offshore windfarm and GF1 interconnector become available, the percentage of operating expenditure attributed to importing electricity drops significantly, which is due to:

- Between 16% and 22% of operating expenditure attributed to the offshore windfarm – with operating cost decoupled from the annual electricity supplied as the input energy for wind generation may be considered a free resource.
- Between 58% and 65% of operating expenditure attributed to the GF1 interconnector – used as the primary connection for system balancing and electricity import.

<sup>31</sup> Capital expenditure for 33/11 kV reinforcements is not included and will need to be identified by Guernsey Electricity Limited

- Ongoing 15% to 18% of annual operating expenditure is attributed to the maintenance of security of supply assets, with GJ1 incurring £3.2m per year, followed by the thermal power plant (reducing from £1.4m to £0.7m per year) and the hydrogen fuel cells (increasing to £0.3m per year).

For electricity import, the prevailing GJ1 pricing structure includes standby charges and seasonal and time-of-day variations and is currently priced at a favourable level given the Island’s predictable loads. In general, it is assumed that the same commercial principles will apply to a GF1 interconnector, with consideration to forward looking electricity prices for imports rising in line with European markets, and consideration given to an uplift in electricity import prices due to the variable nature of offshore wind resulting in less predictable electricity import via an interconnector.

For electricity export, a spill type arrangement was considered, which sets a spill export price at 10% of the import price. The low price assumes that surplus renewable electricity will be generated at times when the European market is unlikely to require additional electricity.

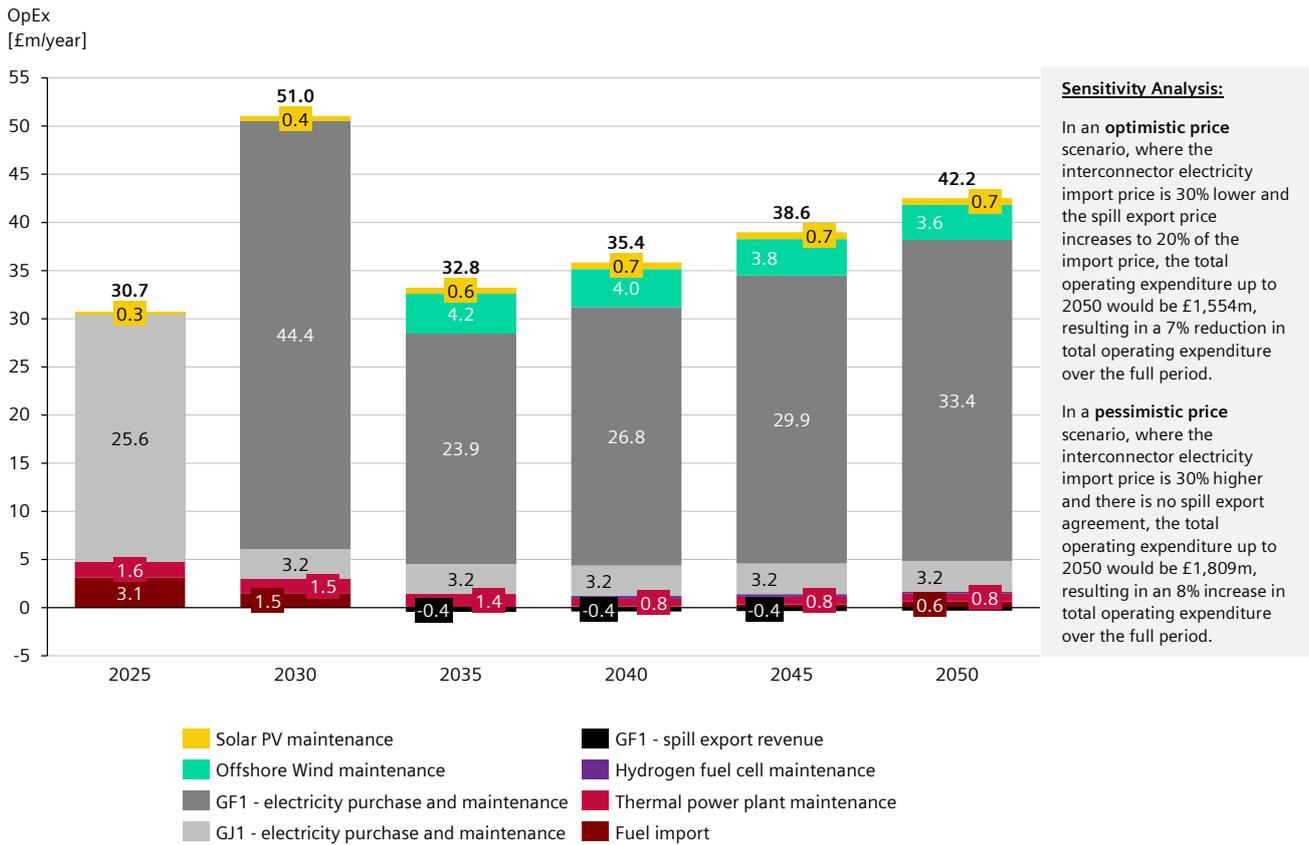


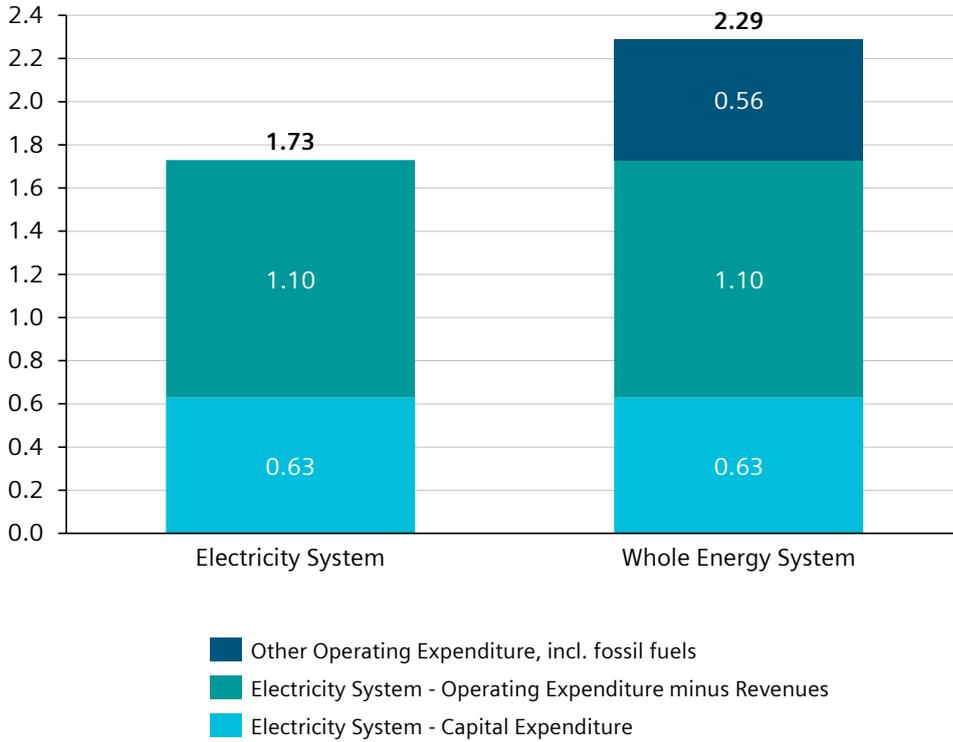
Figure 10 - Annual operating expenditure up to 2050<sup>32</sup>

### Total expenditure

When applying 6% of Weighted Average Cost of Capital (WACC) to all capital expenditure, total expenditure for the Dual Interconnectors with Offshore Wind (D) supply pathway up to 2050 is £1.73bn (see Figure 11) directly associated with the electricity system. A further £566m would be associated with the residual cost of purchasing fossil fuels for the operation of conventional road vehicles and heating systems.

<sup>32</sup> Operating expenditure for 33/11 kV reinforcements is not included and will need to be identified by Guernsey Electricity Limited

Total Expenditure to 2050 £bn



**Sensitivity Analysis:**

In an **optimistic price** scenario, where the interconnector electricity import price is 30% lower and the spill export price increases to 20% of the import price (see Figure 10), the TotEx up to 2050 would be £210m cheaper, with a reduction on CapEx expenditure on a smaller windfarm (40MW) and lower electricity import costs.

In a **pessimistic price** scenario, where the interconnector electricity import price is 30% higher and there is no spill export agreement (see Figure 10), the TotEx up to 2050 would be £173m more expensive due to the additional CapEx expenditure on a larger windfarm (73MW) and the increase in electricity import costs.

Figure 11 - Total expenditure up to 2050 for electricity system and whole energy system

Considering a total of 15,445 GWh produced up to 2050, the average system price of electricity will be £112/MWh (11.2p/kWh) for the Dual Interconnectors with Offshore Wind (D) supply pathway, which includes costs associated with an elevated security of supply. By comparison, it is estimated that the average system price of electricity for the Base Case (A) supply pathway up to 2050 will be £130/MWh, which is £18/MWh (or 16%) higher, and the average system price of electricity for the Renewables First (C) supply pathway up to 2050 will be £110/MWh, which is £2/MWh (or 2%) lower.

The system price for the electricity system in 2050 is 22% lower in the Dual Interconnectors with Offshore Wind (D) supply pathway compared to the Base Case (A) supply pathway, as shown in Figure 12. The increase in 2030 in both supply pathways is due to the anticipated change in the purchasing cost for imported electricity via the interconnector<sup>33</sup>. The comparative increase for supply pathway (D) in 2030 is due to the acquisition of the new interconnector GF1, with the comparative decrease in 2035 being primarily driven by the addition of the offshore windfarm.

<sup>33</sup> Currently contracted rates for GJ1 will expire in 2027.

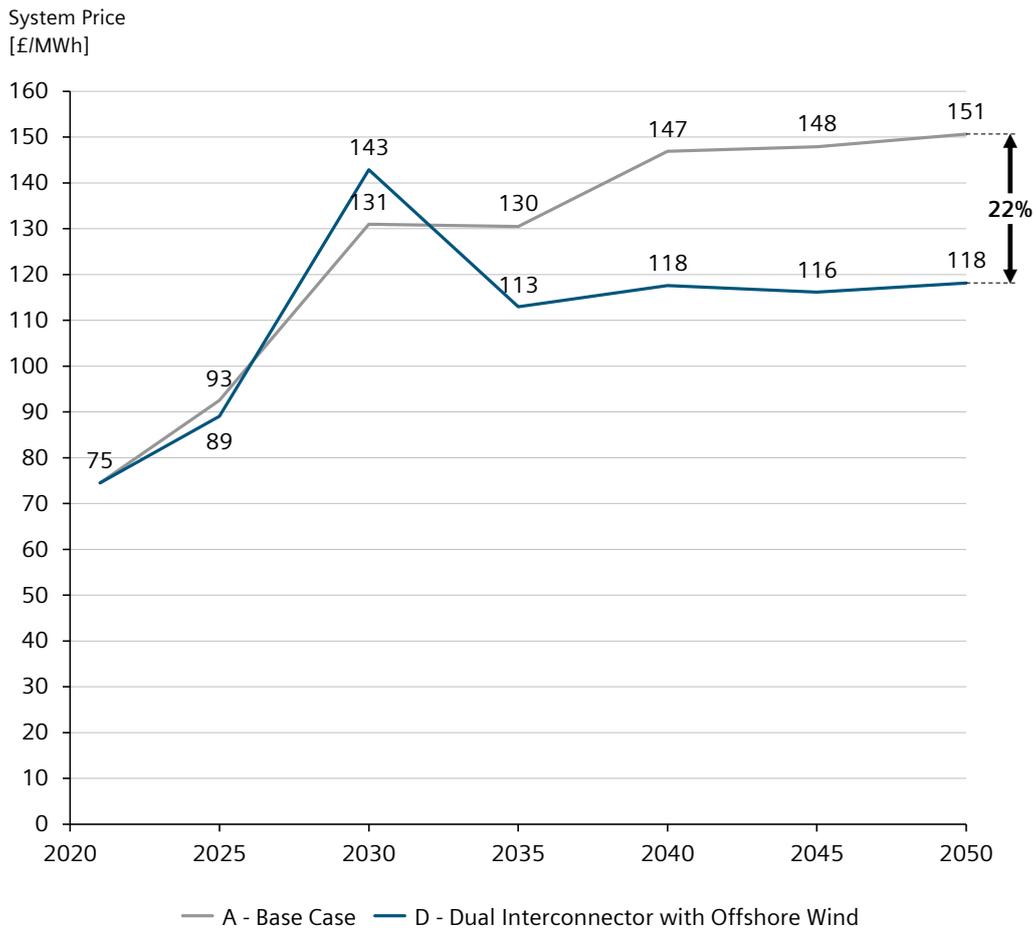


Figure 12 - System prices for electricity system – supply pathways A and D

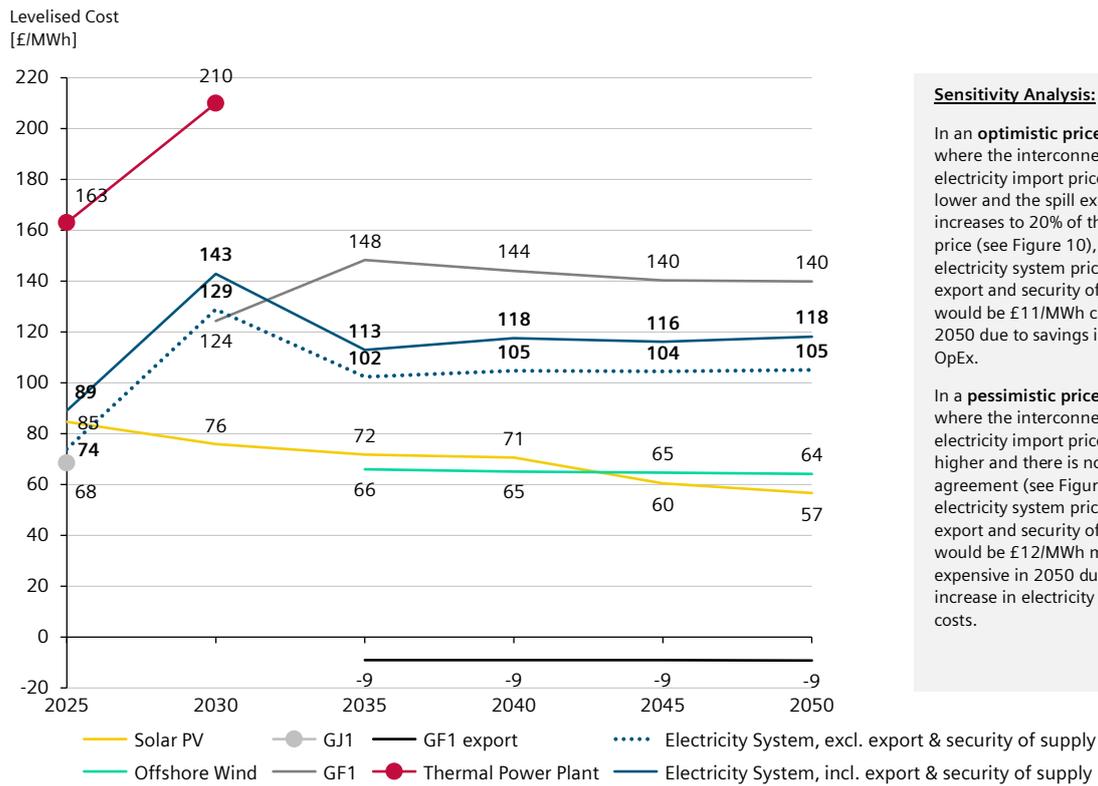
Figure 13 shows the levelized cost of individual electricity generation technologies, along with the average spill export revenue, and the following points should be noted:

- The electricity system price in this graph shows the aggregated costs based on the electricity produced in relation to the TotEx cost associated with generating this electricity and either including or excluding the security of supply assets, as well as the revenues from export electricity.
- The costs shown for the existing GJ1 interconnector and thermal power plant only include OpEx references, as the CapEx for these assets have been considered as a sunken cost.
- The costs shown for GF1 is based on costing exercises carried out by Guernsey Electricity Limited in 2018<sup>34</sup>. It is worth noting that the comparatively higher cost also covers the dispatchable nature of this asset. The GF1 spill export costs shown only include OpEx costs, as GF1 interconnector’s CapEx is fully attributed to its import capacity, with this being its primary purpose.
- Renewable electricity sources, such as wind and solar, have significantly lower LCOE due to their ‘free of charge’ input energy. The LCOE values shown are based on industry predictions<sup>35</sup> with a conservative approach taken on the anticipated cost reductions over time for fixed-base offshore windfarms, despite maturing technology and supply chains, which aligns with ambitious floating-base predictions and thus encompasses the uncertainty of final designs.
- The LCOE of other security of supply options, which do not form part of this Strategy, such as large-scale batteries or electrolyzers coupled with hydrogen storage, are expected to be more than £200/MWh in 2030<sup>36</sup>.

<sup>34</sup> WSP, Revised Cable Investment Strategy, 2018

<sup>35</sup> [Technologies | Electricity | 2022 | ATB | NREL](#)

<sup>36</sup> Schmidt et al., Projecting the Future Levelized Cost of Electricity Storage Technologies, Joule, 2019 <https://doi.org/10.1016/j.joule.2018.12.008>



**Sensitivity Analysis:**

In an **optimistic price** scenario, where the interconnector electricity import price is 30% lower and the spill export price increases to 20% of the import price (see Figure 10), the electricity system price, including export and security of supply, would be £11/MWh cheaper in 2050 due to savings in CapEx and OpEx.

In a **pessimistic price** scenario, where the interconnector electricity import price is 30% higher and there is no spill export agreement (see Figure 10), the electricity system price, including export and security of supply, would be £12/MWh more expensive in 2050 due to the increase in electricity import costs.

Figure 13 - Levelised cost per technology type<sup>37</sup>

For Guernsey, a detailed site feasibility and business case for an offshore windfarm and second interconnector will be necessary to determine viability and derive a levelised cost for each technology and in aggregate, and which will additionally need to consider planning consents for assets located offshore and on the Island.

### 4.3 Emissions from electricity generation

Imported electricity is already sourced from certified low carbon generators across Europe via the GJ1 interconnector and this is expected to continue when the GF1 interconnector becomes operational in 2030. To fully decarbonise by 2050, Guernsey's main priority should be to reduce its reliance on fossil fuel, either for direct consumption, such as in ICE vehicles or heating systems, or for indirect consumption, such as in the thermal power plant to produce electricity.

As highlighted by Figure 5 and Figure 14, one of the objectives of this Strategy is to reduce carbon emissions from electricity generation and enable carbon emissions from transport and heating to be reduced through electrification. With a predicted 40% of vehicles and 54% of heating systems being electrified by 2030, the interim target of reducing carbon emissions by 57% compared to 1990 levels will be met—by the Dual Interconnectors with Offshore Wind (D) supply pathway in the event of emissions from other sources remaining unchanged since 2021, see Figure 14. However, in the Base Case (A) supply pathway, the projected annual emissions in 2030 would be 122 ktCO<sub>2e</sub> and this interim target would be missed if emissions from other sources did not reduce.

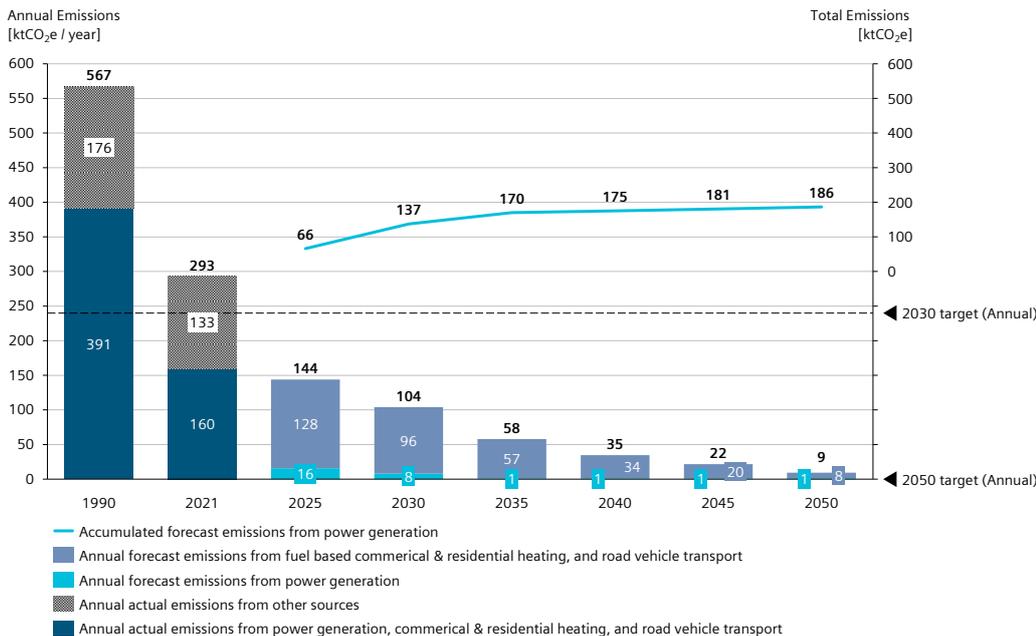
Assuming that by 2050, 5% of vehicles and 10% heating systems remain non-electric, annual emissions of 9 ktCO<sub>2e</sub> will be released, with 1 ktCO<sub>2e</sub> associated with the power generation process and 8 ktCO<sub>2e</sub> attributed to the continuous burning of fossil fuels. To meet the 2050 net-zero target, those emissions would need to be offset at prices of approximately £25 to £80 per tonne of CO<sub>2e</sub><sup>38</sup>. For the power generation part, this would cost between £25k and £80k per year. It should be noted, however, that an ability to offset may be rescinded in future, meaning that there would be a shortfall on achieving net-zero and requiring an alternative intervention, such as generating more renewable energy than is being consumed.

The accumulated carbon emissions for power generation by 2050 in the Dual Interconnectors with Offshore Wind (D) supply pathway will be 187 ktCO<sub>2e</sub>, which compares favourably with 1,167 ktCO<sub>2e</sub> for the Base Case (A) supply pathway (a 980 ktCO<sub>2e</sub> or 84% reduction) and 437 ktCO<sub>2e</sub> for the Renewables First (C) supply pathway (a 250 ktCO<sub>2e</sub> or 57% reduction).

<sup>37</sup> LCOE values of >£500/MWh were excluded from the graph - removing Thermal Power Plan and Hydrogen Fuel Cell values in the years 2035 to 2050.

<sup>38</sup> Costs based on low (~£25) to high (~£80) estimates per tonne CO<sub>2</sub>. Ref: [Future Demand, Supply and Prices for Voluntary Carbon Credits – Keeping the Balance](#)

It is worth noting that the thermal power plant or hydrogen fuel cells will not significantly impact overall emissions from 2030 onwards, as their primary purpose will switch to being part of the security of supply provision.



**Sensitivity Analysis:**

In a **high demand** scenario with projected +300 net-migration each year and 97% EV uptake and 95% eHeating uptake by 2050 (see Figure 6), an additional 28 ktCO<sub>2</sub>e would be emitted in total by 2050 due to the higher number of electrified vehicles and heating systems.

In a **low demand** scenario with projected +150 net-migration each year and 90% EV uptake and 80% eHeating uptake by 2050 (see Figure 6), a further 32 ktCO<sub>2</sub>e could be avoided in total by 2050 due to the lower number of electrified vehicles and heating systems.

Figure 14 - Annual and total emissions in relation to 2030 and 2050 targets

#### 4.4 Electricity network assessment: capacity and performance considerations

The connection of offshore wind and the proposed GF1 interconnector will require upgrades and/or extension of the 33kV electricity network to accommodate the changes in bulk power flows that will arise. A preliminary network assessment indicates that the following new assets will be required:

- A new 33kV offshore wind connection substation comprising up to 8 switchgear bays at 33kV, together with the transformers associated with the windfarm export cables, which are expected to operate at a voltage significantly higher than 33kV. Capital expenditure was included in the model.
- A new 33kV GF1 interconnector substation comprising up to 8 switchgear bays at 33kV, together with the transformers associated with the GF1 cable, which is expected to operate at a voltage significantly higher than 33kV. Capital expenditure was included in the model.
- Approximately 60km of new 33kV cable circuits will be required to interconnect the new 33kV substations into the existing 33kV network (using multiple cables and circuits that link up offshore wind and the land-based assets attached to the GF1 subsea cable). The opportunity exists to use the new cable circuits as to modify the topology of the 33kV network, possibly moving away from the current radial arrangement and establishing a “ring” arrangement, which may yield network efficiency and security improvements for little incremental cost. Capital expenditure was not included in the model, however a rough-order magnitude of £18m is estimated for installed 33 kV cabling up to 2050.
- Optionally, new 33/11kV transformers and 11kV substations could be established at the new 33kV substation sites to create new feed-in points to the 11kV distribution network. This would require some modification to the 11kV network, the details of which would be determined through detailed analysis of 11kV network power flows. Capital expenditure was not included in the model, however a rough-order magnitude of £12m is estimated for two commissioned 33/11kV substations up to 2050.

The network upgrades described above must be implemented on a timescale commensurate with the expected connection dates of the GF1 interconnector and the offshore windfarm, which are to be implemented by 2030 and 2035, respectively.

The expected increase in system demands, in connection with the Dual Interconnectors with Offshore Wind (D) supply pathway, will necessitate significant reinforcement of the 11kV network, and possibly also upgrades to the 33/11kV transformers that feed the 11kV network. A detailed assessment of this requirement has not been undertaken as it requires a detailed analysis of the 11kV network, down to the individual 11kV substation level, which is beyond the scope of this strategy. It is anticipated that Guernsey Electricity Limited will wish to investigate this aspect in the coming months, and we have suggested a possible high-level scope for such an analysis in the initiatives listed in Section 5.

## 4.5 Future electricity system operation: skills, security and digitalisation considerations

To enact and operate the *future electricity demand and supply strategy* for Guernsey, necessary skills will be required to sponsor, manage, develop and operate the revised electricity system. Further consideration will need to be given to safety and security, both during and after enacting the Strategy, and the opportunities for digitalisation.

### Skills

New skills and upskilled resources will be required to sponsor, direct and develop the future electricity strategy for Guernsey. The successful management, delivery and operation of the new electricity system is critical for its interconnected nature and secure operation. The States of Guernsey and Guernsey Electricity Limited will be key stakeholders – both contributing specific roles and responsibilities to support the change. A variety of other stakeholders and organisations will also need to contribute to a revised network.

Achieving the Dual Interconnectors with Offshore Wind (D) supply pathway will most likely involve on-island resources to design, develop, build and maintain the variety of deployed technologies, augmented with off-island specialist knowledge and skills. The traditional choices of procuring and/or attracting and/or developing new skills and resources with proven experience, for execution of each stage of the future electricity demand and supply strategy, will likely require a combination of all levers to be utilised. Partner selection will be of critical importance, requiring appropriate technologies to be fully specified together with warranted and maintained operational performance criteria. New assets and their specifications can be defined through clearly specified procurement activities that are conducted with an overarching goal of achieving their decarbonisation and compatibility.

### Safety and security

Safety management of the new operational environment and assets will be required across all sites, together with an assessment of operational guidelines and safety rules within Guernsey Electricity Limited. Additional training and authorisations may be required to sit alongside existing company practises, which should include an approved competent workforce. For all new technology applications, an appropriate safety case should be completed together with risk assessments and method statements, particularly for hydrogen fuel cells. For all safety matters, appropriate consultation and advisory guidance should identify the need to up-skill other organisations such as local emergency services e.g., fire, police, ambulance.

Physical security and accessibility to sites, including necessary road closures, should be addressed with suppliers during procurement e.g., site visits, signage, guarding, locks and authorisations etc. For new assets that provide recording and notification of alarms and events, these should additionally be employed and introduced into network operations monitoring. For the new offshore windfarm and hydrogen facilities, the management of physical security should be specified to include regular inspections that may include the use of new techniques available e.g., drones, helicopters, cameras etc. Security aspects that manage and prohibit existing shipping routes, flight routes and fishing grounds must also be implemented e.g., restrictive air and shipping spaces, licensed fishing rights and zones etc.

A cyber security policy for the electricity system will need to be updated or created by Guernsey Electricity Limited, which covers the new types of technologies that are introduced and how they are integrated and orchestrated. This policy should additionally be interlocked with existing States of Guernsey Critical National Infrastructure (CNI) policies – established or updated to reflect new technology solutions that have been added, the risks that are apparent with them, and identify mitigating and management measures to protect the security of supply. Ongoing cyber awareness measures and proactive operations should additionally be implemented alongside existing government security measures that are in place e.g., States of Guernsey and Guernsey Electricity Limited document control, supplier vetting, threat detection, vulnerability and penetration testing, private networks and DMZ protocols, and should include communications for assets added, both on and offshore etc.

### Digitalisation

Digitalisation that is inherently secure for Critical National Infrastructure (CNI) will increasingly enable electricity generators and grid operators to sustainably integrate, orchestrate and manage their asset bases and serve their customers – from upstream through to retail. Electricity generators and grid operators generally need to make foundational investments for digitalisation to occur, which means connecting assets, via Internet of Things (IoT) sensors and controllers, and enabling operational workers to connect to operational systems securely and dependably via fixed and/or mobile networks.

With enhanced visibility and remote control that is brought about from a foundational investment in digitalisation, electricity generators and grid operators can introduce proactive and predictive interventions into network operations and introduce assisted and automated workflows into network change. In connection with the *future electricity demand and supply strategy* for Guernsey, the following opportunities should be considered:

- **Visibility and Control:** Consider introducing automation and intelligence into network monitoring and change processes. Initially, such implementation might alert risks and issues to operational workers and recommend suitable interventions – without requiring human loss of control – and enable operational teams to improve their speed of

response and design proactive interventions. Over the longer term, trust in digitalisation can enable more intelligent operations, which might include partial or full automation of less operationally critical workflows.

- **Smart Grid:** Consider fully integrating the different energy vectors of demand and low carbon generation across power, heat, waste, and transport to develop a decarbonised control system for areas across the Island. Initially, this should focus on electricity generation and balancing technologies e.g., offshore wind, interconnectors and dispatchable generation. Over time, this should additionally integrate solar PV, metering, and EV charging infrastructures, along with V2G, and additionally consider charge point management, maintenance, billing and settlement.
- **Flexibility Services:** Building further on Guernsey's purpose-designed tariffs for EV charging and eHeating, consider introducing systems that will encourage electricity consumers to transfer their time-of-day EV charging and eHeating decisions to their electricity services provider, enabling peak loads to be further optimised.

## FUTURE ELECTRICITY DEMAND AND SUPPLY STRATEGY FOR GUERNSEY

## 5.0 Initiatives to enact the future electricity demand and supply strategy

To support the successful implementation of the future electricity demand and supply strategy, many initiatives will need to be actioned, covering aspects of demand management, generation planning, network development and operation, and enabling the transition.

Electricity **demand** initiatives should encourage greater adoption of electric vehicles and electric heating up to 2050. Improved energy efficiency standards in new and existing buildings should additionally be encouraged, which is an area of focus for the States of Guernsey's Committee for the Environment & Infrastructure.

Electricity **supply and network** initiatives should attract offshore wind developers, initiate the installation of a second interconnector and initiate the replacement of on-island dispatchable generation – considering both the fossil fuelled generators and future integration of hydrogen fuel cells. Initiatives in connection with on-island network reinforcements should consider integrating future loads and generation, planning for constraint mitigation measures, improving network efficiency, including quality and security of supply, and enhancing the electricity distribution network. It will also be important to consider opportunities to introduce grid digitalisation measures, including further development of flexibility services.

Electricity **transition** initiatives should ensure that the necessary resources and skills are accessible throughout the electricity transition journey and will require many organisations to be engaged, both on- and off-island, to deliver the future electricity demand and supply strategy. An extensive stakeholder communication plan will need to be created and executed over several years, necessitating a high level of programme-level coordination. Considerations, when developing a stakeholder engagement and communication plan, are set out in Appendix D – Considerations for stakeholder engagement and communication.

Initiatives within each area will need to align with the output from PwC's "Considerations for Guernsey's future electricity demand and supply strategy and market framework"<sup>39</sup>.

Initiatives for the areas highlighted above are set out in turn below:

---

<sup>39</sup> PwC, Further analysis of a proposed electricity market framework – Final Version, March 2023

## 5.1 Electricity demand initiatives

<b>Initiative</b>	5.1.1 – Encourage the electric vehicle (EV) transition and coordinate infrastructure build	
<b>Sponsor</b>	States of Guernsey	
<b>Description</b>	Electric vehicles play a crucial role in fully decarbonising Guernsey and provide an opportunity to build a green and digital economy. Enacting this transition will require the buy-in from a range of stakeholders and interlinked techno-economic and policy solutions.	
<b>Energy Policy objective alignment</b>	<p>Decarbonisation</p> <p>Consumer value and choice</p> <p>Equity and fairness</p> <p>Supportive of a vibrant economy</p>	
<b>Actions</b>	<p>A – Legislate on ICE vehicles in conjunction with an existing States resolution in the Climate Change Policy</p> <hr/> <p>B – Coordinate Island-wide planning of EV infrastructure build</p> <hr/> <p>C – Encourage EV adoption</p> <hr/> <p>D – Encourage the availability of EV services</p> <hr/> <p>E – Provide flexible EV charging tariffs</p> <hr/> <p>F – Assess digital grid opportunities and explore Vehicle to Grid (V2G) potential</p>	<p><b>Purpose</b> – Define a vision to phase out the use of ICE vehicles and develop associated policy tools, which consider an exhaustive list of vehicle types and uses. Consider best practice in other countries e.g., ban of sale of new ICE vehicles, impose emissions related taxes, introduce an ICE scrappage scheme.</p> <hr/> <p><b>Lead</b> – States of Guernsey</p> <hr/> <p><b>Purpose</b> – Review and address technical barriers to wide-spread EV charger rollouts in public, commercial and private environments, including headroom in network points and spatial constraints, followed by a strategic implementation plan to install publicly accessible charging stations.</p> <hr/> <p><b>Lead</b> – States of Guernsey and Guernsey Electricity Limited</p> <hr/> <p><b>Purpose</b> – Communicate ambition and consider the need for financial relief for costs associated with acquiring and using EVs, which should additionally encourage the use of public transport in any schemes.</p> <hr/> <p><b>Lead</b> – States of Guernsey</p> <hr/> <p><b>Purpose</b> – Identify market limitations or barriers to the widespread adoption of EVs e.g., availability of vehicle leasing arrangements, maintaining vehicles, recycling batteries etc.</p> <hr/> <p><b>Lead</b> – Energy Partnership members</p> <hr/> <p><b>Purpose</b> – Quantify the financial benefit of flexible demand side response on a per unit basis, and design one or more tariffs to encourage EV charging during off-peak times at sub-hourly resolution.</p> <hr/> <p><b>Lead</b> – Guernsey Electricity Limited</p> <hr/> <p><b>Purpose</b> – Explore underlying opportunities that widespread rollout of new EV charging technology could enable, such as advanced monitoring, innovative billing services and localised grid balancing. Determine the role and value of EVs to support the grid, by discharging electricity from their battery within technical and financial limits.</p> <hr/> <p><b>Lead</b> – Guernsey Electricity Limited and Energy Partnership</p>
<b>Timeline</b>	September 2023 – June 2025 and ongoing	
<b>Policy lever options</b>	<p><b>Energy &amp; Climate Change Policies</b> (clarify role of fossil and low carbon fuels in vehicles and eventual phasing out); <b>Transport &amp; Planning Policies</b> (encourage electrification of private/commercial/public vehicles, coordinate island-wide EV charging infrastructure); <b>Economic Policies</b> (encourage green financing for vehicles, encourage companies to scale support services, develop/attract skills etc.); <b>Generally in policies</b> (set ambitions, measures and timelines and introduce necessary incentives, grants, penalties, taxes and scrappage schemes – legislating as necessary).</p>	
<b>Outcomes</b>	A supportive and inducive environment for an electrified transport enabled economy to thrive.	

<b>Initiative</b>	5.1.2 – Improve energy efficiency standards across all sectors in connection with electricity sector	
<b>Sponsor</b>	States of Guernsey	
<b>Description</b>	Avoiding unnecessary energy consumption can provide significant financial and environmental benefits, whilst enabling the transition to renewable electricity generation technologies. Strengthening energy efficiency standards across all sectors and monitoring progress will encourage electrification and optimal use of electricity and provide greater value to consumers.	
<b>Energy Policy objective alignment</b>	<ul style="list-style-type: none"> <li>Decarbonisation</li> <li>Greater energy independence</li> <li>Equity and fairness</li> <li>Supportive of a vibrant economy</li> </ul>	
<b>Actions</b>	A – Update energy efficiency related regulations	<p><b>Purpose</b> – Review regulations that cover energy efficiency aspects of all major sectors, including building standards, appliance sales and industrial processes, and align them with best practice from other countries.</p> <hr/> <p><b>Lead</b> – States of Guernsey</p>
	B – Engage with end users and stakeholders	<p><b>Purpose</b> – Define and enact a communication plan to ensure the buy-in of all parts of society in relation to widespread energy improvement measures, including the benefits of electrification and optimised electrical usage.</p> <hr/> <p><b>Lead</b> – Energy Partnership</p>
	C – Quantify energy performance gap of buildings	<p><b>Purpose</b> – Ascertain the performance of Guernsey’s housing stock and derive the technical and financial effort required to bring them to a sufficiently high standard to enable low carbon heat technologies, such as heat pumps.</p> <hr/> <p><b>Lead</b> – States of Guernsey</p>
	D – Define an energy savings opportunity scheme	<p><b>Purpose</b> – Develop a supervised self-assessment scheme, that may be an enhanced Energy Performance Certificate scheme, which requires commercial and industrial entities in Guernsey to identify and act on energy efficiency improvements together with electrification and optimised electrical usage.</p> <hr/> <p><b>Lead</b> – States of Guernsey</p>
	E – Legislate for rental and resale markets of goods and assets	<p><b>Purpose</b> – Consider incentivising the improvement of assets with significant energy consuming potential by making rental and/or resale conditional on meeting minimum acceptable energy performance targets.</p> <hr/> <p><b>Lead</b> – States of Guernsey</p>
	F – Provide a financial support scheme	<p><b>Purpose</b> – Enable energy efficiency measures that require significant capital investments by providing customised support to target groups in the form of grants, tax relief or otherwise.</p> <hr/> <p><b>Lead</b> – States of Guernsey</p>
<b>Timeline</b>	September 2023 – June 2025 and ongoing	
<b>Policy lever options</b>	<p><b>Energy &amp; Climate Change Policies</b> (encourage role of energy conservation and demand management), <b>Energy, Planning &amp; Building Policies</b> (set energy efficiency standards for buildings and sector-specific processes in connection with use of power, heat and transport); <b>Planning &amp; Building Control Policy</b> (enable homeowners and enterprises to easily enact power/heat centric improvements to buildings and processes); <b>Economic, Employment, Education &amp; Migration Policies</b> (attract and encourage companies to offer/scale services, enabled by prerequisite skills); <b>Generally in policies</b> (set ambitions, measures and timelines and introduce necessary incentives, grants, penalties, taxes and scrappage schemes – legislating as necessary).</p>	
<b>Outcomes</b>	An aggregated reduction in energy consumption which provides financial, environmental and health benefits to Guernsey’s society, whilst improving living standards and fairness.	

<b>Initiative</b>	5.1.3 – Accelerate the electric heating (eHeating) transition	
<b>Sponsor</b>	States of Guernsey	
<b>Description</b>	Guernsey's building stock is already moving towards eHeating systems. Increasing the pace of transition, whilst taking account of hard-to-decarbonise properties and considering other forms of low carbon heating, is paramount to meeting carbon targets. Current practices need to be improved to explore the full potential of eHeating and ensuring that impacts on the electricity system are addressed.	
<b>Energy Policy objective alignment</b>	<ul style="list-style-type: none"> <li>Decarbonisation</li> <li>Greater energy independence</li> <li>Customer value and choice</li> <li>Supportive of a vibrant economy</li> </ul>	
<b>Actions</b>		<p><b>Purpose</b> – Define a common roadmap that will enable Guernsey's providers of heating supplies and services to transition toward low carbon heating solutions as soon as practical and identify role of, and impact on, the electricity system.</p> <hr/> <p><b>Lead</b> – States of Guernsey and Energy Partnership</p> <hr/> <p><b>Purpose</b> – As part of a heating strategy, conduct a detailed analysis of Guernsey's geographical, industrial and other heat sources, and, together with initiative 5.1.2, identify the potential for heat distribution network schemes and cooling e.g., from datacentres.</p> <hr/> <p><b>Lead</b> – States of Guernsey</p> <hr/> <p><b>Purpose</b> – As part of a heating strategy, identify low carbon alternatives for properties that cannot be heated with direct electric or heat pump technologies, including considering hydrogen alternatives, CHP plants or 5<sup>th</sup> generation heat networks.</p> <hr/> <p><b>Lead</b> – States of Guernsey</p> <hr/> <p><b>Purpose</b> – As an output from a heating strategy, develop a market framework for eHeating services, including Heat-as-a-Service and heat network trading options.</p> <hr/> <p><b>Lead</b> – States of Guernsey and Energy Partnership</p> <hr/> <p><b>Purpose</b> – In conjunction with a Hydrocarbon Strategy, phase out the use of fossil fuel heating systems by banning system installations in new buildings from 2025 and in existing buildings from 2035. Consider interim use of biofuel and future role of hydrogen in conventional heating systems.</p> <hr/> <p><b>Lead</b> – States of Guernsey</p> <hr/> <p><b>Purpose</b> – Encourage flexible consumption patterns by designing responsive eHeating tariffs that enable sub-hourly management of this aggregated load.</p> <hr/> <p><b>Lead</b> – Guernsey Electricity Limited</p>
<b>Timeline</b>	September 2023 – June 2025 and ongoing	
<b>Policy lever options</b>	<p><b>Energy &amp; Climate Change Policies</b> (clarify permitted role of electricity, hydrogen and bio fuels for heat in buildings and sector processes and eventual phasing out of traditional fuels), <b>Housing &amp; Buildings Policies</b> (set energy efficiency standards, clarify accepted heating systems in new and existing buildings, identify opportunities and practicalities for community ground heat schemes and district heat networks), <b>Planning &amp; Building Control Policy</b> (set minimum forward-looking standards, eliminate need for or remove cost/time from consenting); <b>Economic, Employment &amp; Education Policies</b> (encourage green finance offers for renewable heating schemes and conversions, encourage companies to offer renewable heating solutions and services etc.); <b>Generally in policies</b> (set ambitions, measures and timelines and introduce necessary incentives, grants, penalties, taxes and scrappage schemes – legislating as necessary).</p>	
<b>Outcomes</b>	A defined and realistic pathway to decarbonised heating and associated infrastructure that provides financial, environmental and air quality benefits to Guernsey's society, whilst improving grid stability and customer value.	

## 5.2 Electricity supply and network initiatives

<b>Initiative</b>	5.2.1 – Attract offshore wind developers	
<b>Sponsor</b>	States of Guernsey	
<b>Description</b>	Offshore developments require complex engineering works, requiring one or many third parties to design, build, and operate future wind energy assets. There is a high demand for wind developers, contractors and service providers, and this is likely to increase further as European nations and the USA invest billions to enhance local generation and national energy security. Consequently, developers can prioritise projects and negotiate preferential contract terms when bidding on projects. De-risk the activity by establishing relations with UK Crown Estates to discuss best practice and key lessons.	
<b>Energy Policy objective alignment</b>	<ul style="list-style-type: none"> <li>Decarbonisation</li> <li>Security and resilience of supply</li> <li>Greater energy independence</li> <li>Consumer value and choice</li> <li>Supportive of a vibrant economy</li> </ul>	
<b>Actions</b>	<p>A – Create a multi-stakeholder taskforce (including Guernsey Electricity Limited)</p> <p>B – Identify priority Wind Energy Areas (WEA)</p> <p>C – Identify points of network connection for offshore wind</p> <p>D – Hold pre-tender wind developer meetings</p> <p>E – Pre-define and publish development consenting metrics</p> <p>F – Define preferential seabed leasing terms</p> <p>G – Create tender specifications</p>	<p><b>Purpose</b> – Fully engage industry and consumers to gain their buy-in to offshore wind plans and participate in key decisions. Engage other jurisdictions to discuss best practice and key lessons.</p> <p><b>Lead</b> – States of Guernsey</p> <p><b>Purpose</b> – Signal a commitment to developers.</p> <p><b>Lead</b> – States of Guernsey</p> <p><b>Purpose</b> – Provide clear guidance to developers and inform tender specifications.</p> <p><b>Lead</b> – Guernsey Electricity Limited</p> <p><b>Purpose</b> – Identify commercial barriers for developers that can be remediated.</p> <p><b>Lead</b> – States of Guernsey - Committee <i>for the</i> Environment and Infrastructure</p> <p><b>Purpose</b> – Ensure developers understand exactly what is needed to ensure project approval, mitigating commercial risk.</p> <p><b>Lead</b> – States of Guernsey (Policy &amp; Resources - offshore, Planning - onshore)</p> <p><b>Purpose</b> – Reduce commercial and approval risk for developers.</p> <p><b>Lead</b> – States of Guernsey – Policy &amp; Resources</p> <p><b>Purpose</b> – Initiate project development.</p> <p><b>Lead</b> – Guernsey Electricity Limited via Engineering, Procurement &amp; Construction contract</p>
<b>Timeline</b>	September 2023 – August 2025	
<b>Policy lever options</b>	<b>Environmental Policy</b> (protect natural areas, identify suitable areas); <b>Marine &amp; Aviation Policies</b> (alter shipping routes and flight paths for safety and security); <b>Planning &amp; Consenting Policy</b> (scope acceptable seabed areas, allocate seabed and landing station areas for development); <b>Economic Policy</b> (attract investors, encourage start-ups and competition); <b>Foreign &amp; International Trade Policies</b> (develop joint ventures with neighbouring islands and countries and address seabed leasing etc.).	
<b>Outcomes</b>	A clear signal to developers that Guernsey is actively reducing project implementation barriers and commercial risk, resulting in many bid applications and a competitive tendering process. As a result, Guernsey will be able to select the best possible applicant.	

<b>Initiative</b>	5.2.2 – Initiate second interconnector project delivery to procurement stage	
<b>Sponsor</b>	Guernsey Electricity Limited	
<b>Description</b>	Subsea interconnector developments require complex engineering works, requiring one or many third parties to design, build, and operate the cable and substation assets. Such projects require early understanding of commercial and installation risks, involving possibly complex environmental issues associated with laying and burial of cables in the seabed and foreshore. In addition, the second interconnector will impact on the operating regime for the existing Jersey interconnector.	
<b>Energy Policy objective alignment</b>	<p>Decarbonisation</p> <p>Security and resilience of supply</p> <p>Supportive of a vibrant economy</p>	
<b>Actions</b>		<p><b>Purpose</b> – Align all affected parties on technical, legislative, regulatory and commercial aspects of the new interconnector, and include considerations for a multi-purpose interconnector, which could aggregate the connection of multiple planned or foreseen offshore generation capacities.</p> <hr/> <p><b>Lead</b> – Guernsey Electricity Limited</p> <hr/> <p><b>Purpose</b> – Investigate and agree terms for energy import and spill export from/to France. Submit appropriate connection application(s).</p> <hr/> <p><b>Lead</b> – Guernsey Electricity Limited</p> <hr/> <p><b>Purpose</b> – Engage suitable consultant(s) to advise on onshore, foreshore and subsea consenting issues for the entire interconnector project, including the terminal substations.</p> <hr/> <p><b>Lead</b> – Guernsey Electricity Limited</p> <hr/> <p><b>Purpose</b> – Engage suitable consultant(s) to assist in the development of the necessary commercial and technical agreements for the installation and operation of the interconnector.</p> <hr/> <p><b>Lead</b> – Guernsey Electricity Limited</p> <hr/> <p><b>Purpose</b> – Engage experienced contractors and consultants to undertake route optioneering and selection for the subsea and foreshore cable sections, including consideration of environmental constraints and appropriate surveys of ground/seabed conditions.</p> <hr/> <p><b>Lead</b> – Guernsey Electricity Limited</p> <hr/> <p><b>Purpose</b> – Engage experienced contractors and consultants to undertake route optioneering and selection for the onshore cable sections and terminal substations, including consideration of environmental constraints and appropriate surveys of ground/burial conditions.</p> <hr/> <p><b>Lead</b> – Guernsey Electricity Limited</p> <hr/> <p><b>Purpose</b> – Appoint owner’s engineer to develop tender specifications for subsea and onshore cables and equipment.</p> <hr/> <p><b>Lead</b> – Guernsey Electricity Limited</p>
<b>Timeline</b>	September 2023 – March 2025	
<b>Policy lever options</b>	<p><b>Environmental Policy</b> (protect natural areas, identify suitable routes); <b>Marine Policy</b> (protection from fishing/anchoring); <b>Planning &amp; Consenting Policy</b> (identify acceptable route, allocate location for landing station); <b>Economic Policy</b> (electricity spill exports); <b>Foreign &amp; International Trade Policies</b> (joint ventures with neighbouring Islands and countries, agreeing routes, bilateral agreements, government sponsorship and negotiations).</p>	
<b>Outcomes</b>	Development of the interconnector project to the procurement stage, clarification on the technical viability of spill export and indicative value attached to spill export.	

<b>Initiative</b>	5.2.3 – Initiate replacement of on-island dispatchable generation to provide required security of supply	
<b>Sponsor</b>	Guernsey Electricity Limited	
<b>Description</b>	Existing on-island fossil-fuelled generation assets will reach end-of-life and/or become uneconomic to operate and maintain. There remains an ongoing operational requirement for on-island dispatchable generation capacity, primarily to ensure security of supply. The replacement of generation assets should be undertaken with a view to reducing carbon emissions as much as reasonably possible.	
<b>Energy Policy objective alignment</b>	<p>Decarbonisation</p> <p>Security and resilience of supply</p> <p>Greater energy independence</p>	
<b>Actions</b>	A – Assess the achievable carbon efficiency improvements using conventional generation technologies	<p><b>Purpose</b> – to research and understand the likely trajectory of conventional generation technologies in terms of efficiency and carbon emissions.</p> <hr/> <p><b>Lead</b> – Guernsey Electricity Limited</p>
	B – Assess zero-carbon and low carbon dispatchable generation technologies	<p><b>Purpose</b> – To research, understand and anticipate the development of zero-carbon dispatchable generation technologies up to 2050 with respect to their application to the Guernsey electrical system, considering the aspects of power-system integration and fuel supply/storage where appropriate. This work to include the assessment of options for on-island zero-carbon fuel production and associated impacts on fuel import and storage requirements.</p> <hr/> <p><b>Lead</b> - Guernsey Electricity Limited</p>
	C – Develop generation replacement plan	<p><b>Purpose</b> – to derive a high-level plan for the replacement of existing on-island dispatchable generation assets with zero-carbon, low carbon or efficient conventional units, considering expected cost-benefits and de-carbonisation impacts.</p> <hr/> <p><b>Lead</b> - Guernsey Electricity Limited</p>
<b>Timeline</b>	September 2023 – September 2024 as immediate priority and repeat in accordance with thermal power plant asset lifecycle milestones through to 2050	
<b>Policy lever options</b>	The States of Guernsey would need to issue direction to Guernsey Electricity Limited, including security of supply sizing linked with initiative 5.2.2 and associated timelines for delivery of a second interconnector, including planning and consenting approvals relating to sites, buildings, assets and logistics.	
<b>Outcomes</b>	Development of a plan for carbon-efficient and cost-effective replacement of on-island dispatchable generation to 2050 that meets security of supply requirements.	

<b>Initiative</b>	5.2.4 – Assess options and plan for future implementation of hydrogen	
<b>Sponsor</b>	States of Guernsey	
<b>Description</b>	The <i>future electricity demand and supply strategy</i> for Guernsey makes provision for 60 MW of hydrogen fuel cell capacity to be installed by 2045, providing a source of dispatchable electricity for the Island that works alongside the thermal power plant, and with a dependency on a supply of hydrogen as a feedstock.	
<b>Energy Policy objective alignment</b>	<p>Decarbonisation</p> <p>Security and resilience of supply</p> <p>Greater energy independence</p>	
<b>Actions</b>		
	A – Bring together key industry players	<p><b>Purpose</b> – Establish a working group, made up of industry specialists, and decision-making structure that enables organisations across the value-chain to interlock their visions and strategic plans for hydrogen e.g., import, produce, store, distribute (road, pipeline, shipping), use hydrogen.</p> <hr/> <p><b>Lead</b> – States of Guernsey</p>
	B – Establish a hydrogen vision for Guernsey	<p><b>Purpose</b> – Explore the potential to position Guernsey as a hydrogen Island and economy, which creates a ‘circular economy’ that produces, imports, stores and transports hydrogen for multiple use cases, including power, heat and heavy goods vehicles on the Island, and possibly export from the Island.</p> <hr/> <p><b>Lead</b> – States of Guernsey</p>
	C – Identify solution options and roles	<p><b>Purpose</b> – Identify the value-chain for hydrogen, including production, storage, distribution and utilisation, along with sizing of infrastructure and need for infrastructure deployment and/or upgrades.</p> <hr/> <p><b>Lead</b> – Industry specialists including Guernsey Electricity Limited, Guernsey Energy, Fuel &amp; Gas Logistics/Storage, Investors etc.</p>
	D – Engage with technology suppliers	<p><b>Purpose</b> – Research providers of technologies and services that will enable the hydrogen vision, infrastructure and processes to be realised – from design through to operation and seek input through presentations and formal RFI.</p> <hr/> <p><b>Lead</b> – States of Guernsey with support from specialist hydrogen expertise</p>
	E – Carry out an initial feasibility assessment	<p><b>Purpose</b> – Identify possible site locations and routes for hydrogen-related infrastructure to be deployed, consider opportunities to minimise investment and disruption by utilising and upgrading existing sites, facilities and networks.</p> <hr/> <p><b>Lead</b> – States of Guernsey and/or appointed hydrogen lead organisation</p>
	F – Build the end-to-end high-level business case	<p><b>Purpose</b> – Build a total expenditure and trading model to demonstrate how value-chain participants can derive an attractive return on investment and annuity business model from hydrogen.</p> <hr/> <p><b>Lead</b> – States of Guernsey and/or appointed hydrogen lead organisation</p>
	G – Monitor industry progression and proof-points	<p><b>Purpose</b> – Once vision and high-level business case has been proven in principle, monitor the broader global landscape so that an Island-wide investment decision can be made when there is a high level of confidence.</p> <hr/> <p><b>Lead</b> – States of Guernsey and/or appointed hydrogen lead organisation</p>
<b>Timeline</b>	January 2026 – December 2030	
<b>Policy lever options</b>	<b>Economic Policy</b> (encourage multi-party involvement in production of and/or distribution of hydrogen fuel source); <b>Energy Policy</b> (clarify role in security of supply); <b>Planning &amp; Consenting Policy</b> (allocate site(s), building(s) and infrastructure route(s), and in time approve necessary builds and civils works).	
<b>Outcomes</b>	A clear signal to industry players and investors that Guernsey sees the potential of hydrogen to create employment and grow the economy through use cases that decarbonise power, heating and transport.	

<b>Initiative</b>	5.2.5 – Assess options and plan for future development of the electricity network	
<b>Sponsor</b>	Guernsey Electricity Limited	
<b>Description</b>	The <i>future electricity demand and supply strategy</i> for Guernsey anticipates significant potential demand growth due to the widespread connection of new loads such as electric vehicle chargers and electric space heating. In addition, the anticipated connection of solar generation at numerous locations is expected to modify power flows on the network during daylight hours. The electricity network will require reinforcement and possible expansion to accommodate these new conditions.	
<b>Energy Policy objective alignment</b>	<ul style="list-style-type: none"> <li>Decarbonisation</li> <li>Security and resilience of supply</li> <li>Greater energy independence</li> <li>Supportive of a vibrant economy</li> </ul>	
	A – Develop detailed future demand and generation scenarios up to 2050	<p><b>Purpose</b> – The <i>future electricity demand and supply strategy</i> described in this document should be used as the basis for more detailed forecast of the anticipated evolution of demand and embedded generation across the distribution network, including each 11kV substation and possibly considering individual low voltage circuits. This analysis should consider several scenarios around the expected rate of connection of new demand or generation.</p> <p><b>Lead</b> – Guernsey Electricity Limited</p>
	B – Develop detailed network reinforcement and expansion options up to 2040	<p><b>Purpose</b> – The ability of the existing electricity network to accommodate the anticipated demand/generation scenarios should be assessed through detailed technical analysis, considering power flows at all voltage levels. This analysis should consider, as a minimum:</p> <ul style="list-style-type: none"> <li>• Planned and unplanned outages of key equipment.</li> <li>• Retirement and replacement of end-of-life assets</li> <li>• System and demand security</li> <li>• System short circuit levels</li> <li>• Power quality (harmonics and voltage stability)</li> </ul> <p><b>Lead</b> – Guernsey Electricity Limited</p>
	C – Develop expenditure plans up to 2040	<p><b>Purpose</b> – Derive the CapEx and OpEx streams required to deliver the network developments identified.</p> <p><b>Lead</b> – Guernsey Electricity Limited</p>
	D – Develop programme of network developments up to 2030	<p><b>Purpose</b> – Derive a programme of required works to implement the first phase of the required network developments, up to year 2030.</p> <p><b>Lead</b> – Guernsey Electricity Limited</p>
	E – Revisit and revise	<p><b>Purpose</b> – The demand/generation forecasts and associated network development plans should be revisited at regular intervals, on an ongoing basis, to re-assess them against the actual demand/generation changes seen on the electricity network.</p> <p><b>Lead</b> – Guernsey Electricity Limited</p>
<b>Timeline</b>	September 2023 – December 2030 (for second interconnector) and December 2035 (for offshore wind) and generally as an ongoing business-as-usual activity.	
<b>Policy lever options</b>	The States of Guernsey may need to issue direction to Guernsey Electricity Limited, including security of supply sizing linked with initiative 5.2.2 and associated timelines for delivery of a second interconnector, including planning and consenting approvals relating to sites, buildings, assets and logistics.	
<b>Outcomes</b>	Development of the electricity network at a pace commensurate with the changes in demand and generation, such that network capacity constraints are avoided as much as is reasonably practicable.	

<b>Initiative</b>	5.2.6 – Introduce digitalisation and flexibility services	
<b>Sponsor</b>	Guernsey Electricity Limited	
<b>Description</b>	Upgrading Guernsey’s electricity network will bring opportunities and challenges in terms of its operation. Developing a digital framework for this network transformation will ensure that any investment and programmes are futureproof and will be fit for purpose as new technologies become accessible	
<b>Energy Policy objective alignment</b>	<ul style="list-style-type: none"> <li>Security and resilience of supply</li> <li>Greater energy independence</li> <li>Consumer value and choice</li> <li>Equity and fairness</li> <li>Supportive of a vibrant economy</li> </ul>	
<b>Actions</b>		
	A – Define the requirements for grid digitalisation	<p><b>Purpose</b> – Develop a short-term and long-term vision of digital services that the grid could provide, considering the previously discussed need for EVs and eHeating to interact flexibly with the network</p> <hr/> <p><b>Lead</b> – Guernsey Electricity Limited</p>
	B – Explore innovation opportunities	<p><b>Purpose</b> – Identify opportunities that Guernsey’s unique position as an Island network enables and the value that living lab type projects could provide to international equivalents</p> <hr/> <p><b>Lead</b> – Guernsey Electricity Limited</p>
	C – Create a digital twin of the network	<p><b>Purpose</b> – Develop and maintain a low-level digital representation of Guernsey’s electricity network to act as a:</p> <ul style="list-style-type: none"> <li>• Virtual testbed for network improvements</li> <li>• Operational interface for day-to-day activities</li> <li>• Maintenance and compliance tool</li> <li>• Integration platform for auxiliary information</li> </ul> <hr/> <p><b>Lead</b> – Guernsey Electricity Limited</p>
	D – Establish interconnected smart grid	<p><b>Purpose</b> – Procure and deploy network equipment that optimises the use of locally generated renewable energy by sending targeted signals to nearby loads and storage assets, thus reducing distribution losses, and increasing overall performance</p> <hr/> <p><b>Lead</b> – Guernsey Electricity Limited</p>
	E – Integrate Internet of Things (IoT) devices	<p><b>Purpose</b> – Deploy or capture information from IoT devices, which will enable the accurate prediction of weather events, asset locations and other energy relevant indicators to optimise operation</p> <hr/> <p><b>Lead</b> – States of Guernsey, Guernsey Electricity Limited and Energy Partnership</p>
	F – Strengthen cyber security	<p><b>Purpose</b> – Regularly review, stress-test and strengthen cyber-security measures of any digitalised services with the view to de-couple critical and from non-critical operations, and de-risk unintended or malicious incidents</p> <hr/> <p><b>Lead</b> – Guernsey Electricity Limited</p>
<b>Timeline</b>	January 2025 – December 2030	
<b>Policy lever options</b>	<p><b>Energy Policy</b> (opportunity for flexibility services and associated conditions relating to benefits, enablement and participation); <b>Economic Policies</b> (encourage incumbent and new organisations to develop retail service offer); <b>Data &amp; Consumer Protection Policies</b> (identify acceptable use of collected data and service provider conditions relating to services offered); <b>Digital Policy</b> (providing necessary connectivity via fixed and mobile networks).</p>	
<b>Outcomes</b>	A modern and secure electricity network that can cater the needs of flexible loads and enable a digital economy to thrive	

### 5.3 Electricity transition initiatives

<b>Initiative</b>	5.3.1 – Invest in resources and develop skills to enable the energy transition	
<b>Sponsor</b>	States of Guernsey	
<b>Description</b>	The introduction of renewable technologies and enabling the scaled adoption of EVs and eHeating will require key organisations to grow their skills and knowledge, achieved by onboarding permanent and contract headcount and procuring services from third party providers. Accelerating this process will require a coordinated approach, involving government and industry players.	
<b>Energy Policy objective alignment</b>	Supportive of a vibrant economy	
<b>Actions</b>		
	A – Identify skills needs and gaps in upstream, downstream and retail.	<p><b>Purpose</b> – Engage with Energy Partnership members to understand their enablers and barriers to growth and achieving the energy transition in a timely manner. Map out skills gaps and resource levels over time to achieve a holistic energy sector view.</p> <p><b>Lead</b> – States of Guernsey</p>
	B – Engage with further education providers and enterprises to develop courses and apprenticeships.	<p><b>Purpose</b> – Engage with on-island providers of further education and training to identify the availability and suitability of courses and qualifications and encourage links with the energy sector to develop industry-relevant courses and encourage industry players to develop apprenticeship schemes.</p> <p><b>Lead</b> – States of Guernsey</p>
	C – Engage with Energy Partnership to explore a shared services model for skills and resources.	<p><b>Purpose</b> – Where organisations have common skill needs but with scale challenges, consider opportunities to encourage service-based organisations to provide such skills on a ‘shared services’ basis across the energy sector e.g., renewable technology installers and maintainers, software developers etc.</p> <p><b>Lead</b> – States of Guernsey - Committee for the Environment and Infrastructure</p>
	D – Prioritise key workers in net migration strategy and plans	<p><b>Purpose</b> – Identify the opportunity at a policy level to attract specific skills to live and work on Guernsey, in conjunction with plans to grow net migration levels.</p> <p><b>Lead</b> – States of Guernsey</p>
	E – Consider incentives to attract businesses and start-ups e.g., Lighthouse	<p><b>Purpose</b> – Identify organisations in geographically adjacent markets (e.g., Jersey, UK, France) that might seek to establish a presence in Guernsey to enable and support the energy transition and consider support that might be offered to encourage start-up enterprises on the Island.</p> <p><b>Lead</b> – States of Guernsey</p>
	F – Consider developing a skills network across the Channel Islands	<p><b>Purpose</b> – Engage with stakeholders on neighbouring Channel Islands to explore common interests and identify whether skills-related initiatives could be developed and promoted across the region.</p> <p><b>Lead</b> – States of Guernsey</p>
<b>Timeline</b>	September 2023 – December 2030	
<b>Policy lever options</b>	<b>Economic &amp; Employment Policies</b> (attract companies and start-ups); <b>Education &amp; Migration Policies</b> (develop and attract skills, which might include use of permanent and temporary workers as part of net migration targets).	
<b>Outcomes</b>	Joined up skills plan that interlocks policy, industry and educational providers, leading to the right type of skills and resource levels on the Island to enable the energy transition and operate its complexities and opportunities, and resulting in gross value added to Guernsey’s economy.	

<b>Initiative</b>	5.3.2 Establish multi-party engagement to deliver the future electricity demand and supply strategy	
<b>Sponsor</b>	States of Guernsey	
<b>Description</b>	Introducing on-island renewables provides opportunities for organisations in the energy sector to contribute to the <i>future electricity demand and supply strategy</i> for Guernsey. A 'circular economy' will encourage existing enterprises and new entrants to invest, build and operate energy-related infrastructure and services that will enable, for example, a supply of hydrogen for a fuel cell, electrification of vehicles and heating, and distributed energy resources and smart technologies at scale. Review this initiative in conjunction with Appendix D – Considerations for stakeholder engagement and communication.	
<b>Energy Policy objective alignment</b>	<ul style="list-style-type: none"> <li>Decarbonisation</li> <li>Security and resilience of supply</li> <li>Greater energy independence</li> <li>Consumer value and choice</li> <li>Equity and fairness</li> <li>Supportive of a vibrant economy</li> </ul>	
<b>Actions</b>		<p><b>Purpose</b> – Identify and address inter-dependencies between on-island providers and distributors of electricity, gas and fuels to achieve the transition to renewable and cleaner electricity e.g., supply of hydrogen and/or low carbon fuels to Guernsey Electricity Limited.</p> <hr/> <p><b>Lead</b> – Guernsey Electricity Limited (for thermal power plant), States of Guernsey (for whole industry perspective)</p> <hr/> <p><b>Purpose</b> – Establish working groups focused on 'upstream' (e.g., production, generation, storage), 'downstream' (e.g., networks, charging infrastructure, logistics) and 'retail' (e.g., behind the meter) and encourage organisations to develop 'circular economy' opportunities and innovation.</p> <hr/> <p><b>Lead</b> – States of Guernsey</p> <hr/> <p><b>Purpose</b> – Engage with the on-island financial services industry to ascertain sources of investment and partnership models across Guernsey's electricity landscape and then promote the opportunities to investors, globally.</p> <hr/> <p><b>Lead</b> – States of Guernsey</p> <hr/> <p><b>Purpose</b> - Sponsor vision and ambition for large-scale offshore wind and second interconnector with neighbouring jurisdictions and pass relevant policies and legislation in areas such as energy, transport and buildings etc.</p> <hr/> <p><b>Lead</b> – States of Guernsey</p> <hr/> <p><b>Purpose</b> - Engage specialist organisations to carry out surveys, feasibilities and designs, and then appoint Engineering, Procurement &amp; Construction (EPC) contractor to lead on the delivery of offshore wind and interconnector to agreed cost, time and performance guarantees.</p> <hr/> <p><b>Lead</b> – Guernsey Electricity Limited</p> <hr/> <p><b>Purpose</b> – Consult with enterprises and citizens to encourage adoption and behavioural change across the transport and buildings (efficiency, heat) sectors and encourage prosumer participation in a distributed smart grid.</p> <hr/> <p><b>Lead</b> – States of Guernsey</p>
<b>Timeline</b>	September 2023 – March 2025	
<b>Policy lever options</b>	Not applicable for the nature of the initiative, although participation will likely identify a role for wide-ranging policies to enable positive change e.g., <b>Licensing</b> (roles in fuels, gases, hydrogen); <b>Highways &amp; Transport Policies</b> (EV charging infrastructure and services); <b>Foreign Policy</b> (neighbouring Islands/nations); <b>Trade Policy</b> (import services, resources etc.); <b>Net Migration Policy</b> (skills acquisition).	
<b>Outcomes</b>	Comprehensive and sustained engagement with stakeholders that enables the <i>future electricity demand and supply strategy</i> for Guernsey to be successfully enacted.	

## FUTURE ELECTRICITY DEMAND AND SUPPLY STRATEGY FOR GUERNSEY

## 6.0 Conclusions and recommendations

The **Dual Interconnectors with Offshore Wind (D)** supply pathway, comprised of large-scale offshore wind, second interconnector and continued solar PV growth, offers the best electricity supply pathway for the Island. It offers diverse and secure electricity supply, uses proven technologies that will result in an overall lower system price of electricity, and ranks highly when assessed against the decarbonisation, security and resilience of supply, and economic growth objectives of the Energy Policy.

The Dual Interconnectors with Offshore Wind (D) supply pathway provides access to the **most diverse number of electricity supply sources and produces the lowest level of emissions** of all six possible supply pathways. The second interconnector with a higher level of capacity will best support Guernsey's increased peak power demand up to 2050, due to population growth and electrification. Considering a total of 15,445 GWh produced up to 2050, the system price of electricity for the Dual Interconnectors with Offshore Wind (D) supply pathway will average £112/MWh (11.2p/kWh), which is 14% lower than the Base Case (A) supply pathway and 2% higher than the Renewables First (C) pathway.

The Dual Interconnectors with Offshore Wind (D) supply pathway provides a realistic target to transition from the Base Case (A) supply pathway and will accommodate elements of the Renewables First (C), Dual Interconnectors without Offshore Wind (E) and Lighthouse (F) supply pathways to be enacted, should future circumstances necessitate a change in direction for Guernsey's electricity supply mix.

Implementing this *future electricity demand and supply strategy* will enable Guernsey to be recognised for its commitment to low carbon electricity, facilitating the transition to net-zero and achieving a **secure, clean and affordable electricity future for all**. This will have the effect of boosting energy security, offering the potential to unlock economic growth opportunities across the Island, and playing a valuable role in protecting Guernsey's unique surroundings for future generations.

It is recommended that the new GF1 interconnector and the offshore windfarm infrastructure projects are initiated immediately with the GF1 interconnector prioritised, particularly as the associated tariff negotiation will influence the business case for the offshore windfarm and its sizing. Whilst the interconnector also provides an opportunity to spill export surplus generation from renewables, this is not a requirement for its financial viability.

Not acting will still require investment in the existing electricity system, increase risk to energy security, resilience and affordability in the short- to medium-term and additionally expose the Island to long-term economic and climate threats.

Prompt decisions and priority actions are required to initiate the *future electricity demand and supply strategy* for Guernsey. Within the next six months, the following initiatives should be initiated and expedited:

1. Communicate the *future electricity demand and supply strategy* for Guernsey to key **stakeholder groups**, along with a clear call to action for their participation.
2. Decide how a **second interconnector** should be contracted, initiate commercial negotiations and commence preliminary works.
3. Develop a procurement strategy, process and timeline for an **offshore windfarm**, commission a detailed feasibility study and engage with offshore wind developers.
4. Develop a programme for the phased replacement of **thermal power plant** assets.
5. Initiate a **multi-year programme** of works to implement the Strategy, along with a structured engagement with Energy Partnership organisations and a communication plan covering key stakeholder groups.
6. Carry out **skills and experience** gap analysis and consider options to develop, attract and procure the necessary skills and experience for each stage of the Strategy.

## Appendix A – Technology exclusions

Certain technologies and fuel sources were considered and excluded during the study and were not modelled due to either restricted availability, technical limitations, or excessively high costs (see Table 9).

Table 9 - Technologies excluded from the future electricity supply pathway assessment

	<b>Excluded Technology / Fuel</b>	<b>Rationale for exclusion</b>
Renewables	Large onshore wind	<ul style="list-style-type: none"> <li>Large onshore wind turbines require a minimum distance of 2km from residential properties to avoid noise pollution and light flicker.</li> </ul>
	Micro onshore wind	<ul style="list-style-type: none"> <li>Micro wind turbines are inefficient and are not economically viable.</li> </ul>
	Wave	<ul style="list-style-type: none"> <li>Wave generation technology is currently in the demonstration and pre-commercialisation stage.</li> </ul>
	Tidal Range	<ul style="list-style-type: none"> <li>Previous assessments for Guernsey were unable to identify economically viable options and suggested low public support.</li> </ul>
	Floating solar PV	<ul style="list-style-type: none"> <li>Requires large areas of shielded open water with no vessel traffic.</li> <li>Issues with salt deposit build-up.</li> </ul>
Storage & management	Compressed air storage	<ul style="list-style-type: none"> <li>Natural caverns are needed to store the compressed air at scale.</li> <li>Liquid compressed air storage has limited potential capacity and requires significant investment.</li> </ul>
	Domestic battery storage	<ul style="list-style-type: none"> <li>Electric vehicles (EV) represent the same opportunities as domestic batteries, with the added benefit of transport. With Guernsey having comparable short average driving distances, the battery capacity in EVs can be used as a replacement for static battery storage.</li> </ul>
Thermal power plant low carbon fuels	Import: Biofuels	<ul style="list-style-type: none"> <li>Biofuels for power generation were not cost competitive when modelled under different supply pathways.</li> </ul>
	Import: Synthetic fuels	<ul style="list-style-type: none"> <li>Require extensive processing leading to poor overall efficiencies and high fuel costs.</li> </ul>
	Import: Biomass or waste (incineration)	<ul style="list-style-type: none"> <li>Availability and sustainability of supply concerns – largely from Canada and Brazil.</li> <li>Limited waste fuel source and practice conflicts with Guernsey's waste policy.</li> </ul>
	Production: Biogas (solid food waste Anaerobic Digestion)	<ul style="list-style-type: none"> <li>Limited fuel source.</li> <li>Processing required with limited electricity production potential.</li> </ul>
	Production: Hydrogen (from fossil fuels)	<ul style="list-style-type: none"> <li>The round-trip efficiency of importing fuels to generate hydrogen would be in single-digit figures and not significantly contribute to Guernsey's net-zero target.</li> </ul>
Alternative thermal power plants	Waste incineration	<ul style="list-style-type: none"> <li>Conflicts with waste reduction policy.</li> <li>Prohibitively high costs ~£75m investment to satisfy ~5% of electricity demand.</li> </ul>
	Nuclear	<ul style="list-style-type: none"> <li>Prohibitively high cost (&gt;£1bn) and footprint.</li> <li>Small-scale reactors are not commercially available</li> </ul>
	Combined Heat and Power (CHP)	<ul style="list-style-type: none"> <li>No heat network (heat sink) exists and retrofitting one will cause significant disruption.</li> </ul>

## Appendix B – Key assumptions

Siemens' MM.ESD Software Tool was used to develop the model and findings discussed in this strategy report. A list of key assumptions used to develop this strategy and parameterise the associated model are listed under the categories below:

### Scope and Delivery

- Excludes aviation, marine, upcoming industries.
- Timeframe: from 2021 to 2050.

### Model and Methodology

- Model optimised for cost, energy and power. A carbon price was not considered in the optimisation parameters.
- Baseline demand represents the network demand as seen in 2021 and scaled accordingly in future years. It is assumed that the included behind-the-meter generation as well as the thus offset demand is negligible.
- All future electricity demand and generation are assessed separately, without consideration of point of origin within the network.
- Modelling was conducted on a 5-year basis, with stated years representing a typical year within the following 5-year period.
- Fixed parameters within the model included the size of existing assets, as well as the GF1 and solar PV capacities. Other project capacities were determined by the model based on a holistic optimisation algorithm.
- Weighted Average Cost of Capital (WACC) of 6% was used for all new investments.
- Where required, a fixed exchange rate of 0.82 was used for \$ to £ conversation, and 0.90 was used for € to £ conversions.
- For modelling purposes, it is assumed that:
  - GJ1 and GF1 cannot be operated simultaneously.
  - The security of supply can be reduced from N-2 to N when GF1 becomes operational.
- For the demand sensitivity analysis, the following population numbers were assumed based on net-migration estimates of +150 and +300 (Ref: [Committee for Home Affairs – Population & Immigration Policy Review, P.2022/81](#)):

	Sensitivity Analysis		
	Low Demand	Moderate Demand	High Demand
2021	63,155	63,155	63,155
2025	63,750	64,500	64,500
2030	64,250	65,750	65,750
2035	64,000	66,500	66,500
2040	63,750	67,000	67,000
2045	63,250	67,750	67,750
2050	62,500	68,000	68,000

### Demand Technologies and Costs

<b>Baseline Demand</b>	<ul style="list-style-type: none"> <li>Overall electrical efficiency improvements have been assumed and applied to the Baseline Demand as follows (Ref: <a href="#">System Transformation - Future Energy Scenarios 2022   National Grid ESO</a>):</li> </ul>
	<b>Improvement in Overall Energy Efficiency</b>
	2021      0%
	2025      8%
	2030      16%
	2035      17%
	2040      17%
	2045      15%
2050      14%	

<b>Electric Heating</b>	<ul style="list-style-type: none"> <li>Overall heating load efficiency improvements have been assumed and applied to the reference heat demand as follows (Ref: <a href="#">Falling Short - Future Energy Scenarios 2022   National Grid ESO</a>):</li> </ul>																																		
	<b>Improvement in Heat Load Efficiency</b>																																		
	2021      0%																																		
	2025      2%																																		
	2030      7%																																		
	2035      13%																																		
	2040      17%																																		
	2045      20%																																		
	2050      21%																																		
	<ul style="list-style-type: none"> <li>An average Coefficient Of Performance (COP) factor of 2 was used to represent new eHeating systems, with the following underlying assumption:</li> </ul>																																		
<table border="1"> <thead> <tr> <th>Heating Technology</th> <th>Proportion in 2050</th> <th>COP</th> </tr> </thead> <tbody> <tr> <td>Existing Direct Electric</td> <td style="text-align: center;">35%</td> <td style="text-align: center;">1</td> </tr> <tr> <td>New Direct Electric</td> <td style="text-align: center;">30%</td> <td style="text-align: center;">1</td> </tr> <tr> <td>New Air Source Heat Pump</td> <td style="text-align: center;">20%</td> <td style="text-align: center;">3</td> </tr> <tr> <td>District Heating</td> <td style="text-align: center;">5%</td> <td style="text-align: center;">4</td> </tr> <tr> <td>Non-Electric</td> <td style="text-align: center;">10%</td> <td style="text-align: center;">-</td> </tr> </tbody> </table>	Heating Technology	Proportion in 2050	COP	Existing Direct Electric	35%	1	New Direct Electric	30%	1	New Air Source Heat Pump	20%	3	District Heating	5%	4	Non-Electric	10%	-																	
Heating Technology	Proportion in 2050	COP																																	
Existing Direct Electric	35%	1																																	
New Direct Electric	30%	1																																	
New Air Source Heat Pump	20%	3																																	
District Heating	5%	4																																	
Non-Electric	10%	-																																	
<ul style="list-style-type: none"> <li>For the demand sensitivity analysis, the following uptake percentages were assumed:</li> </ul>																																			
<table border="1"> <thead> <tr> <th rowspan="2"></th> <th colspan="3">Sensitivity Analysis</th> </tr> <tr> <th>Low Demand</th> <th>Moderate Demand</th> <th>High Demand</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">2021</td> <td style="text-align: center;">35%</td> <td style="text-align: center;">35%</td> <td style="text-align: center;">35%</td> </tr> <tr> <td style="text-align: center;">2025</td> <td style="text-align: center;">43%</td> <td style="text-align: center;">45%</td> <td style="text-align: center;">45%</td> </tr> <tr> <td style="text-align: center;">2030</td> <td style="text-align: center;">50%</td> <td style="text-align: center;">54%</td> <td style="text-align: center;">55%</td> </tr> <tr> <td style="text-align: center;">2035</td> <td style="text-align: center;">58%</td> <td style="text-align: center;">63%</td> <td style="text-align: center;">65%</td> </tr> <tr> <td style="text-align: center;">2040</td> <td style="text-align: center;">65%</td> <td style="text-align: center;">72%</td> <td style="text-align: center;">75%</td> </tr> <tr> <td style="text-align: center;">2045</td> <td style="text-align: center;">73%</td> <td style="text-align: center;">81%</td> <td style="text-align: center;">85%</td> </tr> <tr> <td style="text-align: center;">2050</td> <td style="text-align: center;">80%</td> <td style="text-align: center;">90%</td> <td style="text-align: center;">95%</td> </tr> </tbody> </table>		Sensitivity Analysis			Low Demand	Moderate Demand	High Demand	2021	35%	35%	35%	2025	43%	45%	45%	2030	50%	54%	55%	2035	58%	63%	65%	2040	65%	72%	75%	2045	73%	81%	85%	2050	80%	90%	95%
		Sensitivity Analysis																																	
	Low Demand	Moderate Demand	High Demand																																
2021	35%	35%	35%																																
2025	43%	45%	45%																																
2030	50%	54%	55%																																
2035	58%	63%	65%																																
2040	65%	72%	75%																																
2045	73%	81%	85%																																
2050	80%	90%	95%																																

<b>Electric Vehicles</b>	<ul style="list-style-type: none"> <li>For the demand sensitivity analysis, the following uptake percentages were assumed:</li> </ul>																																			
	<table border="1"> <thead> <tr> <th rowspan="2"></th> <th colspan="3">Sensitivity Analysis</th> </tr> <tr> <th>Low Demand</th> <th>Moderate Demand</th> <th>High Demand</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">2021</td> <td style="text-align: center;">2%</td> <td style="text-align: center;">2%</td> <td style="text-align: center;">2%</td> </tr> <tr> <td style="text-align: center;">2025</td> <td style="text-align: center;">5%</td> <td style="text-align: center;">10%</td> <td style="text-align: center;">12%</td> </tr> <tr> <td style="text-align: center;">2030</td> <td style="text-align: center;">35%</td> <td style="text-align: center;">40%</td> <td style="text-align: center;">42%</td> </tr> <tr> <td style="text-align: center;">2035</td> <td style="text-align: center;">65%</td> <td style="text-align: center;">70%</td> <td style="text-align: center;">72%</td> </tr> <tr> <td style="text-align: center;">2040</td> <td style="text-align: center;">83%</td> <td style="text-align: center;">88%</td> <td style="text-align: center;">90%</td> </tr> <tr> <td style="text-align: center;">2045</td> <td style="text-align: center;">87%</td> <td style="text-align: center;">92%</td> <td style="text-align: center;">94%</td> </tr> <tr> <td style="text-align: center;">2050</td> <td style="text-align: center;">90%</td> <td style="text-align: center;">95%</td> <td style="text-align: center;">97%</td> </tr> </tbody> </table>		Sensitivity Analysis			Low Demand	Moderate Demand	High Demand	2021	2%	2%	2%	2025	5%	10%	12%	2030	35%	40%	42%	2035	65%	70%	72%	2040	83%	88%	90%	2045	87%	92%	94%	2050	90%	95%	97%
			Sensitivity Analysis																																	
		Low Demand	Moderate Demand	High Demand																																
	2021	2%	2%	2%																																
	2025	5%	10%	12%																																
	2030	35%	40%	42%																																
	2035	65%	70%	72%																																
	2040	83%	88%	90%																																
	2045	87%	92%	94%																																
2050	90%	95%	97%																																	

### Supply Technologies and Costs

<b>Interconnectors</b>	<ul style="list-style-type: none"> <li>• GJ1’s contracted nominal operational capacity is 60 MW, however a practical limit of 57 MW was used in the model to account for losses and other factors.</li> <li>• GF1’s nominal operational capacity is fixed at 100 MW.</li> <li>• Rates currently in place will change by 2030 and will be applicable to both GJ1 and GF1.</li> <li>• Import and export tariffs have the same profile as the current one (not included as commercially sensitive).</li> <li>• Import electricity contract renegotiated every 10 years and in line with wider EU prices (Ref: <a href="#">EU Reference Scenario 2020 – Energy, transport and GHG emissions – Trends to 2050</a>):</li> </ul> <table border="1" style="margin-left: 20px;"> <thead> <tr> <th></th> <th>Interconnector Tariff (EUR/MWh)</th> </tr> </thead> <tbody> <tr> <td>2030</td> <td>138</td> </tr> <tr> <td>2040</td> <td>138</td> </tr> <tr> <td>2050</td> <td>141</td> </tr> </tbody> </table> <ul style="list-style-type: none"> <li>• In line with the consultation report, it is assumed that spill export of excess electricity will be possible via GF1 and won’t be possible via GJ1.</li> <li>• OpEx equivalent to today’s cost applied per circuit with one circuit assumed for GF1 and 2.11 circuits assumed for GJ1, taking Guernsey Electricity Limited’s ownership split into account for the four circuits associated with the CIEG.</li> <li>• Carbon emissions factor for electricity imported via GJ1 or GF1 assumed to be 5.7 g/kWh.</li> </ul>		Interconnector Tariff (EUR/MWh)	2030	138	2040	138	2050	141
	Interconnector Tariff (EUR/MWh)								
2030	138								
2040	138								
2050	141								

<b>Offshore Wind</b>	<ul style="list-style-type: none"> <li>• Timescale of 5 to 10 years is required to deliver an offshore windfarm from the point of the decision to the commission.</li> <li>• Single size calculation to cover the period 2035 to 2050.</li> <li>• Highly conservative CapEx projection was used to account for Guernsey’s specific circumstances, including inexperience of delivering this type of project (Ref: <a href="#">Offshore Wind   Electricity   2021   ATB   NREL</a>, Fixed Bottom – Class 7 – Conservative + 10% uplift).</li> <li>• Moderate OpEx projection was used to align with industry developments (Ref: <a href="#">Offshore Wind   Electricity   2021   ATB   NREL</a>, Fixed Bottom – Class 3 – Moderate).</li> <li>• Costs include the operation, maintenance and replacement of critical components (e.g., turbine blades), together with insurance and other fixed costs, over the lifetime of the asset. It should be noted that the cost of repowering would be associated with the end-of-life replacement of an asset, and therefore not included.</li> </ul> <table border="1" style="margin-left: 20px;"> <thead> <tr> <th></th> <th>CapEx for Fixed-Bottom Offshore Windfarm (£/MW)</th> <th>OpEx for Fixed-Bottom Offshore wind (£/MW/year)</th> </tr> </thead> <tbody> <tr> <td>2021</td> <td>3,708,471</td> <td>87,375</td> </tr> <tr> <td>2025</td> <td>3,391,458</td> <td>77,611</td> </tr> <tr> <td>2030</td> <td>3,248,709</td> <td>70,773</td> </tr> <tr> <td>2035</td> <td>3,139,508</td> <td>66,190</td> </tr> <tr> <td>2040</td> <td>3,060,254</td> <td>62,737</td> </tr> <tr> <td>2045</td> <td>2,998,010</td> <td>59,966</td> </tr> <tr> <td>2050</td> <td>2,946,747</td> <td>57,652</td> </tr> </tbody> </table>		CapEx for Fixed-Bottom Offshore Windfarm (£/MW)	OpEx for Fixed-Bottom Offshore wind (£/MW/year)	2021	3,708,471	87,375	2025	3,391,458	77,611	2030	3,248,709	70,773	2035	3,139,508	66,190	2040	3,060,254	62,737	2045	2,998,010	59,966	2050	2,946,747	57,652
	CapEx for Fixed-Bottom Offshore Windfarm (£/MW)	OpEx for Fixed-Bottom Offshore wind (£/MW/year)																							
2021	3,708,471	87,375																							
2025	3,391,458	77,611																							
2030	3,248,709	70,773																							
2035	3,139,508	66,190																							
2040	3,060,254	62,737																							
2045	2,998,010	59,966																							
2050	2,946,747	57,652																							

<b>Solar PV</b>	<ul style="list-style-type: none"> <li>• A capacity factor of 2 MWp/ha was assumed for rooftop installations and 1.05 MWp/ha for ground-mount or car port installations.</li> <li>• Building floor areas and agricultural land areas were used to estimate the practical limits of solar PV deployment alongside their likely maximum uptake, see below (Source: States of Guernsey (2021) Annual Residential Property Stock Bulletin / TRP units):</li> </ul> <table border="1" style="margin-left: 20px;"> <thead> <tr> <th rowspan="2"></th> <th colspan="4">Domestic</th> </tr> <tr> <th>Apartments</th> <th>Bungalows</th> <th>Houses</th> <th>Other</th> </tr> </thead> <tbody> <tr> <td>Units (No.)</td> <td>6,542</td> <td>10,247</td> <td>10,298</td> <td>284</td> </tr> <tr> <td>Suitability Factor</td> <td>15%</td> <td>15%</td> <td>15%</td> <td>15%</td> </tr> <tr> <td>Maximum Uptake Factor</td> <td>100%</td> <td>100%</td> <td>100%</td> <td>100%</td> </tr> <tr> <td>Total Capacity (MWp)</td> <td>0.5</td> <td>5.7</td> <td>5.7</td> <td>0.1</td> </tr> </tbody> </table>		Domestic				Apartments	Bungalows	Houses	Other	Units (No.)	6,542	10,247	10,298	284	Suitability Factor	15%	15%	15%	15%	Maximum Uptake Factor	100%	100%	100%	100%	Total Capacity (MWp)	0.5	5.7	5.7	0.1
	Domestic																													
	Apartments	Bungalows	Houses	Other																										
Units (No.)	6,542	10,247	10,298	284																										
Suitability Factor	15%	15%	15%	15%																										
Maximum Uptake Factor	100%	100%	100%	100%																										
Total Capacity (MWp)	0.5	5.7	5.7	0.1																										

	Non-Domestic					
	Hostelry & Food	Warehouse	Office	Heavy Industry	Retail	Other (Incl. Glasshouses)
Area (ha)	19.5	41.7	78.3	11.9	19.3	14.6
Floor to Roof Area Ratio	10%	25%	10%	10%	25%	20%
Suitability Factor	25%	50%	25%	20%	25%	50%
Maximum Uptake Factor	100%	100%	100%	100%	100%	100%
Total Capacity (MWp)	1.0	10.4	3.9	0.5	2.4	5.2

	Public & Commercial	
	Agricultural Land & Glasshouses	Car Parks
Area (ha)	3087	47.8
Suitability Factor	1%	50%
Maximum Uptake Factor	24%	51%
Total Capacity (MWp)	7.8	12.8

- For the supply sensitivity analysis, the following uptake percentages were assumed:

	Sensitivity Analysis (Domestic)		
	Low Solar PV	Moderate Solar PV	High Solar PV
2021	5%	5%	5%
2025	12%	23%	23%
2030	25%	46%	46%
2035	39%	69%	69%
2040	53%	92%	92%
2045	67%	100%	100%
2050	82%	100%	100%

	Sensitivity Analysis (Non-Domestic)		
	Low Solar PV	Moderate Solar PV	High Solar PV
2021	2%	2%	2%
2025	12%	23%	23%
2030	25%	46%	46%
2035	39%	69%	69%
2040	53%	92%	92%
2045	67%	100%	100%
2050	82%	100%	100%

	Sensitivity Analysis (Agricultural)		
	Low Solar PV	Moderate Solar PV	High Solar PV
2021	1%	2%	4%
2025	5%	9%	14%
2030	6%	15%	24%
2035	8%	18%	36%
2040	9%	21%	48%
2045	11%	24%	48%
2050	12%	24%	48%

- Moderate CapEx and OpEx projections were used to align with industry developments for commercial and domestic solar PV installations (Ref: [Solar PV | Electricity | 2021 | ATB | NREL](#), Class 5 – Moderate):

	CapEx for Commercial PV (£/MW)	OpEx for Commercial PV (£/MW/year)	CapEx for Domestic PV (£/MW)	OpEx for Domestic PV (£/MW/year)
2021	1,375,413	14,640	2,082,417	22,459
2025	1,096,566	12,359	1,522,829	17,371
2030	748,006	9,507	823,344	11,012
2035	704,565	9,151	777,709	10,597
2040	661,124	8,796	732,074	10,182
2045	617,683	8,440	686,438	9,767
2050	574,241	8,085	640,803	9,352

<p><b>Thermal Power Plant</b></p>	<ul style="list-style-type: none"> <li>Moderate CapEx and OpEx projections were used to align with the maturity of engine technology (Ref: <a href="#">Fossil Energy Technologies   Electricity   2021   ATB   NREL</a>, Natural Gas – Moderate):</li> </ul> <table border="1"> <thead> <tr> <th></th> <th>CapEx for Fossil Fuel Engines (£/MW)</th> <th>OpEx for Fossil Fuel Engines (£/MW/year)</th> </tr> </thead> <tbody> <tr> <td>2021</td> <td>2,028,363</td> <td>53,382</td> </tr> <tr> <td>2025</td> <td>1,889,003</td> <td>52,808</td> </tr> <tr> <td>2030</td> <td>1,776,615</td> <td>51,906</td> </tr> <tr> <td>2035</td> <td>1,652,540</td> <td>50,594</td> </tr> <tr> <td>2040</td> <td>1,541,052</td> <td>49,528</td> </tr> <tr> <td>2045</td> <td>1,475,418</td> <td>49,528</td> </tr> <tr> <td>2050</td> <td>1,393,600</td> <td>49,528</td> </tr> </tbody> </table> <ul style="list-style-type: none"> <li>It should be noted that OpEx excludes fuel purchase costs.</li> </ul>		CapEx for Fossil Fuel Engines (£/MW)	OpEx for Fossil Fuel Engines (£/MW/year)	2021	2,028,363	53,382	2025	1,889,003	52,808	2030	1,776,615	51,906	2035	1,652,540	50,594	2040	1,541,052	49,528	2045	1,475,418	49,528	2050	1,393,600	49,528								
	CapEx for Fossil Fuel Engines (£/MW)	OpEx for Fossil Fuel Engines (£/MW/year)																															
2021	2,028,363	53,382																															
2025	1,889,003	52,808																															
2030	1,776,615	51,906																															
2035	1,652,540	50,594																															
2040	1,541,052	49,528																															
2045	1,475,418	49,528																															
2050	1,393,600	49,528																															
<p><b>Hydrogen Fuel Cell</b></p>	<ul style="list-style-type: none"> <li>Hydrogen fuel cells are not a fully matured technology yet and best available data was used to project future prices (Ref: <a href="#">US Department of Energy – 2020 Grid Energy Storage Technology Cost and Performance Assessment</a>):</li> </ul> <table border="1"> <thead> <tr> <th></th> <th>CapEx for Hydrogen Fuel Cell (£/MW)</th> <th>OpEx for Hydrogen Fuel Cell (£/MW/year)</th> </tr> </thead> <tbody> <tr> <td>2021</td> <td>1,137,340</td> <td>11,373</td> </tr> <tr> <td>2025</td> <td>1,033,200</td> <td>10,332</td> </tr> <tr> <td>2030</td> <td>856,900</td> <td>8,569</td> </tr> <tr> <td>2035</td> <td>716,000</td> <td>7,160</td> </tr> <tr> <td>2040</td> <td>596,000</td> <td>5,960</td> </tr> <tr> <td>2045</td> <td>476,000</td> <td>4,760</td> </tr> <tr> <td>2050</td> <td>356,000</td> <td>3,560</td> </tr> </tbody> </table> <ul style="list-style-type: none"> <li>It should be noted that OpEx excludes fuel purchase costs.</li> </ul>		CapEx for Hydrogen Fuel Cell (£/MW)	OpEx for Hydrogen Fuel Cell (£/MW/year)	2021	1,137,340	11,373	2025	1,033,200	10,332	2030	856,900	8,569	2035	716,000	7,160	2040	596,000	5,960	2045	476,000	4,760	2050	356,000	3,560								
	CapEx for Hydrogen Fuel Cell (£/MW)	OpEx for Hydrogen Fuel Cell (£/MW/year)																															
2021	1,137,340	11,373																															
2025	1,033,200	10,332																															
2030	856,900	8,569																															
2035	716,000	7,160																															
2040	596,000	5,960																															
2045	476,000	4,760																															
2050	356,000	3,560																															
<p><b>Grid-scale Battery Storage</b></p>	<ul style="list-style-type: none"> <li>Utility scale Lithium-ion battery system projections with moderate certainty were used: (Ref: <a href="#">Technology Data for Energy Storage   Energistyrelsen (ens.dk)</a>):</li> </ul> <table border="1"> <thead> <tr> <th></th> <th>CapEx for Battery Power Converter (£/MW)</th> <th>CapEx for Battery Energy Storage (£/MWh)</th> <th>OpEx for Battery System (£/MW/year)</th> </tr> </thead> <tbody> <tr> <td>2021</td> <td>243,000</td> <td>208,800</td> <td>34,720</td> </tr> <tr> <td>2025</td> <td>183,427</td> <td>157,611</td> <td>26,210</td> </tr> <tr> <td>2030</td> <td>155,688</td> <td>133,776</td> <td>22,240</td> </tr> <tr> <td>2035</td> <td>145,957</td> <td>125,415</td> <td>20,850</td> </tr> <tr> <td>2040</td> <td>136,227</td> <td>117,054</td> <td>19,460</td> </tr> <tr> <td>2045</td> <td>126,496</td> <td>108,693</td> <td>18,070</td> </tr> <tr> <td>2050</td> <td>116,766</td> <td>100,332</td> <td>16,680</td> </tr> </tbody> </table> <ul style="list-style-type: none"> <li>Both the power converter and energy storage packs need to be purchased for the operation of any battery storage system.</li> <li>Purchase of electricity for storage within the battery is not included in these costs.</li> <li>The model also accounted for round-trip efficiency, i.e., the losses incurred during the charging and discharging cycles.</li> </ul>		CapEx for Battery Power Converter (£/MW)	CapEx for Battery Energy Storage (£/MWh)	OpEx for Battery System (£/MW/year)	2021	243,000	208,800	34,720	2025	183,427	157,611	26,210	2030	155,688	133,776	22,240	2035	145,957	125,415	20,850	2040	136,227	117,054	19,460	2045	126,496	108,693	18,070	2050	116,766	100,332	16,680
	CapEx for Battery Power Converter (£/MW)	CapEx for Battery Energy Storage (£/MWh)	OpEx for Battery System (£/MW/year)																														
2021	243,000	208,800	34,720																														
2025	183,427	157,611	26,210																														
2030	155,688	133,776	22,240																														
2035	145,957	125,415	20,850																														
2040	136,227	117,054	19,460																														
2045	126,496	108,693	18,070																														
2050	116,766	100,332	16,680																														
<p><b>Flexibility and Peak Load Management</b></p>	<ul style="list-style-type: none"> <li>Peak load management was only considered for new EV and eHeating loads.</li> <li>Electric vehicle charging can be shifted up to 9 hours and requires a minimum battery charge of 30%. Assumed participation rates in flexible charging programmes and associated share in shiftable processes are listed below:</li> </ul> <table border="1"> <thead> <tr> <th></th> <th>Participation rate of EV owners in flexibility programmes</th> <th>Share of shiftable charging processes</th> </tr> </thead> <tbody> <tr> <td>2025</td> <td>80%</td> <td>56%</td> </tr> <tr> <td>2030</td> <td>76%</td> <td>53%</td> </tr> <tr> <td>2035</td> <td>72%</td> <td>50%</td> </tr> <tr> <td>2040</td> <td>68%</td> <td>48%</td> </tr> <tr> <td>2045</td> <td>64%</td> <td>45%</td> </tr> <tr> <td>2050</td> <td>60%</td> <td>42%</td> </tr> </tbody> </table> <ul style="list-style-type: none"> <li>Electric heating consumption can be shifted by up to 1 hour, e.g., by using technologies such as storage heaters or hot water tanks.</li> </ul>		Participation rate of EV owners in flexibility programmes	Share of shiftable charging processes	2025	80%	56%	2030	76%	53%	2035	72%	50%	2040	68%	48%	2045	64%	45%	2050	60%	42%											
	Participation rate of EV owners in flexibility programmes	Share of shiftable charging processes																															
2025	80%	56%																															
2030	76%	53%																															
2035	72%	50%																															
2040	68%	48%																															
2045	64%	45%																															
2050	60%	42%																															

		<b>Participation rate of eHeating owners in flexibility programmes</b>	<b>Maximum shiftable energy (MWh)</b>
	<b>2025</b>	25%	1.99
	<b>2030</b>	45%	12.6
	<b>2035</b>	65%	31.8
	<b>2040</b>	85%	52.3
	<b>2045</b>	90%	58.5
	<b>2050</b>	90%	60.6

# Appendix C – Electricity supply mix for six possible electricity supply pathways up to 2050

Figure 15 shows the electricity supply mix at five yearly intervals up to 2050 for six possible electricity supply pathways. Model outputs are based on updated configuration parameters that have been consistently applied to all possible future electricity supply pathways to allow a direct comparison.

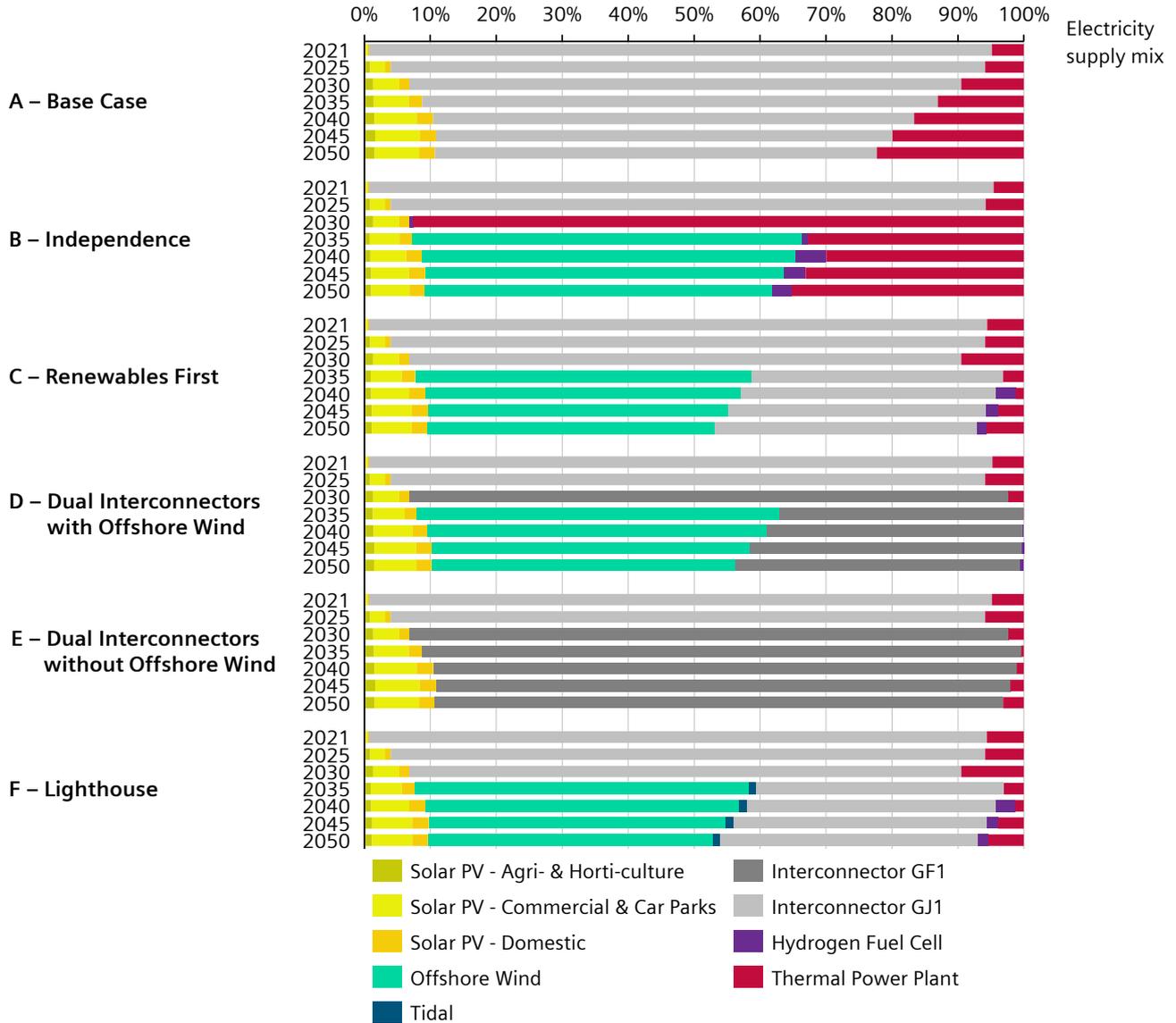


Figure 15 - Electricity supply mix for six possible future electricity pathways

Table 10 shows the installed capacities of electricity generation technologies at five yearly intervals up to 2050 for six possible electricity supply pathways. Model outputs are based on updated configuration parameters that have been consistently applied to all possible future electricity supply pathways to allow a direct comparison.

Table 10 - Electricity generation technology installed nominal operational capacity for six future electricity pathways

<b>A – Base Case</b>		<b>Installed nominal operational capacity for supply pathway (MW)</b>						
	<b>Technology</b>	<b>2021</b>	<b>2025</b>	<b>2030</b>	<b>2035</b>	<b>2040</b>	<b>2045</b>	<b>2050</b>
Interconnector	Current interconnector GJ1	57	57	57	57	57	57	57
	Additional interconnector GF1	-	-	-	-	-	-	-
Renewable electricity generation	Solar PV	2.2	13.3	24.6	35.5	46	51.7	53.7
	Offshore wind	-	-	-	-	-	-	-
	Tidal	-	-	-	-	-	-	-
Dispatchable generators	Thermal power plant	148.7	148.7	148.9	164.2	176.6	187	195.9
	Hydrogen fuel cell	-	-	-	-	-	-	-
<b>Total installed capacity (MW)</b>		<b>207.9</b>	<b>219</b>	<b>230.5</b>	<b>256.7</b>	<b>279.6</b>	<b>295.7</b>	<b>306.6</b>
Total dispatchable capacity (MW)		205.7	205.7	205.9	221.2	233.6	244	252.9
Total on-island dispatchable capacity (MW)		148.7	148.7	148.9	164.2	176.6	187	195.9

<b>B – Independence</b>		<b>Installed nominal operational capacity for supply pathway (MW)</b>						
	<b>Technology</b>	<b>2021</b>	<b>2025</b>	<b>2030</b>	<b>2035</b>	<b>2040</b>	<b>2045</b>	<b>2050</b>
Interconnector	Current interconnector GJ1	57	57	-	-	-	-	-
	Additional interconnector GF1	-	-	-	-	-	-	-
Renewable electricity generation	Solar PV	2.2	13.3	24.6	35.5	46	51.7	53.7
	Offshore wind	-	-	-	81.4	81.4	81.4	81.4
	Tidal	-	-	-	-	-	-	-
Dispatchable generators	Thermal power plant	148.7	138.4	138.4	138.4	116.6	127	135.9
	Hydrogen fuel cell	-	-	12.4	25.8	60	60	60
<b>Total installed capacity (MW)</b>		<b>207.9</b>	<b>208.7</b>	<b>232.5</b>	<b>338.1</b>	<b>361</b>	<b>377.1</b>	<b>388</b>
Total dispatchable capacity (MW)		205.7	195.4	150.9	164.2	176.6	187	195.9
Total on-island dispatchable capacity (MW)		148.7	138.4	150.8	164.2	176.6	187	195.9

<b>C – Renewables First</b>		<b>Installed nominal operational capacity for supply pathway (MW)</b>						
	<b>Technology</b>	<b>2021</b>	<b>2025</b>	<b>2030</b>	<b>2035</b>	<b>2040</b>	<b>2045</b>	<b>2050</b>
Interconnector	Current interconnector GJ1	57	57	57	57	57	57	57
	Additional interconnector GF1	-	-	-	-	-	-	-
Renewable electricity generation	Solar PV	2.2	13.3	24.6	35.5	46	51.7	53.7
	Offshore wind	-	-	-	63.1	63.1	63.1	63.1
	Tidal	-	-	-	-	-	-	-
Dispatchable generators	Thermal power plant	148.7	138.4	138.4	138.4	97.1	107.5	116.4
	Hydrogen fuel cell	-	-	-	6.3	60	60	60
<b>Total installed capacity (MW)</b>		<b>207.9</b>	<b>208.7</b>	<b>220</b>	<b>300.3</b>	<b>323.2</b>	<b>339.3</b>	<b>350.2</b>
Total dispatchable capacity (MW)		205.7	195.4	195.4	201.7	214.1	224.5	233.4
Total on-island dispatchable capacity (MW)		148.7	138.4	138.4	144.7	157.1	167.5	176.4

<b>D – Dual Interconnectors with Offshore Wind</b>		<b>Installed nominal operational capacity for supply pathway (MW)</b>						
	<b>Technology</b>	<b>2021</b>	<b>2025</b>	<b>2030</b>	<b>2035</b>	<b>2040</b>	<b>2045</b>	<b>2050</b>
Interconnector	Current interconnector GJ1	57	57	57	57	57	57	57
	Additional interconnector GF1	-	-	100	100	100	100	100
Renewable electricity generation	Solar PV	2.2	13.3	24.6	35.5	46	51.7	53.7
	Offshore wind	-	-	-	64.6	64.6	64.6	64.6
	Tidal	-	-	-	-	-	-	-
Dispatchable generators	Thermal power plant	148.7	138.4	138.4	138.4	90.5	88	96.9
	Hydrogen fuel cell	-	-	-	-	47	60	60
<b>Total installed capacity (MW)</b>		<b>207.9</b>	<b>208.7</b>	<b>320</b>	<b>395.5</b>	<b>405.1</b>	<b>421.3</b>	<b>432.2</b>
Total dispatchable capacity (MW)		205.7	195.4	295.4	295.4	294.5	305	313.9
Total on-island dispatchable capacity (MW)		148.7	138.4	138.4	138.4	137.5	148	156.9

<b>E – Dual Interconnectors without Offshore Wind</b>		<b>Installed nominal operational capacity for supply pathway (MW)</b>						
	<b>Technology</b>	<b>2021</b>	<b>2025</b>	<b>2030</b>	<b>2035</b>	<b>2040</b>	<b>2045</b>	<b>2050</b>
Interconnector	Current interconnector GJ1	57	57	57	57	57	57	57
	Additional interconnector GF1	-	-	100	100	100	100	100
Renewable electricity generation	Solar PV	2.2	13.3	24.6	35.5	46	51.7	53.7
	Offshore wind	-	-	-	-	-	-	-
	Tidal	-	-	-	-	-	-	-
Dispatchable generators	Thermal power plant	148.7	138.4	138.4	138.4	137.6	148	157.7
	Hydrogen fuel cell	-	-	-	-	-	-	-
<b>Total installed capacity (MW)</b>		<b>207.9</b>	<b>208.7</b>	<b>320</b>	<b>330.9</b>	<b>340.6</b>	<b>356.7</b>	<b>368.4</b>
Total dispatchable capacity (MW)		205.7	195.4	295.4	295.4	294.6	305	314.7
Total on-island dispatchable capacity (MW)		148.7	138.4	138.4	138.4	137.6	148	157.7

<b>F – Lighthouse</b>		<b>Installed nominal operational capacity for supply pathway</b>						
	<b>Technology</b>	<b>2021</b>	<b>2025</b>	<b>2030</b>	<b>2035</b>	<b>2040</b>	<b>2045</b>	<b>2050</b>
Interconnector	Current interconnector GJ1	57	57	57	57	57	57	57
	Additional interconnector GF1	-	-	-	-	-	-	-
Renewable electricity generation	Solar PV	2.2	13.3	24.6	35.5	46	51.7	53.7
	Offshore wind	-	-	-	62.1	62.1	62.1	62.1
	Tidal	-	-	-	10	10	10	10
Dispatchable generators	Thermal power plant	148.7	138.4	138.4	138.4	97.1	107.5	116.4
	Hydrogen fuel cell	-	-	-	6.3	60	60	60
<b>Total installed capacity (MW)</b>		<b>207.9</b>	<b>208.7</b>	<b>220</b>	<b>309.3</b>	<b>332.2</b>	<b>348.3</b>	<b>359.2</b>
Total dispatchable capacity (MW)		205.7	195.4	195.4	201.7	214.1	224.5	233.4
Total on-island dispatchable capacity (MW)		148.7	138.4	138.4	144.7	157.1	167.5	176.4

## Appendix D – Considerations for stakeholder engagement and communication

An effective and ongoing stakeholder engagement and communications plan will be required to achieve the Dual Interconnectors with Offshore Wind (D) supply pathway. It will need to be executed over several years, necessitating a high level of centralised coordination.

The stakeholder engagement and communications plan should identify who needs to be engaged, why engagement is beneficial, what needs to be communicated, what level of participation is required, and how and how often to engage or communicate. Depending on circumstances, it may be valuable to:

- **Inform:** educating and/or updating stakeholder groups on progress and timelines, using email and website etc.
- **Involve:** seeking views and feedback through consultation feedback, focus groups, townhall presentations etc.
- **Initiate:** inviting stakeholder groups to play an active role in enacting, adopting and/or embedding change.

A range of communication channels may be used in isolation or collectively for engaging with different stakeholder groups, and which might vary over time, as follows:

- Website, Intranet.
- Group email, social media.
- Press releases, newsletters, bulletins.
- Presentations, workshops (physical, virtual).
- Meetings.

Table 11 identifies the organisations and groups that will need to be engaged, why they will need to be engaged and how their participation might be engaged in delivering the *future electricity demand and supply strategy* for Guernsey.

Table 11 - Considerations for stakeholder engagement and communication

Audience	Purpose of engagement	Approach and frequency
Leadership & Transformation	<p>Leadership: Obtain sponsorship and commitment to cross-functional resources and budget.</p> <p>Transformation: Establish multi-year programme across Government directorates and incorporating external organisations.</p> <p>Public Relations: Design, plan and enact communications plan for external stakeholders.</p>	<p>Briefing presentation to leadership.</p> <p>Cadence of programme level communication and review meetings.</p> <p>Calendar of weekly, monthly and quarterly reviews for Programme, Operational and Executive steercos, respectively.</p>
States of Guernsey	<p>Transport: Define and implement policy levers that encourage EV adoption and ICE scrappage.</p> <p>Housing &amp; Planning: Define and implement policy levers that encourage electric heat in new-build and retro-fit environments.</p> <p>Planning: Define and implement planning controls to enable solar PV deployments to be scaled in urban and green spaces, and consent infrastructure build for landing sites (offshore wind, interconnector) and on-island substations.</p>	<p>Briefing (kick off) presentation.</p> <p>Facilitate workshops within and between directorates to build programme workstreams and identify, shape, select and integrate ideas.</p> <p>Sponsor and programme level communications and updates.</p> <p>Email and intranet internal communications.</p>
Politicians	<p>Sponsor vision/ambition for large-scale offshore wind.</p> <p>Sponsor and facilitate discussions with French Government on principle of spill export and seek agreement on second interconnector.</p> <p>Support and implement relevant policy levers, including incentives and/or penalties e.g., energy, transport, buildings, population (skills) etc.</p>	<p>Individual and group briefing presentations, which allow for input and feedback.</p> <p>Written and verbal briefings in preparation for meetings with external organisations.</p> <p>Align with calendar of debating and decision-making events.</p>
Guernsey Electricity Limited	<p>Design, plan, implement and commission renewable generation (e.g., wind, solar), second interconnector and dispatchable asset upgrades.</p> <p>Design, plan and implement network reinforcements and support widely available EV charging infrastructure.</p>	<p>Formal written instruction of electricity strategy and approval of investment cases.</p> <p>Continued review meetings at strategy, programme and executive levels.</p>

	Enact and/or support market related changes, such as electrification of heat and transport, and use of flexibility services.	Close collaborative working, supported by third party organisations to deliver and embed the future electricity demand and supply strategy.
Investors	Promote green investment and financing opportunities to attract investors.	Early informal engagement meetings with known investors to seek inputs. Host an investor day briefing showcase a clear direction for on-island renewables. Request input from investors through use of Request for Information (RFI).
Upstream Electricity Partners	Engage RTE to design, plan, install and commission landing substations and undersea cabling. Engage EDF to agree bilateral trading agreements and revisions to existing commercial and operational agreements. Engage the CIEG and Jersey Electricity to enact operational change control and agree any commercial changes.	Present electricity strategy briefing, along with value proposition. Establish joint or multi-party working groups and schedule meetings e.g., technical, operational, commercial.
Technology & Services Vendors	Engage specialist organisations to carry out surveys, feasibility studies and designs. Engage Engineering, Procurement & Construction (EPC) contractor to lead deliver turnkey installations. Procure equipment and services within time, quality and budget parameters.	Procurement research and initial qualification discussions with services vendors. Host a procurement open day to signal clear direction and commitment. Issue requests for information to evaluate and shortlist vendors for different categories. Follow structured communications through regulated procurement processes.
Solar PV & Heat Pump Installers	Engage with existing local players early to promote opportunities and provide notice for players to scale their operations. Advertise the opportunity more broadly to encourage new players to enter the market.	Presentation via Energy Partnership. External digital communications – Guernsey, neighbouring markets etc.
Gas & Fuel Suppliers	Position Guernsey as a hydrogen economy, which might mean renewable gas for heating and establishing short/long term storage for electricity generation. Engage on-island suppliers of liquid fuel to enable a transition to cleaner fuels for thermal generators.	Presentation via Energy Partnership. Workshop participation by key players to shape circular economy opportunities and business models.
Guernsey Enterprises	Work with enterprises to encourage changes to transport, buildings (efficiency, heat) and operational processes – using legislation, incentives, penalties.	Enterprise consultation feedback process. Workshops involving industry segments e.g., Finance, ICT, Retail, Hospitality, Agriculture etc.
Citizens of Guernsey	Work with citizens to encourage changes to transport, buildings (efficiency, heat) and encourage prosumer participation in distributed grid of things.	Bulletins and newsletters on website. Group email distribution and social media. Establish focus group on specific topics e.g., EV adoption, eHeating conversion, solar PV installation, intelligent home controls, beat the peak etc. Formal consultation and feedback.

**Published by  
Siemens PLC 2023****Report authors**

Dr. Eldar Naghiyev – Consultant  
Serge Kabunda – Principal Consultant  
Steve Elliott – Technical Director  
Ellis Williams – Executive Consultant  
Ian Lloyd – Executive Consultant  
Joy Aloor – Head of Power Technologies International

For more information, please contact.

**Address**

Siemens UK  
Power Technologies International  
Energy Business Advisory  
Sir William Siemens House  
Princess Rd  
Manchester  
M20 2UR  
United Kingdom

**Internet**            [www.siemens.com](http://www.siemens.com)  
**E-mail**             [si.gsw.pti.gb@internal.siemens.com](mailto:si.gsw.pti.gb@internal.siemens.com)

All rights reserved  
© 2023 by Siemens UK, Manchester

**Disclaimer**

© Siemens 2023

This Report was produced by Siemens for the States of Guernsey. The Report is meant to be used as a whole and in conjunction with this disclaimer. Any use of the Report other than as a whole and in conjunction with this disclaimer should not occur. The information and statements herein are based in whole or in part on information obtained from various sources during the course of the project. While Siemens, the States of Guernsey believe such information to be accurate, they make no assurances, endorsements or warranties, express or implied, as to the validity, accuracy or completeness of any such information, any conclusions based thereon, or any methods disclosed. Siemens assume no responsibility for the results of any actions and inactions taken on the basis of this Report. By a party using, acting or relying on this Report, such party consents and agrees that Siemens, their employees, directors, officers, contractors, advisors, members, affiliates, successors and agents shall have no liability with respect to such use, actions, inactions, or reliance.

The Report contains some forward-looking projections. Certain unanticipated factors could cause actual values to differ from the opinions contained herein. Forward-looking opinions and projections are based on historical and/or current information that relate to future operations, strategies, financial results or other developments. Some of the technological changes, competitive conditions, new products, general economic conditions, changes in tax laws, adequacy of reserves, credit and other risks associated with Corning and/or other third parties, significant changes in interest rates and fluctuations in foreign currency exchange rates. Further, certain statements, findings and conclusions in this document are based on Siemens' interpretations of various contracts. Interpretations of these contracts by legal counsel or a jurisdictional body could differ.

## Review of the Energy Policy Objectives

Through the development of the draft Electricity Strategy, feedback from both industry and political stakeholders has highlighted that there is a level of confusion around the Energy Policy objectives (“the objectives”) that were agreed by the States of Guernsey through the Energy Policy 2020-2050. Whilst the agreed objectives address the energy trilemma, which is the requirement to balance the affordability, reliability, and environmental sustainability of energy systems, stakeholders outlined that some of the objectives can be hard to define, include potential conflicts within their own category, and may have unintended consequences. It was also highlighted that the objectives, and associated descriptions, do not mention “affordability” and that there is potential conflict between “value” and “choice”. This feedback is in response to the practical implementation of the Energy Policy through the development of the draft Electricity Strategy and is likely to reflect, amongst other things, the uncertainties that have impacted the industry marketplace over recent years.

### **Decarbonisation**

The ‘Decarbonisation’ objective provides the Energy Policy’s focus on environmental sustainability. Whilst the decarbonisation aim is clear, and the objective is relatively straightforward to measure, it leaves other environmental aspects ambiguous as to their relevance. This is clearly not the intention of the policy given, amongst other considerations, its requirement to define “low emission” energy sources (as distinct from “low carbon”). The consultation responses were also clear on the point that decarbonisation should not come at the expense of wider environmental impact. Therefore, this objective will be changed to more accurately reflect the intentions of the Energy Policy to ‘Minimise carbon emissions and environmental impacts’ with the updated associated description:

*“Decarbonisation of the Island’s energy system will meet or exceed international standards, and those set by other jurisdictions, to mitigate climate change. This will be achieved whilst following environmental best practice and through the efficient use of energy. Our aim is that our energy supplies come from clean, low carbon sources where energy is not wasted, and adverse environmental impacts are avoided or minimised. The outcome of this will be clean air and a healthy environment in which our community lives.”*

### **Security and Resilience**

In order to reflect the recommendations, set out in this policy letter, the ‘Security and resilience of supply’ objective description will be updated, with the change highlighted in

bold:

*“Maintaining the required level of security of supply to withstand simultaneous infrastructure failures within the system and still serve our energy needs. Working on the basis of increased interconnection; the **Island’s criteria for on-island generation provision will be updated, as appropriate, to maintain security of supply levels in light of increased connectivity.**”*

### **Consumer value and choice**

The technical consultation for the development of the draft Electricity Strategy highlighted that, in a small marketplace, there can be conflict between the provision of value and competition due to duplication of effort. Therefore, ‘Consumer value and choice’ will be replaced with the following two objectives, which also gives increased visibility to the importance of affordability of energy for the Island:

*Consumer value – “An energy market where cost-effective procurement of energy, and energy efficiency, are prioritised with the aim of affordable energy for the island.”*

*Appropriate competition and consumer choice - “An energy market that encourages investment and competition and provides the consumer with choice over energy services. Critical infrastructure should not be duplicated.”*

### **Equity and fairness**

The ‘Equity and fairness’ objective is not substantively defined in the Energy Policy, and the language used is close enough to that used for ‘Value and choice’ to cause confusion. An issue identified through the consultation is that the title of the objective does not appear to directly link to the description. In terms of the “energy trilemma”, this objective most closely relates to the affordability component. Therefore, the objective will be updated to ‘Transparency and fairness’ with the following description:

*“An energy market where costs of services are well understood and clearly explained, where the maintenance of the system is shared fairly by consumers, and who in return receive equal access to the opportunities that come from technological advances.”*

### **Supporting a vibrant economy**

The need to ‘support a vibrant economy’ is a non-negotiable aim of the Energy Policy. However, the ‘Supporting a vibrant economy’ objective is not a single element but is rather an overarching objective covering the entire energy trilemma. It is also a non-negotiable aim of the Energy Policy and wider States of Guernsey policies and workstreams. This overarching

objective will therefore be incorporated into the policy Vision Statement as drafted below:

*“Guernsey will be aligned with global efforts to reduce emissions and develop renewable technologies. The vast majority of Guernsey’s energy supplies will come from clean, low carbon sources by 2050 at the latest, and residual emissions will be offset. Facilitating reliable and affordable renewable energy supplies will act as an economic enabler, providing diversification and vibrancy to the Island’s economy, whilst also improving Guernsey’s credibility and reputation in the green finance sector. Guernsey’s natural resources will be used appropriately and maintain the unique surroundings, biodiversity and natural beauty of the Island.”*

### **Greater energy independence**

The ‘Greater energy independence’ objective will remain unchanged as it is understood as providing an increased proportion of our energy from local sources and was a well-supported objective through the technical consultation process.

## Detailed technical analysis of Guernsey's current electricity system

### **The existing electricity supply chain**

Guernsey Electricity Ltd (GEL) procures the vast majority (94% in 2020 and 93% in 2021) of the electricity it supplies to the Guernsey community from the European wholesale market, through an interconnector cable. Through the Channel Islands' Electricity Grid (CIEG), EdF and French grid operator RTE are contracted to supply and transmit power for both Guernsey and Jersey. European electricity currently offers a low cost, low carbon supply chain and, as of January 2020, GEL have elected to purchase 100% of its imported European electricity from certified renewable sources in Europe.

The CIEG network comprises three interconnector cables between France and Jersey, and a single interconnector between Jersey and Guernsey. Jersey therefore enjoys a more resilient supply network and thus has a less comprehensive back-up power generation requirement and provision than Guernsey. The single interconnector circuit between Jersey and Guernsey has a contractual entitled limitation of 60MW which is lower than Guernsey's peak electricity demand which in 2021 reached 94MW. As such when Island demand exceeds 60MW, local generation must supplement imported power supplies. Calculated on an annual basis, local generation makes up under 10% of the electricity supplied to the Island and this is achieved predominantly using diesel power generation whilst being complemented by a modest level of generation through distributed solar photovoltaic arrays that generate year-round, but principally in the summer.

The diesel power provision exists in the form of a power generating facility in the north of the Island, the Vale Power Station (VPS). This facility comprises 10 generators within three separate generating halls, with a total installed capacity of c. 146MW. However, the dispatchable available capacity is limited to 114MW due to the derating factors of plant configuration and age. Whilst this facility is fundamentally a thermal power plant, there are three primary technology variants in operation as follows:

- Slow Speed Diesel Generators – 64MW (asset age between 42 and 27 years in service)
- Medium Speed Diesel Generators – 33MW (asset age between 8 and 5 years in service)
- Gas Turbine Generators – 49MW (asset age between 25 and 18 years in service)

Operational generating halls are B, C and D Stations configured as follows:

- B-Station comprising 2 x 18.5 MW Gas Turbine Generators
- C-Station comprising 3 x 11 MW Slow Speed Diesel Engines and 1 x 12 MW Slow Speed Diesel Engine
- D-Station comprising 1 x 12 MW Slow Speed Diesel Engine, 2 x 16.7 MW Medium Speed Diesel Engines and 1 x 10.5 MW Gas Turbine Generator

The power station also comprises a fuel storage terminal for heavy fuel oil (HFO) and supplementary intermediate storage tanks for HFO and diesel distillate fuel or 'gas oil' (GO). Both slow and medium speed diesel power generation technologies operate in base-load duty mode on heavy fuel oil, and each can operate for short periods on diesel distillate. Gas turbine technology runs only on diesel distillate. Storage capacity allows for the following running durations:

- HFO – typically 4-8 weeks in 'islanded' mode (dependant on time of year) i.e. disconnected from European grid
- GO – approx. 30 hours at full capacity

Beyond the power station production facility, GEL own a modest complement of distributed solar photovoltaic (PV) arrays. The combined installed capacity is approximately 350kW which contributes to around 0.2% of the annual electricity production. Additional capacity is anticipated to be commissioned shortly, which would take this to approximately 600kW. There are also a small but growing number of privately owned micro solar PV installations, primarily on domestic property, which are used for both self-supply and spilling back excess generated electricity onto the grid (spill back).

The power station comprises key electricity transmission and distribution infrastructure including: two 33 kV substations connecting generators and interconnectors to other key nodes within the Island's power transmission grid. Also located on site is a 3-zone double busbar (resilient) 11kV substation connecting generators and distribution circuits. Dual and double busbars offer redundancy in the event of component failure.

### **Existing security and resilience of supply**

The average annual customer lost minutes has fallen since the installation of the cable connection to France via Jersey. There have been notable increases in downtime relating to the interconnector faults, but overall customer lost minutes have remained lower. The Guernsey Electricity's Annual Report for 2020/2021<sup>1</sup> outlines that there was an average minutes loss of just over 21 minutes per customer over the year.

Ensuring technical security of supply is a fundamental concept in the planning and

---

<sup>1</sup> [Annual Report 2020/2021 by GuernseyElectricity - Issuu](#)

operation of power grids, and within the industry there is a range of different established methodologies by which to assess the level of supply security and system resilience. There are also a wide range of interpretations and applications of these assessment methodologies across different power networks as each network and jurisdiction have subtle differences.

In September 2021 (Billet XVII<sup>2</sup>), the States of Guernsey agreed that the responsibility for determining retail tariffs would be transferred from the Guernsey Competition & Regulatory Authority<sup>3</sup> (GCRA) to the States' Trading Supervisory Board (STSB). This interim arrangement was agreed to address a period of regulatory vacuum that had persisted since 2012, created through the decision to remove GEL from regulation which was later put on hold pending the outcome of the Energy Policy and the changes in the marketplace brought about by the issuing of new generation licences.

The interim regulations enable the STSB to agree the setting of tariffs, as is done for other States trading entities. This was done to allow for tariff changes whilst the Committee for Economic Development undertakes a broader review of the tariff structure, as resolved through the Energy Policy.

Terminology associated with security of supply can be used interchangeably. Terms like security, reliability, resilience, adequacy are all broadly synonymous with one another but mean different things to different stakeholders – grid operators, regulators, suppliers, customers etc.

In 2016 the European Commission published a paper entitled 'Identification of Appropriate Generation and System Adequacy Standards for the Internal Electricity Market'<sup>4</sup>. Its objective was to offer a common methodology to member states in the assessment of power system adequacy and related metrics and provide benchmarking data of other jurisdictions. The publication makes clear that system adequacy is commonly referred to as security of supply:

*"A major concern of national authorities is to ensure the security of supply, which is to say to make sure that the electric system is able to satisfy all consumers' needs. Such a characteristic is also referred to as system adequacy.*

*In order to assess security of supply, representative metrics are needed. Since the demand is less flexible than supply, system adequacy is usually interpreted as the ability of producers to supply a given load demand, often referred to as generation adequacy. The ENTSO-E defines system adequacy as follows:*

---

<sup>2</sup> 1.1.1 [1] Policy letter - GUERNSEY ELECTRICITY – INTERIM ARRANGEMENTS FOR TARIFF REGULATION - <https://gov.gg/CHttpHandler.ashx?id=140081&p=0>

<sup>3</sup> [Guernsey Competition & Regulatory Authority \(gcra.gg\)](https://www.guernsey.gov.gg/guernsey-competition-and-regulatory-authority)

<sup>4</sup>[https://energy.ec.europa.eu/system/files/2017-08/a\\_common\\_approach\\_for\\_generation\\_adequacy\\_assessment\\_0.pdf](https://energy.ec.europa.eu/system/files/2017-08/a_common_approach_for_generation_adequacy_assessment_0.pdf)

*“System adequacy of a power system is a measure of the ability of a power system to supply the load in all the steady states in which the power system may exist considering standard conditions. Within the ENTSOE Scenario Outlook and Adequacy Forecast, system adequacy is assessed by means of Generation Adequacy Assessment.” (Chapter 7, section System Adequacy, p.126)*

*In other words, a system is considered adequate if the installed generation capacity is such that the demand can be met.”*

The ENTSOE Mid-term Adequacy Forecast 2019 Appendix 2<sup>5</sup> outlines that system adequacy is further split into three main functional elements of the power systems:

- Generation adequacy level (or hierarchical level I), which considers the total system generation, including the effects of transmission constraints in the form of Net Transfer Capacities.
- Transmission adequacy level (or hierarchical level II), which includes both the generation and transmission facilities in an adequacy evaluation.
- Overall hierarchical adequacy level (or hierarchical level III), which involves all three functional zones, from the generating points to the individual consumer load points, typically connected at the distribution level.

When considering technical security of supply for the Island, generation adequacy level (or hierarchical level I) is traditionally considered. It is recommended that when the term security of supply is used it continues to apply to generation adequacy, and where broader system adequacy is being considered, such as network performance, the term system adequacy is adopted.

When considering the security of supply of the existing system the two main supply sources, importation through the cable to France via Jersey and the VPS, can be assessed both independently and combined to give an overall indication of security.

The cable link to France via Jersey allows GEL to import certified renewable electricity, split between hydro, wind and solar<sup>6</sup>, and provides the lowest cost supply source. GEL are currently required to prioritise the lowest cost supply source through the merit order.

When considering the technical security of supply, the electricity is delivered by a network which is not currently diverse, there being only a single power cable between Guernsey and Jersey, so its security is compromised. This has been highlighted by cable

---

<sup>5</sup> [https://eepublicdownloads.entsoe.eu/clean-documents/sdc-documents/MAF/2019/MAF-2019-Appendix\\_2-Methodology.pdf](https://eepublicdownloads.entsoe.eu/clean-documents/sdc-documents/MAF/2019/MAF-2019-Appendix_2-Methodology.pdf)

<sup>6</sup> GEL annual report 2020/2021 p.9 -

[https://issuu.com/guernseyelectricity/docs/2021.09.30\\_gel\\_final\\_glossy\\_fs\\_colour](https://issuu.com/guernseyelectricity/docs/2021.09.30_gel_final_glossy_fs_colour)

failures leading to outages in 2012 and 2018. From a political perspective the electricity is sourced in another jurisdiction (France) and transmitted through a third jurisdiction (Jersey), which are also factors relevant to its security.

The geopolitical element to security of supply, requires consideration of a number of factors, both shorter and longer term. Whilst the addition of more cables can reduce the technical risk, the political risk of sourcing electricity from another jurisdiction remains unchanged. Whilst a direct connection does not reduce the risk from the jurisdiction of supply, it would reduce any risk associated with delivery via a third country.

In terms of expected operation of the existing cable to Jersey (GJ1), the subsea element was replaced in 2019 and has a life expectancy of 30-40 years, however the land-based elements of switchgear and plant are now 20 years old and would therefore be expected to require replacement or upgrading in the 2030's. Land based cables have a longer life expectancy of 60+ years and so would not need replacing until later.

In security terms on-Island generators are reliable devices, controlled locally and they can be expected to be available for service provided they are properly maintained and have fuel. The security risk for this plant is therefore largely attributable to the risks associated with maintaining a supply of fuel. The on-Island generators run on either Heavy Fuel Oil and Gas oil, both of which need to be imported to the Island.

The most recent generators installed, the medium speed diesel engines, offer an improved emissions performance and lower operating costs, making them more suitable for the intermittent running expected when the majority of the Island's electricity is imported through the cable link. The use of generators in this way is generally referred to as top-up generation. These generators also provide part of the backup generation capacity under the security of supply requirements.

The gas turbine generators provide a quick start ability to recover electricity supplies in the event of technical failures and as a last line of defence when other sources are not available for any reason. However, they are characterised by high operating costs. The use of generators in this way is generally referred to as back-up generation.

As outlined above, the slow speed diesel generators are beyond expected normal reliable operational life and whilst they are generally reliable, at over 40 years old in some cases, they present an increasing risk of failure. Guidelines for similar large diesel plants of somewhat different design suggest a life of 25 years. Unfortunately, there is little relevant external information to assist in determining the life of this plant, but it is reasonable to expect that plant of this age will suffer decreasing reliability and increasing maintenance costs as well as increasing difficulties in sourcing specific parts. It is expected that by 2030 all the slow speed generation capacity will be of an age that they will require replacement for continued resilience and cost optimisation. The gas turbine generators are expected to be in service to around 2040, as they are newer generators, and the medium speed plant to 2050 or beyond.

Although the plant is on-island and therefore under Guernsey's jurisdictional control, it is important to remember that the fuel has to be sourced from elsewhere. The importation of fuel is also exposed to wider geopolitical risks. Whilst the sourcing of the fuel does not have to come from a specific refinery, the global situation has an impact upon both fuel availability and price. As with the importation of electricity through the cable, the war in Ukraine has created market disruption and this can affect Guernsey through variable pricing or issues with timely sourcing of fuel.

An additional factor when considering the security of supply is the potential impact of the Island's import infrastructure. The harbour at St Sampson, where liquid hydrocarbons are delivered in bulk, requires specific NAABSA (Not Always Afloat But Safely Aground) vessels for delivery, and is only accessible for a small number of tides every two weeks. The power station has sufficient fuel storage to provide power for four to eight weeks (and there is a regulatory target of a minimum of four weeks). Beyond the local port infrastructure limitations there are also supply chain risks in the shipping, refinery and generally in global hydrocarbon markets.

GEL currently operate under two security of supply criteria, namely "N-2" and the "80/80 criterion". The "N-2" criterion relates to the level of generating back up the island maintains whilst the "80/80 criterion" attempts to provide a cost control to the on-island plant.

The "N-2" security criterion requires that GEL should maintain sufficient on-island generation plant such that the island maximum demand can still be met with the two largest generators simultaneously unavailable. This criterion was adopted as States policy in 2005 and in 2014 the States of Guernsey reaffirmed the approach and agreed that the criterion should apply only to on island generation whilst there remained a single point of interconnection.

The purpose of a security criterion is to provide a margin of redundancy to ensure that there is sufficient generation plant to cope with forecast maximum demand. The existence of the "N-2" criterion does not guarantee that supply will be sufficient, as multiple sources of electricity might be unavailable simultaneously and this time may coincide with a time of maximum demand. However, the greater degree of redundancy that is built into the system design reduces the probability that the system will not be adequate, but also increases the cost since more capital plant must be installed.

The importance of this approach whilst the island only benefits from a single interconnector was highlighted most recently in 2018 following a failure of the subsea cable between Guernsey and Jersey. This resulted in the need to generate on-island over the winter period.

It has been generally accepted that a criterion based on unavailability of items of plant is reasonable for small power systems like Guernsey's. More sophisticated mathematical

techniques are used for large systems. However, as system complexity increases it may be advantageous to include probability-based measures in the assessment.

The “80/80 criterion” was a novel security of supply requirement introduced through the 2014 electricity supply strategy. This was designed to mitigate the cost risk impacts of a long-term interconnector outage. It achieves this by requiring there to be adequate on-island generating capacity to supply 80% of the island peak demand using plant that does not cost more than 80% of the average electricity retail price to run.

However, there are some notable pitfalls with the criterion. The pass / fail of the criterion is dependent on factors that vary over time, such as the relative prices between different fuel oils and the retail electricity market – this can lead to fleeting compliance / non-compliance in terms of long-term electricity supply adequacy. Further, the criterion does not adequately protect against the emissions impacts associated with hydrocarbon-based power generation.

Given the inherent variability in the marketplace, it is questionable whether the “80/80 criterion” has been met over the past nine years. However, given this criterion was introduced to ensure some level of cost consideration in sourcing on island generation, some format of price consideration should be maintained.

## **Network**

The network is the other vital component of the resilience and security of the islands electricity system. Guernsey has benefitted from the additional resilience of the network from the decision to switch to subterranean cables rather than overhead cables. However, this improved performance comes with some drawbacks that impact upon the speed with which the network can be upgraded and, with aging infrastructure in mind, replaced.

Subterranean cables have approximately double the lifespan of overhead cables, with subterranean cables expected to last for at least 60 years. In addition, the maintenance costs of subterranean cables would be expected to be lower than those associated with overhead cabling as they are not affected by weather events. However, when maintenance is required, it can take longer and be more expensive than with overhead lines. The cost of installing subterranean cables is significantly more than overhead lines. However subterranean cables are preferable in built up areas<sup>7</sup>. In addition to the installation costs, subterranean cables in Guernsey are aligned to the road network which adds the impact of road closures to undertake works.

In short, the Island’s approach to cabling has provided high levels of transmission adequacy, but that now requires replacement and upgrading which will likely cause

---

<sup>7</sup> Parsons Brinkerhoff Electricity Transmission costing study 2012 - <https://www.theiet.org/media/9376/electricity-transmission-costing-study.pdf>

disruption to road users over the coming years. 149 general network faults were reported for 2020/2021 in GEL's latest annual report.

The Committee is aware that GEL has a replacement plan in place. However, due to historic underinvestment, in part created by the regulatory environment, investment was focussed principally on a reactive approach. GEL is now looking to accelerate the replacement of cabling over 60 years old. This is based on the UK methodology of replacing infrastructure that is 60-100 years old, although there is no defined lifetime of a cable, with the assets depreciating over 75 years. The plan currently allows for the replacement of around eight kilometres of low voltage cabling per year and high voltage cabling as required, however this is out of around 1400km of the existing cable network. Given the potential for increased demand on the network, in terms of increased electrification of heating and transport, the Committee recommends additional ambition is added into this plan, although it recognises that this is challenging from a resourcing and disruption perspective.

Alongside cable infrastructure, the network also has in the order of 450 substations that require ongoing maintenance and replacement. GEL has been undertaking a multi-year programme to ensure the substations are maintained and, as of the latest annual report, ten percent of the secondary substations were maintained or replaced in the previous year, in line with the management plan.

## **Cost**

Guernsey's electricity prices are affected by two components, the cost of maintaining the generating capacity and distribution infrastructure (otherwise known as fixed costs) and the fuel component to run the generators or electricity imported from France (the variable costs). GEL recoup these costs through their tariff system, with a fixed connection charge and a pay per unit charge. However, it is acknowledged that the fixed costs do not adequately reflect the costs incurred of maintaining the system and security of supply – currently, the vast majority of electricity sales revenue is recovered on the basis of units consumed. The remaining amount is recovered through fixed standing charges, however the fixed costs of operating the generation, transmission and distribution infrastructure equates to approximately 50% of the total costs of the business. The recent approval from the STSB, for GEL to increase its revenues by 13% from July 2023 demonstrates this, and has started to address the discrepancies. Further work is still needed.

This is not a Guernsey specific issue and is faced by European countries who have moved towards tariff structures based upon a higher proportion of fixed charges. The Energy Policy directed that a review of tariff structures be undertaken to reflect this split more accurately, however to date this work stream has not been undertaken due to uncertainties surrounding the regulatory environment and will require implementation based on the objectives of Electricity Strategy. In the meantime, GEL made a graduated first step towards such tariff restructuring by increasing its fixed standing charges by a

higher percentage than its unit charges as part of its approved tariff changes in July 2022 which resulted in fixed charge revenue increasing from an initial 4% to 7% of total electricity sales revenue. This has been increased further through the changes coming into force in July 2023.

It should also be noted that substantial improvements are needed to the grid infrastructure in order to enable the Electricity Strategy and meet the predicted increase in demand requirements. Enhancements to technological solutions should also be considered. The amount of work and the resources needed to complete it are also ambitious. Investigations to date anticipate that new substations and the associated transformers would be required to connect both the offshore wind array and second interconnector to the grid. An additional 60km of cable circuits will also be required. Detailed analysis and assessment is needed, following agreement of a strategic direction, in order to truly understand how this could be rolled out and what the associated costs may be.

Of the variable costs, the island is exposed to market forces in both the procurement of the fuels to run the on-island generators and the electricity imported through the cable. GEL and Jersey Electricity procure imported electricity through its joint venture, Channel Island Electricity Grid (CIEG) who own and operate the interconnectors to France. CIEG partake in multi-year contracts, to date with EDF, to secure electricity through the cable with some element of fixed pricing to seek to achieve an order of price stability and mitigation against volatility in wholesale energy market prices.

The overall cost of electricity to the island is therefore a combination of the fixed standing charges and the variable tariffs. GEL has a number of tariffs, primarily in the domestic space including; standard, super economy 12 (which consists of a high and low rate), superheat, and heat pump tariffs. When considering how prices compare to other jurisdictions, using the standard tariff as a comparison, assessment by the GCRA illustrates that the cost of energy per unit is on average higher than the EU average (see figure 1 below).

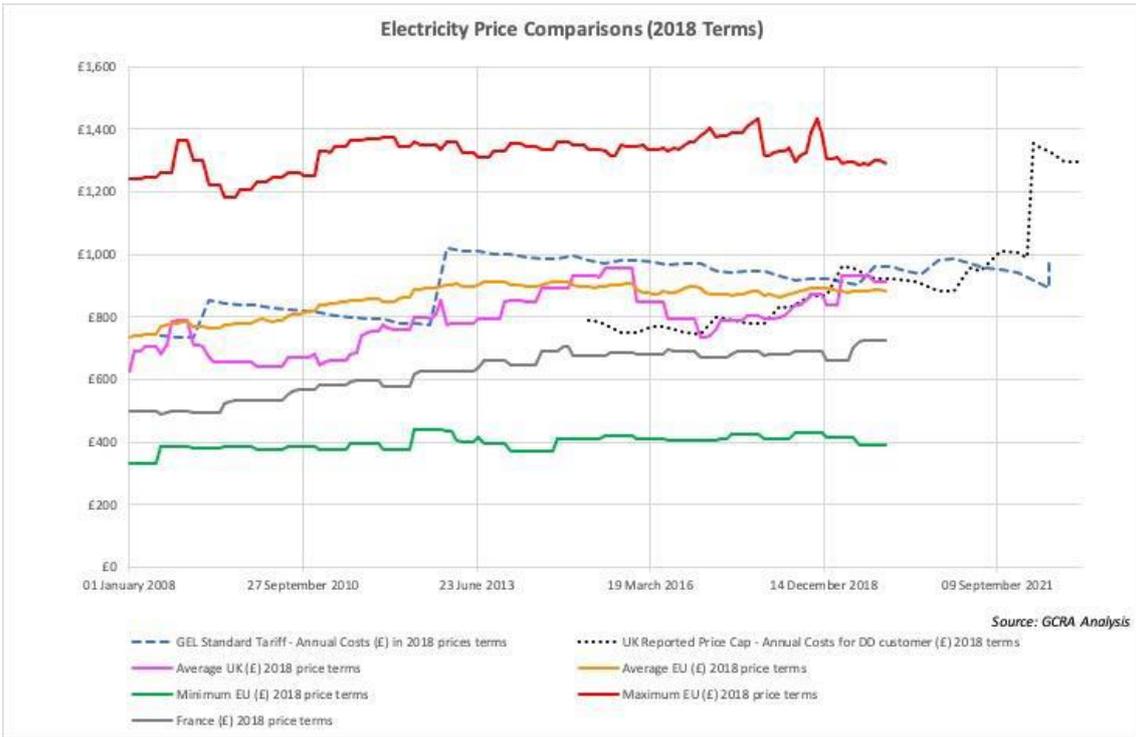


Figure 1 - GCRA analysis of electricity price comparisons

The wide range of tariff offerings by other jurisdictions makes like-for-like analysis virtually impossible on an individual tariff basis. Notwithstanding this, GEL undertook an historical comparison of its average domestic electricity end prices, based upon a defined usage, against 14 European countries and the UK. GEL’s price was based on the weighted average of its standard and super economy 12 tariffs. The EU14 + UK prices were sourced from the UK’s Department for Business, Energy and Industrial website: <https://www.gov.uk/government/statistical-data-sets/international-domestic-energy-prices>

On this basis, GEL was ranked as sixth least cost for 2021 as shown in the graph below:

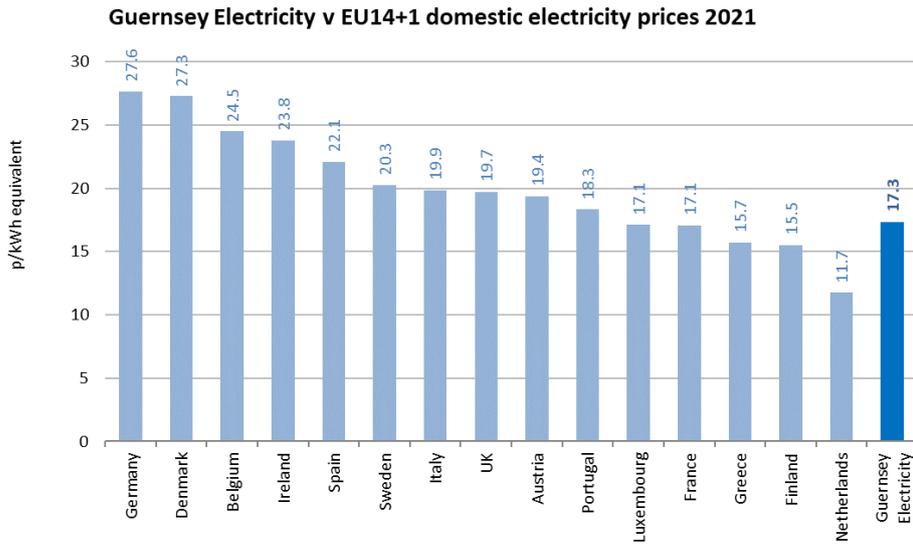


Figure 2 – Guernsey vs EU14+1 domestic electricity prices 2021

The following graph indicates how GEL’s price compares with the spread of prices in p/kWh for the EU and UK jurisdictions since 2009:

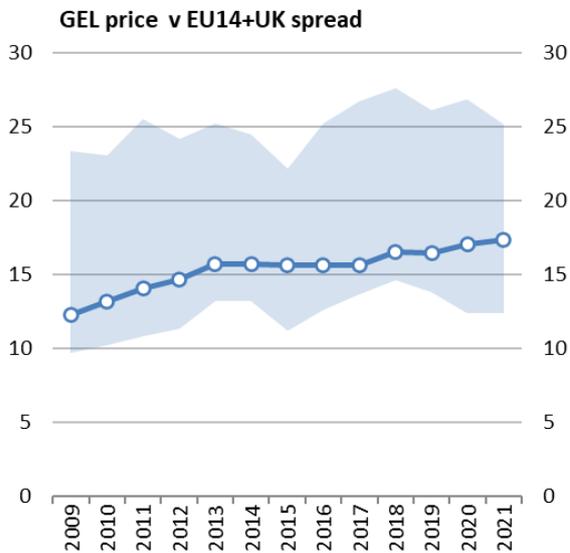


Figure 3 – GEL vs EU14+UK spread

It should be noted however that this latest available data set precedes the unprecedented volatility seen in European energy markets and the resultant huge increases seen in end prices during 2022, particularly for UK customers. Consequently, it is more relevant to consider the price comparisons between GEL and the UK over the last 18 months.

The table below shows the increase in the Ofgem price cap since October 2021 which is set by the energy regulator in response to the rising wholesale energy price. This represents the cap on the average user's energy bill (based upon a set unit consumption) which can be charged by UK energy suppliers. In response to the rapid escalation in prices, the UK government intervened and introduced an Energy Price Guarantee (EPG) in October 2022 which capped the average user's energy bill at £2,500, which was significantly below the Ofgem Price Cap of £3,549. Without the EPG, the UK standard unit price would have increased to 67p/kWh between October 2021 and January 2023. The impact of the EPG limited the increase to 34p/kWh over the same period. The UK standard unit price is currently 64% higher than Guernsey Electricity's standard tariff unit price of 20.77p/kWh.

<b>Date</b>	<b>Ofgem Price Cap</b>	<b>Energy Price Guarantee</b>	<b>UK Standard Unit Price</b>	<b>GEL Standard Unit Price</b>
<b>October 2021</b>	£1,277	N/A	21p/kWh	19.78p/kWh
<b>April 2022</b>	£1,971	N/A	28p/kWh	19.78p/kWh
<b>October 2022</b>	£3,549	£2,500	34p/kWh	20.77p/kWh
<b>January 2023</b>	£4,279	£2,500	34p/kWh	20.77p/kWh
<b>April 2023</b>	£3,280	£2,500	34p/kWh	20.77p/kWh

*Figure 4 – Ofgem price caps*

It is also relevant to consider electricity prices in the Isle of Man, where prices increased by 15% in April 2022, and a further 15% in July 2022. Electricity prices were then effectively frozen until the end of March 2023 with Manx Utilities taking on a £26m government loan to cover the shortfall created by rising wholesale costs. Manx Utilities have recently announced that electricity prices now need to increase by 51% on average and is set to apply the increase in two stages in April and July of this year. Cumulatively, this would represent a doubling of tariffs since last April.

In 2022 there was significant market disruption that was instigated by the war in Ukraine and the knock-on effect of trade restrictions on Russia. This led to escalating gas and wholesale electricity prices. Significantly, in the UK and across Europe this has led to substantial increases in the price of electricity (as set out above). Guernsey and Jersey have been relatively insulated from these price increases in the short-term due to the contractual arrangement in place between the CIEG and EdF. However, this position is unlikely to persist in the coming years, as existing price fixing arrangements expire and in the event that current high wholesale energy market prices are sustained.

Projections of anticipated wholesale energy prices are available, and Siemens have used their own price modelling in the preparation of the Electricity Strategy. Generally they align and predict that prices will fall over time. However, the timeline for when the prices will fall impacted by more recent history is not clear.

## **Existing Market**

Entry to the Island's electricity market is controlled by licence issued by the GCRA, and the sector is subject to economic regulation. The electricity market's largest provider is GEL, which is wholly owned by the States of Guernsey and meets commercial, environmental, and social objectives set by the shareholder executive function that is overseen by the STSB.

The electricity market in Guernsey is regulated and licensed for three components – generation, conveyance, and supply. A generation licence or exemption is required “to generate electricity for the purpose of giving a supply to any premises or enabling a supply to be so given”. A conveyance licence is required “to convey electricity for that purpose in that person's Authorised Area<sup>8</sup>”. A supply licence or exemption is required “to supply electricity in that person's Authorised Area” or “to supply electricity to any premises specified or of a description specified in the licence”.

There are currently four extant generation licences issued under the law by the GCRA. Only GEL hold supply and conveyance licences in addition to the generation licence, however the other holders of generation licences hold supply licence exemptions.

The Electricity (Guernsey) Law, 2001 provides detailed definitions of the terms “supply” and “conveyance” in relation to electricity. In broad terms, under the current legislation, “supply” can be understood as meaning the supply of electricity through electric cables other than to premises occupied by the electricity licensee. “Conveyance” can be understood as the transportation of electricity by means of an electricity network.

Conveyance covers the transportation of electricity from the generating station (generator or supply cable) to the final substation, which closely aligns to the high voltage (“HV”) cable network, although not in totality as some customers are supplied with HV directly. The low voltage (“LV”) and HV cabling beyond the last substation to supply a property is covered in the supply portion of regulation and licencing. The breakdown of Guernsey's electricity network, in terms of length of cable is approximately one third high voltage and two thirds low voltage.

GEL is licensed to generate electricity and had protected exclusivity in the supply and conveyance sections of the electricity market until 2022. This has subsequently been extended to allow for the development of the Electricity Strategy. In 2017, a generation licence and supply exemption were granted to another entity, the International Energy

---

<sup>8</sup> GEL's “Authorised Area” for Public Supply is the island of Guernsey.

Group (IEG). Subsequent to this licence, two further generation licences have been issued, however GEL remain the only front of meter generator on the Island.

In September 2021 (Billet XVII<sup>9</sup>), the States of Guernsey agreed that the responsibility for determining retail tariffs would be transferred from the GCRA to the STSB. This interim arrangement was agreed to address a period of regulatory vacuum that had persisted since 2012, created through the decision to remove GEL from regulation which was later put on hold pending the outcome of the Energy Policy and the changes in the marketplace caused by the issuing of new generation licences.

The interim regulations enable the STSB to agree the setting of tariffs as is done for other States trading entities. This was done to allow for tariff changes to be undertaken whilst the Committee *for* Economic Development undertake a broader review of the tariff structure, as resolved through the Energy Policy.

## **Environment**

As outlined, GEL currently import over 90% of the electricity consumed on the island through the interconnection with France, via Jersey. Through this arrangement GEL procure 100% of the imported electricity as certified renewable energy.

The electricity sourced through the interconnector is therefore of a low carbon content and contributes significantly to the overall low carbon content of Guernsey's electricity. In 2021 GEL reported lifecycle intensity of distributed electricity as 82gCO<sub>2</sub>e/kWh. However, when interconnection has not been available for any length of time, most recently 2019, the carbon intensity is significantly higher, due to the use of on island hydrocarbon fuelled generators, at 488gCO<sub>2</sub>e/kWh with 47% of electricity imported.

In addition to carbon emissions, there are other oxide emissions of nitrogen and sulphur produced when using the on-island plant. Whilst the newer engines are more efficient and offer improved emissions performance over the rest of the fleet, prolonged running of the on-island generators compromises the environmental credentials of the island's electricity supply.

High level conversations with members of the Guernsey business community have highlighted the importance of a low carbon energy supply to the continued economic prosperity of the Island.

---

<sup>9</sup> Policy letter - GUERNSEY ELECTRICITY – INTERIM ARRANGEMENTS FOR TARIFF REGULATION - <https://gov.gg/CHttpHandler.ashx?id=140081&p=0>

States of Guernsey

Services related to the States of Guernsey  
Electricity Strategy

Work Package 3

# Further analysis of a proposed electricity market framework

Final Version

January 2023



# Table of contents

<b>1. Glossary</b>	<b>2</b>
<b>2. Background</b>	<b>2</b>
2.1 Our work to date	2
2.2 Consultation outcomes and areas of focus	4
2.3 The purpose of this report	7
2.4 Differences to our initial report	8
2.5 Selecting a preferred supply pathway	8
<b>3. Delivering a market framework</b>	<b>10</b>
3.1 Selecting a framework which can deliver the preferred supply pathway to net zero	10
3.2 Direction towards a framework	11
3.3 The key decisions which need to be taken in developing the market framework	12
<b>4. Framework decisions: Competition</b>	<b>22</b>
4.1 What do we mean by competition and what could it look like?	22
4.2 How can competition support the States of Guernsey in delivering the main drivers for the journey to net zero under the preferred supply pathway?	27
4.3 What are the key decisions to be made on implementing competition within Guernsey's Electricity market and what downstream impact would these decisions have?	28
<b>5. Framework decisions: Unbundling</b>	<b>35</b>
5.1 An overview of unbundling	35
5.2 What are the advantages and disadvantages of different forms of unbundling (e.g. functional vs other)?	38
5.3 What unbundling choices are realistic for GEL?	41
5.4 What changes are required to GEL's structure and operations to facilitate the market changes and operations under the preferred supply pathway and when do they need to happen?	41
5.5 What actions could GEL undertake internally in support of cost allocation and unbundling activities?	44
<b>6. Framework decisions: Regulation</b>	<b>45</b>
6.1 Introduction	45
6.2 Why is the regulation required and is there an alternative approach?	52
6.3 Based on the level of competition to be introduced, what level of regulation might be required to support an effective framework and how could it be implemented?	52
6.4 What levels of regulation could be implemented?	53
6.5 Which parties would it cover and why?	53
6.6 What impact, if any, does unbundling GEL have on required regulation?	53
<b>7. Outcomes and decisions</b>	<b>53</b>
7.1 Outcomes of a workshop on the market framework	53
<b>8. PwC contacts</b>	<b>67</b>

# 1. Glossary

Term	Definition
<b>CIEG</b>	Channel Islands Electricity Grid
<b>EDF</b>	Électricité de France
<b>Export (of electricity)</b>	In the context of this report, export of electricity is defined as a fixed amount that would be provided onto the French grid at a given time (i.e. pre-planned). This contrasts to a “spill” of intermittent surplus which is defined separately below.
<b>GEL</b>	Guernsey Electricity Limited
<b>GF1</b>	Guernsey to France interconnector
<b>GJ1</b>	Existing 90kV subsea interconnector from Guernsey to Jersey
<b>GW</b>	Gigawatts
<b>GWh</b>	Gigawatt hours
<b>IPP</b>	Independent Power Producer
<b>kV</b>	Kilovolts
<b>kW</b>	Kilowatts
<b>kWh</b>	Kilowatt hours
<b>MW</b>	1,000 kW
<b>MWh</b>	1,000 kWh
<b>N / N-1 / N-2</b>	Electricity supply criteria where on-island generation capacity must be sufficient to meet demand should the largest 0 / 1 / 2 generation sources be unavailable.
<b>PV</b>	Photovoltaics
<b>RTE</b>	Réseau de Transport d'Électricité
<b>PPA</b>	Power Purchase Agreement
<b>Single Buyer</b>	Entity responsible for administering the electricity market and the ancillary services market including daily scheduling and settlement.
<b>SO</b>	System Operator
<b>Spill (of electricity)</b>	Defined as the spill of surplus intermittent electricity generation into the European grid (i.e. not pre-planned export).
<b>STSB</b>	States Trading Supervisory Board
<b>VIU</b>	Vertically Integrated Utility

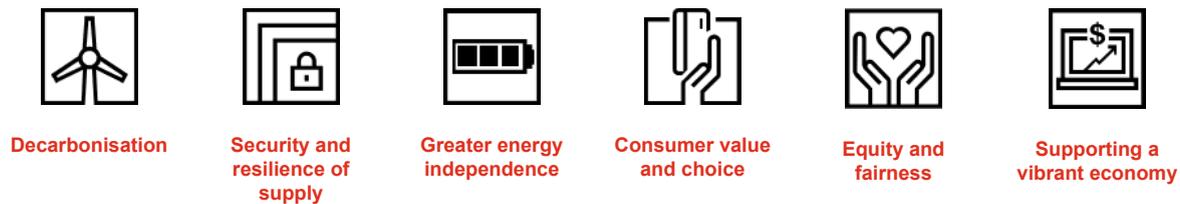
# 2. Background

## 2.1 Our work to date

### 2.1.1 Considerations for a future electricity market framework

PwC was commissioned by the States of Guernsey, through the Committee *for the Environment & Infrastructure*, to support the drafting and development of an updated Electricity Strategy for the island. This Strategy will balance the core objectives of Guernsey's 2020 Energy Policy which are outlined in *Figure 1* below.

Figure 1. Guernsey's Energy Policy 2020 objectives



As part of this work, PwC delivered an initial report entitled “*Considerations for Guernsey's future electricity strategy and market framework*” (the “PwC Consultation Report”) in August 2022. This report was a technical paper provided to the States of Guernsey in support of a consultation on the updated Electricity Strategy which was run during August and September 2022. This report included the following key analysis:

- An assessment of the current state of Guernsey's electricity market, including its strengths and weaknesses;
- Consideration of a set of initial pathways to net zero for Guernsey which were created by Siemens via a techno-economic model;
- Defining a set of principles for a market framework which could support the delivery of these pathways;
- Supporting this analysis with a set of key actions and next steps for the States of Guernsey to consider, as well as case studies from other jurisdictions.

Following this consultation period, a number of comments and points of feedback were provided to the States of Guernsey which resulted in the need to gather further information and ultimately support the Committee *for the Environment & Infrastructure* in putting forward a recommendation to the States of Guernsey on an Electricity Strategy for debate.

**This second report has been prepared to assist the Committee *for the Environment & Infrastructure* in this process and provide specific, detailed analysis of key focus areas arising from the consultation in an efficient manner.**

**Section 3** provides a summary of the key decisions which have been considered by the Committee for the Environment & Infrastructure, **Sections 4 - 6** provide additional background information and analysis and **Section 7** summarises the decisions taken by the Committee following presentation and discussion of this report.

## 2.2 Consultation outcomes and areas of focus

### 2.2.1 Ensuring the right fit for Guernsey

The Electricity Strategy consultation which ran during August and September 2022 contained two key technical reports. The PwC Consultation Report and a techno-economic analysis produced by Siemens entitled “*Guernsey Net-zero On Island Electricity Strategy*” (the “Siemens Consultation Report”) which set out a number of potential technology driven pathways to net zero for Guernsey’s electricity system.

Responses to the consultation were varied, but ultimately provided a robust challenge to the analysis to ensure the proposals were appropriate for Guernsey.

A summary of the key themes from the consultation and the arising actions is outlined in *Table 1A*. *Table 1B* then provides further detailed commentary on how our work has responded to specific consultation question responses.

*Table 1A. Key consultation themes and actions*

Consultation theme	Action taken
<p>Understanding the impact of a second interconnector in greater detail including:</p> <ul style="list-style-type: none"> <li>• What are the implications for offshore wind in terms of optimal sizing / curtailment?</li> <li>• How would a larger wind array impact the interconnector requirements?</li> <li>• What are the comparative impacts on decarbonisation and security of supply compared to a pathway without a second interconnector?</li> </ul>	<p>Siemens have conducted a second follow-up piece of analysis which provides additional detail about the impacts of having (or not having) a second interconnector.</p> <p>This analysis was used to enable the Committee <i>for the Environment &amp; Infrastructure</i> to select a preferred pathway for electricity supply.</p>
<p>Understanding the impact of different ownership models on the cost of the pathways. How does third party ownership impact the expected cost of the pathways compared to States of Guernsey funded development?</p>	<p>In line with above, Siemens’ extended analysis included a discussion of the different ownership implications. It highlighted that third party ownership could increase the overall cost of electricity for consumers (for example through a higher cost of capital and the need for investors to make a return), but does reduce the capital expenditure required from the States of Guernsey upfront.</p>
<p>Understanding in greater detail what alternative market framework models could look like and what their respective benefits and drawbacks would be, particularly with respect to:</p> <ul style="list-style-type: none"> <li>• Competition</li> <li>• Regulation</li> <li>• Unbundling of Guernsey Electricity Limited (GEL)</li> </ul>	<p>PwC has produced this report to respond to these requests for further information and support the Committee <i>for the Environment &amp; Infrastructure</i> in putting forward a recommendation for a market framework.</p>

Table 1B. Framework related consultation responses and how they have been addressed

Question	Response themes	Addressing action
B-13	<p><b>Funding mechanisms -</b>                      Respondents consistently identified a need to have a hybrid funding model including third parties but with continued States of Guernsey involvement.</p>	<p>Funding methodology was a core question put to the Committee for the Environment &amp; Infrastructure to consider in the development of this report.</p> <p>Discussion with the Committee identified broad consensus that a hybrid model was indeed the target approach, and mechanisms such as Green Bonds were to be considered. The exact mix will need to be analysed in greater detail but it was accepted that third parties will need to form part of this and therefore procedures would need to be in place to support competitive bids through tenders or bilateral negotiations.</p>
B-15	<p><b>Functional unbundling -</b> There was debate over the merits of functional unbundling and whether it would provide sufficient confidence to investors or provide meaningful value for its cost to implement.</p>	<p>Unbundling is revisited in this analysis and was tabled as a specific question for the Committee for the Environment &amp; Infrastructure to consider.</p> <p>Ultimately a lighter touch “accounting unbundling” route has been proposed to reduce costs necessary to implement but also provide the necessary cost information to support competitive analysis and identify opportunities to open the market up to third parties.</p> <p>Whilst it is still not believed that retail supply competition is a viable option - the proposed framework will support competition in other areas of the value chain including renewable generation (inclusive of on-island solar) and back-up / network services where cost effective.</p>
B-16 / 17	<p><b>Demand management services -</b>                      There was generally interest from respondents in investigating or providing these services.</p>	<p>This is a core component of the proposed framework which sets out that - once GEL’s cost base is understood (through accounting unbundling) - the introduction of competition in different areas of the value chain (such as demand management) becomes easier to pursue and justify.</p>
B-19	<p><b>Opportunity for renewable generation -</b> Mixed responses but an agreement that there should be opportunities provided and available for renewable generation.</p>	<p>Discussion from the Committee for the Environment &amp; Infrastructure noted that wind and solar generation are both key priorities to deploy to Guernsey and the framework needs to support and enable this to happen with third party involvement as a core component of this.</p> <p>The balancing view is that Guernsey does not have sufficient scale to support multiple networks or retail suppliers, so GEL should take on a responsibility as Single Buyer to enter into contracts with generators and dispatch generated electricity appropriately across the network.</p> <p>It was also felt that a significant regulatory framework or enhanced licensing regime would not be suitable</p>

		<p>for Guernsey because of the historic challenges in these areas and the limited number of third parties expected to be involved in the market. Management of third parties would instead be handled through contracting and competitive tenders/bilateral negotiations. Oversight and dispute management is proposed to be handled by the States of Guernsey and through the Guernsey courts where necessary.</p> <p>For clarity, the report distinguishes between spill of excess renewable electricity generation and pre-planned export. Pre-planned large-scale renewable electricity export is not the focus of this report at this time, although there is nothing in this report that would preclude it should that be desired in the future.</p>
B-20	<p><b>Approach to regulation</b> - There were again mixed responses to this question, with a range of views on whether more or less regulation was required - but all parties aligned with the fact that regulation should be proportionate to the Guernsey market and not overbearing.</p>	<p>This report outlines further detail of the potential regulatory structures which could be pursued for Guernsey. The view from the Committee <i>for the Environment &amp; Infrastructure</i> was that any regulation should be light touch, and where possible to cover roles through other mechanisms, an independent regulator should be avoided.</p> <p>The specific direction outlined in Section 7 below identifies that most aspects of regulatory oversight could be achieved through a States of Guernsey body in order to reduce costs of independent regulation, but also achieve alignment with the strategic direction (and is broadly consistent with the structure in place today).</p> <p>There was however an appreciation that a consumer protection function needed to be owned by an independent body but this could be managed through a non-regulatory body such as a consumer council.</p>
B-21	<p><b>Timeline for changes</b> - Many respondents felt that the proposed timelines were too long for some actions and should be pursued sooner. Others did note some actions are highly dependent on others, and on key decisions such as political direction and funding.</p>	<p>A revised timeline for proposed activities has been included within Section 7 of this report taking into account the decisions made on the market framework direction by the Committee for the Environment &amp; Infrastructure.</p> <p>In general, activities have been proposed to occur sooner, particularly in relation to renewable tenders and accounting unbundling. Regulatory actions are also simplified given the lightweight approach being targeted.</p> <p>As with any proposed timeline, we have made estimates based on our own judgement and these are subject to change as the States of Guernsey makes further strategic decisions and as technology and economic conditions shift.</p>

## 2.3 The purpose of this report

This report is intended to highlight a number of key decision points which the Committee *for the Environment & Infrastructure* will need to consider when defining their chosen market framework, as well as providing context to how these decisions would need to change depending on the final pathways and technologies deployed.

It is structured around three areas of focus, broken down into several specific sections as set out in *Table 2* below. Ultimately this analysis is intended to help the Committee *for the Environment & Infrastructure* as it puts forward a recommendation for a market framework.

Some of these areas are focused on providing information to the Committee *for the Environment & Infrastructure* to support their decision-making, and to answer before reaching the proposed market framework, rather than being questions which directly impact the selected framework.

*Table 2. Areas of focus for this report and specific considerations.*

Area of focus	Specific considerations
Competition <sup>1</sup> (Section 4)	<ul style="list-style-type: none"> <li>How can competition support the States of Guernsey in delivering the main drivers for the journey to net zero under the preferred supply pathway? (Section 4.2)</li> <li>What do we mean by competition and what could it look like? This includes the role of investment. (Section 4.2)</li> <li>What are the key decisions to be made on implementing competition within Guernsey's electricity market and what downstream impact would these decisions have? (Section 4.3)</li> <li>Qualitatively, what are the pros and cons of different approaches? (Our response to this question is embedded in the answers to the above questions)</li> </ul>
Unbundling of Guernsey Electricity Limited (GEL) (Section 5)	<ul style="list-style-type: none"> <li>What changes are required to GEL's structure and operations to facilitate the market changes and operations under the preferred supply pathway and when do they need to happen? (Section 5.4)</li> <li>What are the advantages and disadvantages of different forms of unbundling (e.g. functional vs other)? (Section 5.2)</li> <li>What actions could GEL undertake internally in support of cost allocation and unbundling activities? (Section 5.5)</li> </ul>
Regulation (Section 6)	<ul style="list-style-type: none"> <li>Based on the level of competition to be introduced, what level of regulation might be required to support an effective framework and how could it be implemented? (Section 6.3)</li> <li>Why is the regulation required and is there an alternative approach? (Section 6.2)</li> <li>What levels of regulation could be implemented? (e.g. What could the minimum level of regulation look like to attract investment and what could a more extensive regime include? What does "light touch regulation" look like?) (Section 6.4)</li> <li>Which parties would it cover and why? (Section 6.5)</li> </ul>

<sup>1</sup>Note that this is focused specifically on competition as it relates to generation, and other targeted aspects of the value chain (e.g. support services for network maintenance). Competition is expected to be targeted and is not expected to include network ownership and operation or retail supply. Please refer to the initial PwC Consultation Report for our full analysis of the different forms of competition. As part of the initial report, we recommended that competition should not be introduced for retail distribution in Guernsey or network ownership. Our position on this is unchanged.

## 2.4 Differences to our initial report

Our initial report provided analysis and detail across a large number of market framework areas, potential components and alternative options. It gave initial recommendations but was intended to be a document that supported the consultation process and would need to be re-framed as a preferred supply pathway came into focus and as feedback was gathered.

The topics covered in this report are in alignment with our initial report, however we have added additional detail and provided further analysis of the benefits and drawbacks of different market structures which could support the delivery of the preferred supply pathway which has been agreed by the Committee *for the Environment & Infrastructure* for analysis and development of the Strategy. As a result, some of our conclusions and recommendations in this report have been updated and differ from the initial PwC Consultation Report.

In particular, we gave recommendations around a number of framework components, several relating to competition, which we felt could be introduced. Having listened to the feedback from the consultation process we acknowledge some of these areas may still be overly complex for the small size of Guernsey's market and alternative approaches could be pursued where the trade-offs are deemed appropriate (for example a greater emphasis could be placed on bilateral negotiations rather than tenders particularly if there are limited third parties expected to be engaged). This example and more are covered in greater detail in the following sections.

## 2.5 Selecting a preferred supply pathway

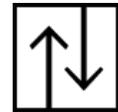
The selection of a preferred supply pathway is a critical step in helping to define a market framework for Guernsey.

We understand that the Committee *for the Environment & Infrastructure* has agreed the preferred pathway, "Dual interconnector with offshore wind", for analysis and the development of the Strategy following the Siemens Consultation Report, responses from the consultation and additional analysis.

An outline of the core components of this pathway are provided in *Table 3* below along with our commentary on how this has impacted our assessment of market framework components.

*Table 3. Summary of key components of the preferred supply pathway*

---

	<b>Deployment of a second interconnector (GF1)</b>
	<p>The core component of the preferred supply pathway is the deployment of a second interconnector directly to France (GF1). This would provide additional security of supply and enable the existing GJ1 interconnector to offer redundancy in the case of interruption or damage.</p>
	<p>From a market framework perspective, this opens up the possibility of managing any spill of excess generation to the European grid (see below), but also simplifies the potential grid management services GEL would need to deploy in the future.</p>
	<b>Interconnector financed by GEL / States of Guernsey</b>
	<p>The expectation is that the delivery of the second interconnector is financed by GEL (or States of Guernsey) such that the cable is effectively publicly owned and no third party investment is required (excluding borrowing).</p>
	<p>This is important as it reduces the need for a market framework to cater for and mediate third party interconnection services (i.e. All network assets are owned by GEL).</p>

---

---

### Spill of surplus electricity is expected

Another critical assumption is that the second interconnector will be able to support the spill of excess electricity to the European grid. In this context we define spill as surplus generation from intermittent sources which we want to dispatch elsewhere rather than curtail (in contrast to pre-planned export of electricity).



This increases the complexity of network and system operation required as Guernsey will no longer simply be a demand sink for electricity and instead will need to manage the intermittency of excess renewable electricity generation.

As the 2nd interconnector negotiations are yet to be started, it will be necessary to understand what direction States of Guernsey would take if it were not possible to negotiate to have the ability to spill excess generation (or if no counterparty can be found for the excess electricity) as this would impact the framework subsequently implemented. This scenario is considered in greater detail as part of the extension to the Siemens Consultation Report delivered in November 2022.

---

### Investment in offshore wind

The preferred supply pathway combines a second interconnector with an investment in an offshore wind array.



The size of this wind array is not yet determined but this report assumes the offshore wind array would be 90MW in size (which we understand could be supported by the existing 33kV network on Guernsey and is the size proposed within the Siemens Consultation Report). We would expect GEL to need to determine factors such as cost of connection and network access charges for the IPP once the scheme details become available.

---

### Offshore wind financing

The method of financing this offshore wind farm is not yet decided.

This is the largest area of uncertainty remaining and will have a substantial impact on the level of market framework which needs to be introduced. This is discussed in greater detail in the following sections (in particular in section 4.3) of this report but in summary:



- Where investments are owned by GEL or States of Guernsey, there will be limited need to implement additional framework components.
- The presence of third party investment will likely require a greater degree of market framework and structure to enable transparency, oversight and monitoring.
- This said, if the third party investment is one-off in nature the risks could be managed through contractual procedures rather than a more complex market framework.

---

### Increased support for solar power

Ground mounted, car park canopy and roof mounted solar generation have all been included in the pathway. There is a planned split in ownership, with roof mounted presumed to be privately owned and larger scale arrays expected to be GEL owned and funded, although these could be obtained through 3rd parties using competition.



Siemens identified as part of their Consultation Report that solar power is the most cost-effective method of generation per kWh for Guernsey - however it was limited by the available land on the island. The Committee *for the* Environment & Infrastructure will investigate the possibility of expanding the land area available for use to increase the level of solar power which could potentially be generated.

Our current assumption is that the majority of any future large-scale solar power is expected to be GEL owned and funded, which would limit the need for the introduction of competition and regulation, but we would expect operational changes to be required to

---

---

accommodate the increased level of small-scale solar. As we outlined in our initial PwC Consultation Report there should be appropriate incentives put in place to support the uptake of private small or micro-scale solar.

---

### **Back up generation**

With the introduction of a second interconnector and an offshore wind array - the current N-2 supply criterion could be reduced to a lower level and decrease the level of ongoing investment required to maintain and upgrade thermal plant on the island.



We understand that no competition is to be targeted for the replacement of any thermal plant.

There is however an opportunity to collaborate with existing on-island back-up generation run by third parties where there is a mutual benefit in doing so (e.g. Sure).

---

# 3. Delivering a market framework

## 3.1 Selecting a framework which can deliver the preferred supply pathway to net zero

With the Committee *for the Environment & Infrastructure* having agreed to select the “Dual interconnector with offshore wind” pathway (including additional solar) as the preferred pathway for the next stage of analysis from Siemens Consultation Report, they must now finalise and put forward their recommendation for a complementary market framework.

To support delivery of the preferred supply pathway, this framework will need to cover a wide range of areas including the potential introduction of competition across the electricity value chain, whether GEL should be unbundled (and if so, to what degree), and how the sector should be regulated (for example via an external regulator or lighter oversight through a government body).

This report is intended to highlight a number of key decision points which the Committee *for the Environment & Infrastructure* will need to consider when defining their proposed market framework as well as providing context to how these decisions would need to change depending on the final pathways and technologies deployed.

It is expected that the framework chosen will have to adapt over the course of the next 30 years to accommodate changes in technology, economic conditions and future island priorities for Guernsey.

## 3.2 Direction towards a framework

The decisions taken by the Committee *for the Environment & Infrastructure* provide clarity on the technologies which are likely to be utilised to deliver the preferred net zero pathway in Guernsey. Whilst this provides an indication on the direction of travel, a number of key uncertainties remain (such as the funding model for generation assets). The choice of different pathway components, and in particular the way these are structured and funded, has implications for the degree of framework and structure which is necessary.

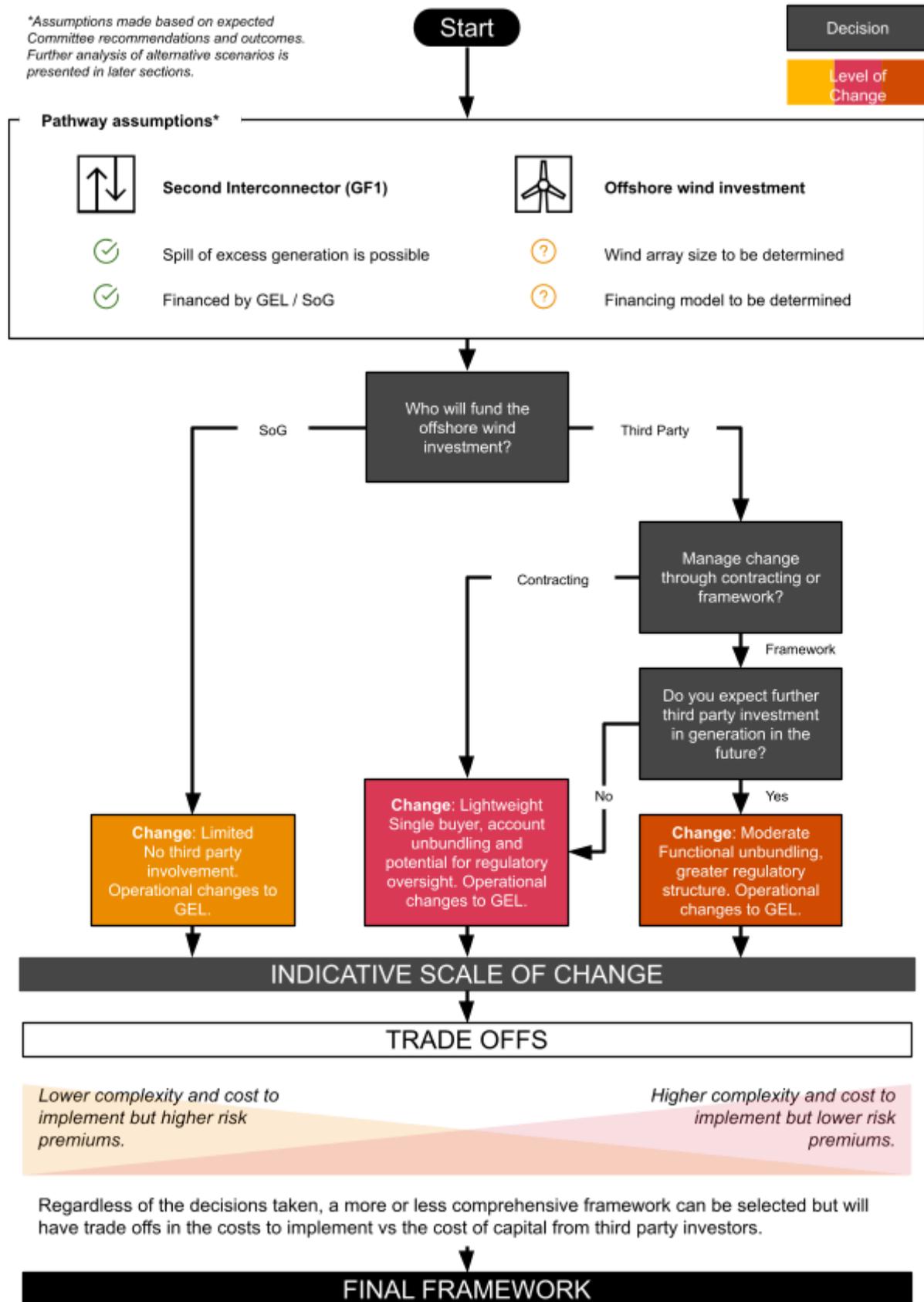
For example, if all investment can be funded by GEL or the States of Guernsey, there may be little need to introduce competition in large-scale generation or unbundle GEL further than at an accounting level. Conversely, if there are multiple third party investments expected in the coming years, a level of regulation and structure may be required to appropriately monitor and manage these parties and their interactions with GEL.

This paper explores the potential for competition in generation in detail, including options for the investment in large-scale generation assets and back-up generation services, but it does not consider competition in all parts of the market. Competition introduced should be targeted at specific aspects of the electricity market in a controlled manner rather than any wider market opening. Please see our previous PwC Consultation Report for further details of why competition is not considered suitable for retail supply, network ownership or the ownership and operation of an interconnector.

A summary of this, and similar decisions we believe will have a substantial impact on what market framework is right for Guernsey, and therefore need to be considered by the Committee *for the Environment & Infrastructure*, is provided in *Section 3.3*.

*Figure 2* (below) provides an indicative view of how these different decisions could impact the necessary framework, while also demonstrating that there are trade-offs to be made between the framework options. It is worth recognising that, despite the decisions impacting on the likely framework, there remains considerable flexibility for the Committee *for the Environment & Infrastructure* to determine the market framework to be proposed.

Figure 2. Indicative Outline Market Framework decision tree based on an assumed preferred supply pathway of “Dual interconnector with offshore wind”



## 3.3 The key decisions which need to be taken in developing the market framework

Building on the above, we identified 12 decisions which the Committee *for the* Environment & Infrastructure needed to take in order to reach a finalised position on a proposed market framework. These decisions are set out in *Table 4* (below) and include a high level summary of the decision alongside their impact on the market framework.

The remainder of this document provides further detail to support the information included within *Table 4*. The decisions outlined in *Table 4* were presented to the Committee *for the* Environment & Infrastructure on 28 November 2022 for debate and discussion. The Committee's responses and ultimately their responses to these decisions have been captured in Section 7 of this report alongside a summary of next steps and actions.

### 3.3.1 An introduction to “competition” in the Guernsey context

As set out in greater detail in *Section 4*, we view the introduction of greater competition in the Guernsey electricity sector as:

*“Facilitating situations in which multiple qualified parties can bid to provide a service, or services, which has been determined as beneficial to the delivery of Guernsey’s Electricity Strategy, at a lower cost or higher quality of service (or both) than others who currently offer the same service or who are also competing to offer the same service or services.*

*This may include creating situations in which qualified parties can make a submission to a representative body of the States of Guernsey to offer specified services relating to the delivery of the Electricity Strategy objectives (through e.g. a tender or bilateral negotiation).”*

We have identified a number of areas in which competition may be worth considering, including:

- Seeking investment for, building and operating large-scale renewable generation (such as an offshore windfarm or large-scale solar array)
- Building and operating large-scale renewable generation funded by States of Guernsey/GEL
- Providing back-up generation services to support grid balancing
- Providing meter installation and network support
- Support with interconnector installation

We also provide some examples to illustrate situations which we do not believe would be suitable for competition in Guernsey:

- Retail supply
- Onshore networks
- Interconnector ownership and operation

We believe that competition could be introduced into certain parts of the electricity market in Guernsey by the States of Guernsey in order to deliver on specific policy objectives. The introduction may be through licensing activities, but is expected to involve either running tenders or using bilateral negotiations to obtain the specific desired services at competitive rates, rather than a wholesale opening of the respective parts of the markets to competition. *Table 4* (below) provides a summary of the key considerations in response to each of the 12 points for decisions set out in this report. Subsequently *Sections 4, 5 and 6* explore them in more detail.

Table 4. Key points for decision presented to the Committee for the Environment & Infrastructure to develop the proposed market framework

Area	Decision to be made	Impact for Guernsey's proposed market framework		
		Impact Rating	Considerations	Impacts
<b>Competition</b>  <i>(More info: Section 4)</i>	1 - How will offshore wind and large-scale solar investments be funded?	High	<p>The primary options for investment include:</p> <ul style="list-style-type: none"> <li>• States of Guernsey/GEL funding (e.g. borrowing),</li> <li>• 3<sup>rd</sup> party funding; and</li> <li>• Joint States of Guernsey/GEL and 3<sup>rd</sup> party funding</li> </ul> <p>The decision on how to invest in these assets will impact the level of capital requirements in the short-term and could impact the long-run costs of electricity from the assets. The funding model chosen will also impact the risk/reward profile of delivery for the States of Guernsey/GEL.</p> <p>It is important to note that through either approach, suppliers will need to be sourced with the capability to deliver the assets. Under a States of Guernsey / GEL funded route, they would need to be responsible for managing and controlling a procurement process for the design, installation and management of the array.</p>	<ul style="list-style-type: none"> <li>• Competition is not required in large-scale generation if States of Guernsey/GEL funds the wind farm / large-scale solar assets (beyond potentially identifying companies to build, operate and maintain the assets through some form of procurement)</li> <li>• Competition may be required if 3<sup>rd</sup> party funding is the desired approach, although bids could be obtained through bilateral negotiations with potential for some element of competition (depending on how bids are sourced and how the process is managed).</li> <li>• Investors will need confidence that the anticipated returns on their investments are predictable, which increases the need for a greater degree of regulation.</li> <li>• Depending on how assets are financed, this will determine the level of confidence that is required by investors. Accounting unbundling may still be sufficient in conjunction with a Single Buyer and internal transfer pricing.</li> <li>• Functional unbundling is more likely to be required if there are multiple investors and/or multiple new generation units which could be competing among themselves as well as with GEL, although there are different approaches to manage the market without functional unbundling (e.g. using</li> </ul>

				<p>contracting as a means to agree dispatch orders)</p> <ul style="list-style-type: none"> <li>Although there may be a need for regulation without competition, e.g. to support customer tariff setting, the introduction of 3rd party investment is the biggest external driver for regulation, and creates the greatest potential for considering unbundling GEL generation.</li> </ul>
<p><b>Competition</b> <i>(More info: Section 4)</i></p>	<p>2 - Will there be further investment in large-scale renewables?</p>	<p>Medium</p>	<p>If the generation assets required are narrow in scope and limited in technology type, there is likely to be less need to have large-scale competition.</p> <p>If the investments in large-scale generation are expected to happen on multiple occasions, there is potential for changes over time, which would result in complexity being added when necessary, based on identifying triggers that would lead to the need for change.</p> <p>If large-scale change is likely to be required there may be greater reason to introduce a more complex market framework.</p>	<ul style="list-style-type: none"> <li>The introduction of generation over time could mean that current investors are concerned about how future investments will impact their assets, and will want comfort that their contract, or the market framework will protect their interests.</li> <li>A comprehensive approach to contracting may be sufficient, but equally a regulator could provide the stability / comfort to support the introduction of change over time.</li> </ul>
<p><b>Competition</b> <i>(More info: Section 4)</i></p>	<p>3 - How will access to the interconnector be managed if there is the ability to export / spill electricity?</p>	<p>Medium</p>	<p>The access arrangements for the interconnector(s) to spill excess generation or plan for electricity export will need to be determined – investors might be concerned that access would be granted preferentially to GEL’s generation capacity.</p> <p>Note: further analysis is necessary to understand the circumstances under which this spill /export is likely to happen and who the offtaker would be for the electricity.</p>	<ul style="list-style-type: none"> <li>Introducing export or spilling excess generation on the 2nd interconnector with 3rd party generators will mean further complexity is likely to be introduced. In particular, in terms of operational complexity covering how access rights are allocated and adjusted according to operational circumstances and the charging methodology for access.</li> <li>If 3rd parties were allowed to export or spill electricity (i.e. excess offshore wind or solar</li> </ul>

				<p>generation), interconnector capacity could be allocated on a firm or non-firm basis, but it would be necessary to determine how short-term capacity should be managed. In addition, it would be necessary to establish how GEL should curtail export / spill rights when necessary, e.g. when there are operational challenges on the interconnector.</p> <ul style="list-style-type: none"> <li>• In addition, it will be necessary to understand what direction States of Guernsey would take if it were not possible to negotiate to have the ability to export / spill (or if no counterparty can be found for the electricity) as this would impact the framework subsequently implemented.</li> </ul>
<p><b>Competition</b> <i>(More info: Section 4)</i></p>	<p>4 - Will you consider introducing competition in other parts of the value chain?</p>	<p>Medium</p>	<p>We have identified a number of areas beyond large-scale generation where targeted competition (expected to be through tenders or bilateral negotiation) could deliver improved outcomes for customers in Guernsey.</p> <p>Examples may include:</p> <ol style="list-style-type: none"> <li>1. GEL running a tender to obtain capability to deliver a States of Guernsey/GEL funded offshore wind farm or large-scale solar.</li> <li>2. GEL running a tender for 3rd parties to provide back-up generation services with existing assets.</li> <li>3. GEL undertaking bilateral negotiations with 3rd parties to provide services to install meters for customers.</li> </ol>	<ul style="list-style-type: none"> <li>• Many of the potential areas for further competition could be introduced with limited impact on the complexity of the framework whilst having the potential to add value to the Guernsey electricity market.</li> <li>• For example, it is possible that other companies could provide back-up generation services for the grid at lower costs than provided by GEL. Competition would allow GEL to determine if such savings are realistic by allowing 3rd parties to provide competitive bids for such services. It would help the island collectively make best use of its energy assets in a collaborative island-wide spirit.</li> <li>• We note, however, that demonstrating the value of these competitive opportunities depends on GEL being able to articulate its existing costs to undertake these activities. It is important that GEL</li> </ul>

			<p>4. GEL/States of Guernsey running a tender to obtain bids to provide services in support of the installation of a new interconnector.</p> <p>5. Enabling the facilitation of community energy schemes if they could be shown to provide efficiencies.</p>	<p>is able to articulate its existing costs, as these provide a baseline against which the cost-effectiveness of alternative, competitive proposals should be assessed. It also helps clarify the likely impact on tariffs of new, competitive generation.</p>
<p><b>Competition</b> <i>(More info: Section 4)</i></p>	<p>5 - Will you use licensing to enable competitive markets or a tender / bilateral negotiation approach to deliver targeted competition supported by licences?</p>	<p>High</p>	<p>Tenders and bilateral negotiations are expected to provide suitable control to States of Guernsey to oversee the markets developing as intended.</p> <p>Using licensing (enabling companies to enter the market without winning a tender/undertaking a bilateral negotiation) as an approach to attract new entrants is expected to be more complex than is required. This would require amending and updating the licensing process to ensure it is consistent with the framework and the participant roles, while providing suitable consideration for existing licence holders. In addition, this will likely result in investment in generation assets which are not aligned with the States of Guernsey net zero ambitions.</p> <p>Note that some changes to licences are likely to be required under the proposed preferred pathway, as the obligations on GEL will change if there is any unbundling, there may be IPPs with different obligations and the existing generation licences may not reflect new operating requirements.</p>	<ul style="list-style-type: none"> <li>Tenders and bilateral negotiations are likely to be sufficient and require smaller changes to the overall market than a more “open” introduction of competition. In addition, tenders and bilateral negotiations will allow States of Guernsey to maintain greater control over the direction of market development.</li> </ul>

<p><b>Unbundling GEL</b></p> <p><i>(More info: Section 5)</i></p>	<p>6 - To what extent should GEL be unbundled?</p>	<p>High</p>	<p>Accounting unbundling is expected to be beneficial to support all future market pathways and to improve efficiency and cost justification of future activities. If actioned, it would support GEL to be better positioned to determine if 3rd parties can offer services at improved rates for customers. Further unbundling may be possible but anything beyond functional unbundling is not likely to be necessary.</p>	<ul style="list-style-type: none"> <li>• Greater unbundling is expected to incur higher costs and take longer to deliver.</li> <li>• The choice of unbundling options appears to be limited between accounting and functional unbundling. Legal and full ownership unbundling appear unnecessary and disproportionate for the Guernsey electricity market.</li> <li>• We suggest accounting unbundling should be undertaken, even if functional unbundling is not pursued. This will support GEL transfer pricing and tariff justification. This will be a key step in allowing GEL to demonstrate the costs associated with services it provides, which could enable GEL to procure services (e.g. back-up generation services) from 3rd parties where these represent value for money.</li> </ul>
<p><b>Unbundling GEL</b></p> <p><i>(More info: Section 5)</i></p>	<p>7 - Will GEL have a Single Buyer function?</p>	<p>Medium</p>	<p>GEL should have an obligation to dispatch to keep costs to a minimum subject to other constraints such as interconnector contract requirements, contracts with other third parties, fuel contracts, emissions criteria etc. The System Operator (SO) part of GEL needs to dispatch plant according to a form of merit order, based on information it has been provided on marginal costs.</p> <p>The Single Buyer would be tasked with buying power from Independent Power Producers (IPPs), usually through Power Purchase Agreements (PPAs) and selling it directly to consumers or to the retail supplier. The Single Buyer would become responsible for managing the interconnector contract as a source of generation. The setting up of a Single Buyer within the SO business would</p>	<ul style="list-style-type: none"> <li>• We are proposing the establishment of a Single Buyer function within the networks function of GEL to be the counterparty for internal contracts, for internal cross-department transfers or for contracting with 3<sup>rd</sup> parties.</li> <li>• If accounting unbundling is not undertaken, there will be less transparency of costs (and less ability to justify tariffs and future capex needs) and therefore it is not necessarily beneficial or effective to set up a Single Buyer. If unbundling is undertaken – e.g. either functional or accounting unbundling – a Single Buyer should be introduced.</li> <li>• In addition to a Single Buyer, it will be necessary for GEL to further develop its System Operation capability to manage the increased network complexity driven by greater renewables being</li> </ul>

			<p>provide a counterparty for all generation contracts at grid scale and a single source of information for dispatch.</p> <p>We understand that the preferred supply pathway suggests that Guernsey's demand needs to 2050 can be met most economically by a 2nd interconnector and a 90MW offshore wind farm. It will be necessary to direct GEL, through the Single Buyer, to take appropriate actions to support the delivery of this preferred supply pathway. Note that this pathway does not preclude additional renewable generation in the future, should it be cost-effective.</p>	<p>connected and the ability to export / spill on the 2nd interconnector.</p> <ul style="list-style-type: none"> <li>Regardless of the decision to set up a Single Buyer, the framework should provide clear guidance to GEL on its requirement to take actions to deliver the preferred supply pathway at lowest cost to consumers (or similar). This is expected to require guidance on the process that should be followed if an investor wants to propose a new project and the setting of certain targets where appropriate. This is aimed at delivering the preferred supply pathway while minimising costs and risks - i.e. avoiding unnecessary investment in overly-complex projects or deploying technologies which are yet to be fully proven.</li> </ul>
<p><b>Direction to GEL</b></p> <p><i>(More info: Section 5 and 6)</i></p>	<p>8 - Will GEL be required to set a long-term investment plan?</p>	<p>Medium</p>	<p>A long-term plan for network investment, replacement and expansion that takes account of the preferred generation pathway, as well as the demand pathways being developed by Siemens would support cost-reflective tariffs mentioned above. The long-term plan should be based on the preferred supply pathway and a set of agreed demand scenarios. We would expect the demand scenarios to also consider Guernsey's use of other fossil fuels (which electricity could be a substitute for).</p> <p>These plans should help GEL clarify their needs and provide transparency to other users over where future network investment is expected.</p>	<ul style="list-style-type: none"> <li>The introduction of a long-term investment plan provides increased transparency and confidence for investors, it can also contribute towards the creation of cost-reflective tariffs.</li> <li>There is likely to be a need to include some level of oversight on the plans – both that the plans are reasonable and align with the preferred supply pathway, and that GEL are following them appropriately in developing their network. This oversight could be provided by an independent regulator, or through an agreed approach between the States of Guernsey and GEL.</li> </ul>

<p><b>Customer tariff setting</b></p> <p><i>(More info: Section 5 and 6)</i></p>	<p>9 - How will customer and spill tariffs be set going forward?</p>	<p>Medium</p>	<p>Greater clarity is required on what changes are needed to make sure tariffs are cost-reflective and how they are approved when GEL seeks changes.</p> <p>A decision on regulation may impact the tariff setting approach where the process for setting tariffs is included within the remit of new regulation.</p>	<ul style="list-style-type: none"> <li>• To support the development of cost-reflective tariffs it will be appropriate to put in place a consistent process to support tariff setting and implementation, which may involve taking ownership of setting tariffs for GEL to charge customers outside the political cycle.</li> <li>• There may be a need to introduce a route for customers to escalate issues to, in instances where they do not believe that GEL is providing the service they require.</li> </ul>
<p><b>Regulation</b></p> <p><i>(More info: Section 6)</i></p>	<p>10 - What level of regulation is desired?</p>	<p>High</p>	<p>There are two potential, linked reasons why the States of Guernsey might want to establish an independent decision-making process:</p> <ul style="list-style-type: none"> <li>• <b>Challenging decisions</b> – The States of Guernsey might envisage the need for future decisions which it will be difficult or impractical for existing political institutions to make in a timely way; and/or</li> <li>• <b>Investor confidence</b> – The States of Guernsey might conclude that independent decision-making processes are needed to underpin third party investment.</li> </ul> <p>For the States of Guernsey, the key trigger for creating an independent regulator (or revisiting existing structures) is likely to be the involvement of third party investment in renewable generation. Investors will need confidence that the anticipated returns on their investments are predictable, while representing value for money for consumers in Guernsey. There will be a need for GEL to be directed such that projects are assessed on merit</p>	<ul style="list-style-type: none"> <li>• The choice between agreeing a contract or establishing an independent regulator comes down to how easy it is to translate the likely requirements of investors into a legal contract. Where it is not practically feasible to capture investors' requirements in a contract, it is often easier to rely on a competent regulatory authority, with appropriate duties, to make independent decisions.</li> <li>• Regulation is also beneficial to support oversight of GEL's long-term network investment plans, customer service levels and tariffs, as well as the access arrangements for the interconnector(s) to spill excess generation .</li> <li>• Where the need for greater independent regulation is implied by the choice of net zero pathway, it should focus solely on GEL. Introducing regulation beyond GEL will result in greater cost and complexity than is required to provide confidence to investors, and support delivery of the wider ambitions for the sector.</li> </ul>

			<p>and compared against technology benchmarks, which implicitly caps the cost of a project without a need for there to be explicit caps defined.</p> <p>There are two ways of securing the confidence that investors will require. Either, through a contract between the States of Guernsey and the investors which would look to protect the investor against future decisions from the States of Guernsey which may have an adverse impact on the investor (e.g. future market changes that impact achievable revenues and are applied to existing PPAs), or through the establishment of an independent regulator.</p>	
<p><b>Regulation</b> <i>(More info: Section 6)</i></p>	<p>11 - How would any regulation be structured?</p>	<p>High</p>	<p>There are different ways of providing investors with confidence. For example, through a contract between the States of Guernsey and the investors (which could limit the freedom of the States of Guernsey to take decisions that would have an adverse impact on the investor).</p> <p>Establishing an independent regulator (whose powers and duties would include ensuring market participants are treated in a fair and non-discriminatory way) can also achieve the same result. There are options between these two extremes which offer varying levels of confidence to investors.</p>	<ul style="list-style-type: none"> <li>The choice of approach of how to structure regulation will impact the costs and complexity of the network, while also impacting the level of transparency and comfort afforded to 3<sup>rd</sup> parties.</li> </ul>
<p><b>Timing</b></p>	<p>12 - When are these changes required?</p>	<p>Medium</p>	<p>The potential changes indicated by the market framework are not all needed immediately, with many changes only necessary towards the 2030s with the introduction of the 2<sup>nd</sup> interconnector,</p>	<ul style="list-style-type: none"> <li>Some changes are expected to be undertaken as soon as possible, and regardless of the market framework including (if agreed) accounting unbundling for GEL and initial changes to</li> </ul>

			<p>potential large-scale solar and offshore wind farms.</p>	<p>operational rules for generation deployment, acknowledging the need to manage increased complexity with contracts (e.g. 3<sup>rd</sup> party generation, two interconnector contracts). The timing of changes for increased solar depends on scale, with changes to support micro solar being tariff based, and larger-scale changes requiring more time.</p> <ul style="list-style-type: none"> <li>• If they are proposed by States of Guernsey, the introduction of some elements of competition could also happen in the near-term- for example GEL exploring the use of 3rd parties to provide back-up grid services. To deliver this quickly, the framework and licences would need to be changed, both to impose obligations on the third parties and to enable GEL to change its operating procedures and possible systems</li> <li>• Example operational changes - changes to operating procedures, decisions on how the two interconnectors would interact (i.e. not at all), how the back-up GEL generation is to be used, and what happens as micro-renewables are integrated (e.g. impact on system stability).</li> <li>• There may be less requirement to progress other changes, such as regulatory changes until later in the 2020s, depending on the approach taken, noting there may be shorter-term changes necessary to the existing electricity licence regime.</li> </ul>
--	--	--	---	---

# 4. Framework decisions: Competition

## 4.1 What do we mean by competition and what could it look like?

### 4.1.1 What do we mean by competition?

In developing market framework options for Guernsey, we have considered international practice, looked at a range of market structures and levers to support change and considered how successful market frameworks have evolved over time to adapt to changing demand and evolving technologies. The initial PwC Consultation Report considered what it could mean to introduce competitive tensions into certain parts of the Guernsey electricity value chain.

Any framework for Guernsey must take account of the small island scale of the market and recognise that, well past 2030, the likely continued presence of one or more interconnectors will have a major influence on overall operations.

In some markets, competition has been introduced across all parts of the value chain, from generation, through the networks and into the retail sector. In these markets, tenders play an important role to obtain specific services (e.g. National Grid tendering for frequency response services) but the majority of competition is overseen through licences and driven by opening the market to any relevant licence holder to compete.

Given the small scale of the market, any competition introduced is not expected to match that seen in the UK or other markets. Instead, we see the potential for targeted competition to be introduced into specific aspects of the electricity sector in a controlled manner.

Our position is based on the following analysis:

- Guernsey is a small market with a limited retail market, and relatively limited total generation demands through to 2050.
- The benefits to be gained from competition (e.g. improvements in efficiency in retail activities, market-driven increases in generation capacity) in many parts of the value chain are not expected to outweigh the costs of getting there (in particular, the small number of consumers means there is only a limited base over which to recover the costs of market changes over time).
- Direction from the States of Guernsey provides a clear view that competition is not a desired outcome for some parts of the value chain – e.g. that there should remain a single grid for use by all market participants – we are supportive of this view as networks are inherently monopoly activities, with limited opportunities for efficient and effective competition.

We view introducing greater competition in the Guernsey electricity sector as:

*“Facilitating situations in which multiple qualified parties can bid to provide a service, or services, which has been determined as beneficial to the delivery of Guernsey’s Electricity Strategy, at a lower cost or higher quality of service (or both) than others who currently offer the same service or who are also competing to offer the same service or services.*

*This may include creating situations in which qualified parties can make a submission to a representative body of the States of Guernsey to offer specified services relating to the delivery of the Electricity Strategy objectives (through e.g. a tender or bilateral negotiation).”*

That is, we believe that competition could be introduced into certain parts of the electricity market on the island, by the States of Guernsey in order to deliver on specific policy objectives. The introduction may be through licensing activities, but is expected to involve either running tenders or using bilateral negotiations to obtain the specific desired services at competitive rates, rather than a wholesale opening of the respective parts of the markets to competition.

#### 4.1.2 What could competition look like in Guernsey?

Regardless of the decisions taken on investments, and how those could impact the delivery of competition, we have identified a number of key principles which are crucial to shaping any competition which may be introduced. We believe any competition should be:

Table 5. Principles for competition in the electricity market in Guernsey

Principle	Overview
<b>Targeted</b>	Any competition which is introduced needs to be deliberate and introduced with the aim to deliver specific outcomes and objectives, rather than as a broad-brush introduction of competition across the value chain.
<b>Directed by the States of Guernsey</b>	Given the proposal that competition should only be introduced where it can help deliver a specific outcome, competition introduced needs to be directed by the States of Guernsey. This is expected to be through a clear set of desired outcomes to be delivered by GEL (which could involve a potential new part of the business, known as a Single Buyer). For example, we would expect that the States of Guernsey would provide direction on aspects such as the amount of generation to be procured (e.g. through renewable energy targets), which technologies to include, target dates for timing, high level standards and experience the bidders need to meet etc.. This is expected to be in line with the preferred supply pathway. Where regulation is introduced, there would likely be a role for regulating GEL to support these activities.
<b>Controlled centrally</b>	Given the scale of the market, and GEL's position, we believe that any competition introduced is likely to be overseen by a part of GEL. The Single Buyer is expected to be required to act as the counterparty to all generation contracts, including both new contracts and contracts with existing generation.
<b>Relevant to the delivery of net-zero</b>	While this may be obvious, any competition introduced should avoid inadvertently supporting investment in technologies which are not helping to deliver Guernsey's net zero ambitions. As such, decisions should be taken to support the preferred supply pathway.
<b>Financially viable</b>	Competition should be used to deliver projects which offer value for consumers. Such projects should avoid difficult and unnecessarily challenging projects where the technology does not currently exist or is bleeding edge so carries too much project risk.
<b>Structured appropriately</b>	<p>We assume that any competition would largely be driven by the use of tenders to attract desired investment, rather than using licensing to enable a complete opening of the market to anyone to enter. For large-scale investments, bilateral negotiations are also a possibility, but if multiple parties are interested, then a tender is likely to produce a more attractive proposition for Guernsey.</p> <p>We are not suggesting however a removal of the existing licensing regime - rather we are keen to limit the entrant of major generators to those which align with the States of Guernsey ambitions for Net Zero. As such, we are proposing that new entrants are selected through a competitive negotiation / tender process and then issued with a licence to cover their relevant obligations. Existing licences may need to be amended to cover changes in operational requirements as a result of GEL unbundling or other framework adjustments, as well as to support smaller scale solar generators. For example it may be appropriate to introduce two tiers of</p>

	licences (based on MW generation thresholds), one for large scale generators and the second (more lightweight) for small scale (particularly solar) generators who may wish to provide intermittent back-up services into the grid under contract with GEL.
<b>Timed appropriately</b>	The introduction of competition needs to be phased into the right places as and when the markets are ready. For example, introducing competition into generation without putting in place appropriate changes to GEL or establishing relevant regulatory structures (if these are required) could result in worse than expected outcomes being delivered. The introduction of changes also needs to be cognisant of the risks associated with stranded assets - if new generation is encouraged, consideration needs to be given to the impacts this could have on GEL's existing thermal generation, which plays a key role in back-up, meeting peak demand and in times of system stress.

#### 4.1.3 Where could competition be introduced and where do we not propose the introduction of competition?

In line with the initial PwC Consultation Report recommendations, we do not believe that competition should be introduced into domestic retail or network activities. However, we believe there is a potential case for introducing competition into elements of electricity generation. The extent to which it is needed across the electricity value chain, is heavily dependent on the decisions taken on what generation assets are to be built and how you expect to deliver these investments.

To help explain our position with examples, we have identified a non-exhaustive list of areas in which competition may be worth considering, including:

Table 6. Situations which appear suitable for competition in Guernsey

Area	Overview
<b>Building an offshore wind farm or large-scale solar</b>	Running a tender to obtain suppliers to build, operate and maintain new generation assets which are to be financed by States of Guernsey/GEL.
<b>Investing in and building an offshore wind farm</b>	Agreeing terms with a 3rd party to finance, build, operate and maintain new generation assets.
<b>Back-up generation services</b>	GEL running a tender for 3rd parties to provide back-up generation services with existing assets. This could cover the provision of load following and frequency response services, as well as stand-by generation. (Our expectation is that these services would be provided by local companies with batteries or existing fossil fuel generators who could make firm commitments to perform under contract). It is possible that 3rd parties could provide these services at lower costs (and possibly lower carbon emissions) than GEL is currently able to provide. Payments could be for a range of services e.g. availability of assets or generation levels.
<b>Meter and network support</b>	GEL undertaking bilateral negotiations with 3rd parties to provide services to install meters for customers or provide support for the maintenance of the on-shore network.

<b>Interconnector installation support</b>	GEL/States of Guernsey running a tender to obtain bids to provide services in support of the installation of a new interconnector.
<b>Community energy schemes</b>	It may be beneficial for customers if GEL were to enable the facilitation of community energy schemes if they could be shown to provide efficiencies.

We also provide some examples to illustrate situations which we do not believe would be suitable for competition in Guernsey:

*Table 7. Situations which do not appear suitable for competition in Guernsey*

<b>Area</b>	<b>Overview</b>
<b>Retail supply competition</b>	In the Guernsey market, there are only c.31,000 customers. At this size, we do not believe that it is feasible to achieve meaningful competition in retail supply in Guernsey. We propose GEL should retain the monopoly for retail supply, as the costs of implementation and operation are likely to outweigh any potential benefits.
<b>Network competition</b>	Similar to the point noted above, moving away from a single network for all given the scale of Guernsey would not be beneficial. There would be increased complexity for managing dispatch across different networks from different sources, and the costs to build and maintain would likely result in a higher cost for consumers without a meaningful change in quality of service or optionality. Current policy guidance also supports this position.
<b>Interconnector</b>	We do not expect a 3rd party to build and operate an interconnector as this is expected to add significant complexity to the management of the overall Guernsey electricity market. Providing management of the interconnector to a 3rd party will reduce States of Guernsey's control over a key piece of national infrastructure (especially if the interconnector is assumed to provide some level of security of supply).
<b>Providing licences for market entry to large-scale generation</b>	We do not believe it is suitable to use licensing as the route for companies to enter the market for supplying electricity conveyed through the single network to domestic customers as this has the potential to result in investment in generation assets which are not aligned with the States of Guernsey net zero ambitions.  Licences would still be issued to generators (see Table 5 above) - but entrance to the market would instead be controlled through competitive tenders / bilateral negotiations.

## 4.2 How can competition support the States of Guernsey in delivering the main drivers for the journey to net zero under the preferred supply pathway?

As we have set out in Section 3 the decisions taken on a 2nd interconnector and new generation capacity (in particular offshore wind and large-scale solar) are crucial to the level of competition you may look to deliver in Guernsey. This is especially true for competition used to attract investment. If States of Guernsey take decisions on the market framework which result in the majority of investments being led by States of Guernsey/GEL there will be less opportunity to make effective use of competition.

Although we do not currently have clarity on how investment will be sought and structured, we are assuming that the use of competition would be targeted (in line with our definition) at “*services, which has been determined as beneficial to the delivery of Guernsey’s Electricity Strategy, at a lower cost or higher quality of service*”.

When exploring this question, we have made an assumption that States of Guernsey have an aim to deliver the preferred supply pathway set out by the Siemens Consultation Report in the lowest cost approach, in an efficient manner which delivers for all customers. Due to the scale of expected investment, and the types of technologies being deployed, it is possible that States of Guernsey/GEL may not be able to deliver on the selected net zero pathway without using 3rd parties. The extent to which this is needed, and the extent to which competition is required to attract this support is still to be decided.

Although the extent to which these are relevant will depend on the decisions taken on investments, there are a number of ways in which competition can help to support the States of Guernsey in delivering the main drivers for the journey to net zero. In particular, these include:

- **Access to investment** – in line with our Consultation Report, competition can be used to attract investment into the Guernsey electricity market. In our initial Consultation Report, we identified use of competition as the most suitable way to attract investment into assumed generation assets. This is crucial in instances where States of Guernsey/GEL are unable or unwilling to finance new assets. We put forward competitive tenders as a suggested mechanism to encourage investment - however bilateral negotiations could achieve similar outcomes if the pool of third parties is small and the process is appropriately controlled.
- **Obtaining necessary capability** – attracting experienced third parties into the market (e.g. through a competitive tender to build a new generation asset funded by States of Guernsey/GEL) could enable States of Guernsey to overcome the capability gaps which exist in Guernsey to deliver the assets assumed as part of the current pathway work. GEL are not currently equipped to deliver an offshore wind farm – the use of 3rd parties (with a competitive process) will allow GEL to get access to the necessary skills and deliver relative value for money to consumers.
- **Reducing cost of delivery** – investment and capability can be attracted without competition – in particular through bilateral negotiations with parties who are already interested in the opportunity to support States of Guernsey. Utilising competitive tenders, in particular through tenders, allows multiple parties to express interest to be involved in the market. With projects being assessed on merit and compared against technology benchmarks, this has the potential to bring down costs and provides an implicit cap to the cost of a project without trying to define a fixed cap.
- **Delivering existing services, but better** – GEL currently provides back-up capacity to balance the network and reduce the risk of outages. It is possible that other companies could provide the same services at lower costs. As an example, we understand that data centres in Guernsey currently have small-scale generation which may be suitable for this. Competition would allow GEL to determine if such savings are realistic by allowing 3rd parties to provide competitive bids for such services. (There is a need for GEL to be able to set out its costs in order to understand the current baseline against which costs of 3rd parties should be compared). Equally it would be

important for third parties to understand the commitments with which they would need to comply if they were to provide the services.

- **Obtaining learning** – going through competitive processes may result in learning for States of Guernsey/GEL which could help with future activities. For example, procuring services to build an offshore wind or solar farm from multiple providers may result in GEL being provided insight from the bidders on how best to deliver onshore connections to enable offshore transmission networks. Following processes which do not enable multiple parties to express their interest is less likely to result in the identification of learnings for States of Guernsey/GEL.
- **Maintaining flexibility on control** – depending on the decisions taken on how States of Guernsey want to deliver the Electricity Strategy, competition can be used to achieve a certain level of control. If States of Guernsey do not want to be involved in the financing, build and operation of assets, they can set up the competition to deliver this. If States of Guernsey would rather have much greater control over activities, competition can still be used to deliver assets which the States of Guernsey finances.
- **Getting customers more involved** – using competition and licensing to support the creation of new business models, and in particular community energy schemes (if a policy decision is taken to encourage these), is expected to support customers to increase their engagement in the electricity sector in Guernsey. This can result in positive benefits related to the generation mix and demand profiles. Microgeneration, such as rooftop solar/parking lot solar (as described within the Siemens Consultation Report), allows customer involvement but requires appropriate tariffs that balance the encouragement of customer involvement with the changing costs of system balancing.

## 4.3 What are the key decisions to be made on implementing competition within Guernsey's Electricity market and what downstream impact would these decisions have?

Regardless of the approach taken to deliver on Guernsey's net zero ambitions, there are likely to be opportunities to introduce competition across parts of the value chain to drive benefits for customers in Guernsey.

Such competition may include delivering investment in new assets, the use of competition to get access to capability necessary to build new generation, competition to provide back-up generation services, or competition to support customers with becoming more involved in the market.

When deciding to introduce (or not introduce) competition into Guernsey's Electricity market, there will be inevitable trade-offs which will have to be made.

These potential trade-offs include:

- How much value can be obtained from the introduction of competitive tension. This is expected to come in a mixture of quantitative and qualitative benefits, in line with the potential benefits set out above.
- How much cost is likely to be associated with introducing such competition. At this stage, this would need to be based on a qualitative view of likely costs. Further investigation of costs would likely be required before making any decision to introduce competition into a specific part of the value chain. A key step in this process is obtaining clarity from GEL of their cost breakdown across various services (e.g. as part of an accounting unbundling process), as this will provide the benchmark against which to compare competitive options.
- What sort of companies are being sought to provide investment or expertise, and whether the desired competition will help to attract them. In addition, it will be beneficial to understand whether

there is/appears to be interest (and capability) from local parties to provide one or more potential competitive services.

- An understanding of how else the same outcomes could be delivered without competition, and whether these approaches would cost more or less and deliver better or worse outcomes than the proposed competitive approach.

Despite the potential trade-offs, the primary decisions impacting whether or not, how, and to what extent, significant competition should be introduced into the market are those related to the pathway selection.

In particular, this is in relation to:

1. The existence or not of a 2nd interconnector, how it will be funded and owned, and whether or not Guernsey can spill excess generation down the interconnector will all have impacts on the indicated market framework; and
2. The decision to deploy large-scale renewables in the near future (expected to be offshore wind or solar), the expected ownership structures and whether or not such investments are expected to be a one-off will all have impacts on the indicated market framework.

*Table 8* (below) provides a view on how the different answers to these decisions could impact the market framework (and in some instances the costs to consumers). In the same table we have included a number of further decisions which should also be considered.

Table 8. Specific considerations for competition across key areas

Area	Decision(s)	Impact(s)
Interconnector	Will there be a second interconnector?	<p>If you take a decision to not have a second interconnector, there will be a larger requirement for investment into generation assets (wind and solar, plus back up). In this case, it will be necessary to deliver increased generation capacity to bridge likely capacity shortfalls. This could require competition if it is not funded by States of Guernsey/GEL. If there were to be competition in large-scale renewable generation, it may be necessary to explore some level of unbundling for GEL (either accounting or functional separation) and your decisions on this would impact the need for increased regulatory oversight.</p> <p><i>We understand that the preferred supply pathway includes a second interconnector.</i></p>
Interconnector	How will the interconnector be funded and owned? (1 / 2)	<p>If you decide to have a second interconnector, it is expected that this will be owned and operated by States of Guernsey/GEL/CIEG in a similar structure to the GJ interconnector. Import on this interconnector would be expected to run in a similar manner to the GJ interconnector and require limited changes to the market. However, this would require changes to operating procedures, decisions on how the two interconnectors would operate together, how the back-up GEL generation is to be used and how micro-renewables are integrated (as they will impact stability etc).</p>
Interconnector	How will the interconnector be funded and owned? (2 / 2)	<p>If there is a second interconnector but it is not owned by States of Guernsey/GEL, it is expected that complexities and different costs (e.g. usage charges) would be added to the market. Ownership could be with a third party but practically GEL should operate the interconnector or else operational challenges will emerge. In this instance, contracts will be necessary for building and leasing needed. With a second interconnector, questions about priority of delivery of power are the same regardless of who owns/operates the asset. For example, if the interconnector is owned by a 3rd party, it would be necessary to:</p> <ul style="list-style-type: none"> <li>● Introduce competition to deliver the interconnector;</li> <li>● Determine how access to the interconnector is controlled;</li> <li>● Determine how the electricity brought through the interconnector by the 3rd party will interact with the GEL-operated on-island market.</li> </ul> <p>In all instances, even if the investment is undertaken by States of Guernsey/GEL there is potential to use competition to procure tranches of work in the delivery of the interconnector. In addition, due to the knock-on impacts of a second interconnector on existing generation, licences, contracts (including the GJ interconnector contract) and cost-recovery will all need to be reviewed.</p>

Interconnector	Will it be possible to spill excess generation / export pre-planned generation down the interconnector? (1 / 2)	<p>If the pathway selected includes a second interconnector but without the ability to spill excess generation or export, it is expected that the GF interconnector will cover nearly all imported electricity needed for the island at peak demand times and would only need to operate at partial load for much of the year. It is understood that the GJ interconnector would transition to providing back-up support. (Please refer to the updated Siemens Consultation Report from November 2022 for further details of this scenario).</p> <p>Assuming such electricity is classified as from low-carbon sources, it is likely that you will be in a position in which the majority of electricity consumed in Guernsey is low-carbon, and you will be well positioned to deliver against your net zero ambitions. Following this route could mean that the level of further investment required is lower and it may be possible to attract the necessary capacity with less competition.</p> <p>The extent to which further capacity is required will depend on the decisions on the N-2 policy. We note that some of this investment is likely to be in assets which can provide firm back-up generation which is expected to require storage /other technologies as these become available.</p> <p><i>We understand that the preferred supply pathway includes a second interconnector with the ability to spill excess generation.</i></p>
Interconnector	Will it be possible to spill excess generation / export pre-planned generation down the interconnector? (2 / 2)	<p>However, if the second interconnector is set up to enable Guernsey to spill excess / export electricity, there is greater commercial incentive for additional generation capacity to be built in Guernsey, with the potential for this to be used to provide a mixture of electricity for Guernsey and the spill of excess generation (as well as the potential for generators to agree pre-planned exports to the European grid). Either this could be delivered by States of Guernsey/GEL investment or through competition (to attract investment). If competition is to be used to attract investment it may be necessary to explore some level of unbundling for GEL (either accounting or functional separation) and the need for associated regulation. With the ability to spill excess generation it will also be necessary to determine which entity will be selling the power flowing out of Guernsey and who the offtaker(s) might be.</p> <p>Introducing the spillage of excess generation on the 2nd interconnector with 3rd party generators will mean further complexity is likely to be required. In particular, in how access rights are allocated and adjusted according to operational circumstances and the charging methodology for access. Interconnector capacity could be allocated on a firm or non-firm basis, but it will be necessary to determine how short-term capacity gets managed. In addition, it will be necessary to establish how GEL curtails rights when necessary, e.g. when there are operational challenges on the interconnector.</p> <p><i>We understand that the preferred supply pathway includes a second interconnector with the ability to spill excess generation.</i></p>
Renewable	What range of generation	As set out above, the decisions on the second interconnector are likely to influence the extent to which further

Generation	assets are expected to be built?	<p>generation assets are required to meet Guernsey's strategic ambitions.</p> <p>If the generation assets required are narrow in scope and limited in technology type, there is likely to be less need to have competition for large-scale generation assets. For example, if the strategic direction is to deliver a single, large, offshore wind site there is unlikely to be a need to have competition between technologies, or the need to procure generation consistently over a long period of time. If, however, the level of generation required exceeds this, or the single site is smaller and will not cover States of Guernsey's required capacity, then the potential for competition is greater.</p> <p>The ownership of the generation assets is also a crucial consideration. If the ownership is expected to sit with 3rd parties, competition for investment and associated changes to the market would be required.</p> <p>If there are different assets to be built over time, the framework should provide clear guidance to GEL on its requirement to take actions to deliver the preferred supply pathway at lowest cost to consumers (or similar). This is expected to require guidance on the process that should be followed if an investor wants to propose a new project. This is aimed at delivering the preferred supply pathway while minimising costs and risks - i.e. avoiding unnecessary investment in overly-complex projects or deploying technologies which are yet to be fully proven.</p>
Renewable Generation	How will offshore wind and large-scale solar investments be funded?	<p>Competition is not required in large-scale generation if States of Guernsey/GEL funds the wind farm / large-scale solar assets (beyond potentially identifying companies to build, operate and maintain the assets). Competition may be required if 3rd party funding is the desired approach, although bids could be obtained through bilateral negotiations.</p> <p>Such investors will want to have confidence that the anticipated returns on their investments are predictable, which increases the potential for unbundling GEL generation as well as potentially the introduction of some level of regulation.</p> <p>Although there may be a need for regulation without competition, e.g. to support customer tariff setting, the introduction of 3rd party investment is the biggest external driver for regulation, and creates the greatest potential for considering unbundling GEL generation.</p>
Renewable Generation	Who will operate and maintain the assets?	<p>If States of Guernsey/GEL are providing the investments in the assets, any competition is expected to be limited to the building, operating and maintenance of the assets. It is likely competition will be required to procure these services, but given the proposed ownership it will not be necessary to restructure the market to attract investment. This is likely to mean no requirement to unbundle GEL and reduced requirements for regulatory oversight.</p>
Renewable Generation	Who will fund the assets through their life?	<p>When considering the ownership of the generation assets, it is not only the impact on the framework which needs to be considered. Regardless of approach, customers or the taxpayer will be required to pay for these assets over the lifetime</p>

		<p>of the assets. The shape of the payments and the size of them will depend on the approach taken. For example:</p> <ul style="list-style-type: none"> <li>● If States of Guernsey/GEL finances and takes build risk: <ul style="list-style-type: none"> <li>○ States of Guernsey will need to provide upfront capex financing. The cost of capital is likely to be lower than for a commercial entity, but it would need to sit on Government books.</li> <li>○ The States of Guernsey will need to use 3rd parties to do the work. We note that the cost of these 3rd party services may be different when compared to the equivalent costs under a model where the 3rd party was also responsible for financing the asset. It is expected you would use competition (through a procurement process) to identify who these companies are and their associated costs.</li> <li>○ Electricity prices for customers could be set at level to pay back the cost of the assets with minimal return requirements.</li> <li>○ Such costs would be expected to be paid back through customer bills (so that only customers who are getting the direct benefits are paying, in line with the existing energy market principle that the “consumer pays”) but this could be through taxation or a combination of bills and taxation.</li> </ul> </li> <li>● If States of Guernsey passes all of the investment requirement, ownership and building (as well as operation and maintenance) to a third party: <ul style="list-style-type: none"> <li>○ This removes the need for States of Guernsey to find capital up front for the asset and the 3rd party is expected to be responsible for taking the risk associated with the build phase of the project.</li> <li>○ It is expected that the achieved cost of capital will increase higher, driving up the overall cost of the projects.</li> <li>○ However, the cost of building the assets may be lower, providing some mitigation to the increased cost of capital.</li> <li>○ It will be necessary to develop a clear mechanism with which to set prices for customers for electricity generated by the asset. This level will need to be attractive to investors and provide value for customers.</li> </ul> </li> </ul>
Renewable Generation	How could introducing competition impact the operations of GEL?	Introducing competition into the investment for generation assets is expected to require changes to how GEL operates and, as such, may require some level of regulatory oversight. We have provided detail on the potential approaches in such a scenario in the initial PwC Consultation Report, but as a short summary:

		<p>The introduction of competition in the generation sector may impact the appropriateness of GEL to be a bundled vertically integrated utility, as it may impact the confidence of IPPs to invest in the market, although we recognise there are multiple instances of jurisdictions having IPPs investing without unbundling the VIU.</p> <p>Regardless of approach taken, the introduction of new large-scale generation will have impacts on the existing market. We would expect to see changes to GEL operating procedures, such as: decisions on how the back-up GEL generation is to be used, what happens to micro-renewables spilling into the network (as they will impact stability etc), as well as the need to understand the impacts of a second interconnector on existing generation, licences, contracts (including the GJ interconnector contract) and cost-recovery will all need to be reviewed. (We understand that some of this is already planned in the next phase of Siemens' work).</p>
Other generation	Will you introduce competition only in new large-scale generation or in other parts of the value chain?	<p>While the primary focus of introducing competition into generation involves the necessary investment and capability to (potentially) deliver a second interconnector and large-scale renewable generation, there is also potential to provide further competition in generation.</p> <p>In particular, there is potential of using competitive tenders to provide back-up generation from existing thermal assets or future storage assets which are owned by 3rd parties. The intention would not be to fund the building of these assets. Instead, the intention would be to create revenue streams which are available for existing assets which have the potential to provide services needed by GEL to manage the network.</p> <p>For example, GEL currently uses its own generation assets to provide load following and reserve services to maintain supply in Guernsey. Such services could potentially be provided by 3rd parties. Given the ageing nature of some of the GEL asset base, it is possible that 3rd parties would be able to provide such services at a more competitive cost than GEL can provide (payments could be for a range of services e.g. availability of assets or generation levels). Analysis would be required to establish whether this is the case through a review of costs (operational and replacement) as well as capabilities (i.e. can the third parties provide sufficient support and would they be able to respond in the necessary timescales to meet their obligations?).</p> <p>Creating competition in such markets is likely to require minimal changes to the way that GEL operates. In order for GEL to be able to confirm that the offers made by 3rd parties represent value for money, GEL needs to complete an exercise to accurately apportion its costs internally so that it understands the marginal costs of delivering the services with its own assets (this would be expected to form part of an accounting unbundling process). It could also lead to changes in systems operations processes as services from 3rd parties are utilised (e.g. notice periods, duration of support).</p>
Other areas	Which other parts of the value chain will you introduce competition into?	Based on our assessment of the likely levels of competition across the value chain, this analysis has predominantly focused on competition in generation. We have, however, identified the potential for targeted competition in networks (through the provision of services, e.g. metering) and for the delivery of community energy schemes (where these can provide benefits to consumers). There is potential for other areas to be identified, such as the provision of energy

		<p>efficiency services.</p> <p>Introducing competition in these areas is likely to require smaller changes than some of the generation considerations, but these will still need to be implemented in a coherent manner. For example, suppliers tendering to provide network services will need to have the suitable accreditations, and GEL will need to be able to oversee the work.</p> <p>Companies delivering community energy schemes may need some level of suitable licensing (targeted at the activities being undertaken), and the approach to use of GEL as a “supplier of last resort” if the community scheme generation is not sufficient will need to be determined. We note that there will be a cost associated with enabling choice which will need to be assessed against, for example, the challenges of requiring GEL to implement efficiencies without such competition.</p>
Where competition is to be introduced, what type of competition?	Will you use licensing to enable competitive markets or a tender / bilateral negotiation approach to deliver targeted competition supported by licences?	<p>It will be necessary to decide if States of Guernsey will focus on the use of tenders and bilateral negotiation to deliver competition or if it will enable companies to enter the market for grid-connected generation without winning a tender/undertaking a bilateral negotiation solely by obtaining a licence.</p> <p>Tenders and bilateral negotiations are expected to provide suitable control to States of Guernsey to oversee the markets developing as intended. We note, however, that even if bilateral negotiations or tenders are used, the counterparty/successful tenders would need to sign a generation licence as part of the process (or other licence if for other services).</p>

# 5. Framework decisions: Unbundling

## 5.1 An overview of unbundling

Unbundling a Vertically Integrated Utility (VIU) involves introducing some level of separation between the different elements of the utility provider. There are multiple different levels of unbundling which can be delivered, with varying levels of change required – from accounting unbundling (separation of accounts across the value chain) to ownership unbundling (preventing firms from owning operations in conflicting parts of the electricity value chain). At a high level, accounting unbundling gives clarity of costs but does not directly impact day-to-day operations of the business, while the more extensive forms of unbundling impact how the business is run.

Unbundling VIUs has been undertaken in many states around the world, in particular by following the guidance set out in the EU's Third Energy Package. The core premise of the Third Package is to reduce the impact that vertically integrated utilities can have on competition through preventing other parties from gaining fair access to the market. It is possible to have competition in generation with a VIU (e.g. in Thailand). Germany is often cited as a market where VIUs remain - there is in fact unbundling of transmission, but a lot of common ownership, and cross-ownership of municipal companies, remains and there is significant regulatory oversight.

Unbundling a VIU is a complex process requiring clear separation to be introduced into the company, and is not without costs. Such costs need to be taken into account and compared with the potential benefits before a decision to undertake a more comprehensive form of unbundling (e.g. functional, legal or ownership) is undertaken.

The choice to unbundle the VIU, and the type of unbundling selected depends on a range of factors including:

- **Level of competition sought** – a future market which is aiming to have wide scale competition based on multiple new entrants is expected to require greater separation of the incumbent provider in order to provide a level playing field and confidence to third party investors. A market with very targeted, or only limited competition is much less likely to benefit from significant unbundling.
- **Scale of market** – smaller markets are less likely to benefit from the more comprehensive types of unbundling.
- **Desired market signals** - unbundling of GEL demonstrates to third parties that the States supports non-discrimination in a competitive market.
- **Future government involvement in the market** – although this is hypothetical and included only for completeness - if you were looking to move to a position where GEL is no longer owned by the States of Guernsey it is more likely that you would want to separate the constituent parts of the business such that these could each be privatised separately. We note that this is a hypothetical position and is not expected to be acted upon.
- **Costs** – decisions need to consider the scope for cost efficiencies, and the practicalities of separating out different parts of the company.
- **Resources and roles** – skilled resources may have roles that span different parts of the business and may make it more challenging to achieve anything above accounting unbundling without additional costs (e.g. personnel). This is particularly the case in a market like Guernsey's with a potentially limited pool of staff.

- **Timescales for change** – it needs to be recognised that more complex unbundling takes longer to deliver and as such, it may need to be phased if that fits in with market changes.

Based on the assumptions set out in the competition section, we are not anticipating meaningful competition being introduced into either the networks or retail elements of the Guernsey electricity sector. Instead, the focus here is on the proposals to introduce competition into generation and how this could lead to a decision to unbundle GEL.

If competition is being introduced into the market in order to seek 3rd party investment, it will be necessary to attract market participants. Such participants are expected to seek a return on their investments which is commensurate with the risks they are taking in investing in the market. i.e. markets which represent a higher risk for investors are likely to have to require higher returns for investors when compared to lower risk markets.

The typical factors which impact perceived risks for investors include:

- Political stability
- Market maturity
- Perceived fairness of the market

Having a VIU can impact how third parties view the fairness of the market. If there is a desire to attract IPPs, it is possible that GEL's generation activities should be separated from the rest of its business to ensure a level playing field with IPPs. Otherwise, IPPs could legitimately be concerned that GEL – as network owner and operator – would favour its own generation activities when planning network access or investment and when determining and managing the dispatch of generation assets. However there may be approaches to mitigate these concerns through the use of appropriate regulatory structures / government direction as set out in more detail in Section 6 (Regulation).

We note that it is possible to run a competitive market for generation without undertaking unbundling. In these cases, the VIU is the counterparty to the IPP contract typically, so the introduction of a Single Buyer type role within the VIU is useful. With the right protections it is feasible to create a market framework which is attractive to external investors while maintaining GEL's current structures and lack of unbundling. This may include the use of contracting to define the agreement with the generator. This is explored further in Section 6 (Regulation).

For example, if 3rd party generators are provided a long-term contract which guarantees them an acceptable return and has suitable protections incorporated, there is potential they will invest (this will be based on comparisons with the returns they can obtain elsewhere). Investors are expected to be happy to contract with a States owned VIU, arms length VIU or a Single Buyer, and would adjust the risk accordingly (i.e. the cost to Guernsey of procuring the electricity).

As unbundling is primarily focused on supporting the introduction of competition, the decision to unbundle, or not, and the type of unbundling, is heavily driven by the preferred net zero pathway selected. For example, if the pathway includes only States of Guernsey-led investments, there is limited opportunity for competition and, as such, limited need for a complex unbundling of GEL. Equally, even with some level of competition, if only a single offshore wind farm is expected, it may not be necessary to unbundle GEL to deliver this – it may be easier, and cheaper to manage the risks through a contract with the provider. However if the desire is to obtain investments in multiple different asset types over a longer period of time, there will be a need to make sure they are all protected not only from GEL but also from each other.

If changes were to be made regarding unbundling, we would expect these to happen when there is clarity on the future direction and the value unbundling would bring, rather than based on a potential future need.

## 5.2 What are the advantages and disadvantages of different forms of unbundling (e.g. functional vs other)?

There are varying stages of unbundling, ranging from accounting unbundling to ownership separation. In addition, it is necessary to determine which parts of the business would be unbundled. In a competitive market, unbundling could include separating:

- Generation
- Network ownership and maintenance
- System operation
- Retail

In our initial Consultation Report we considered multiple approaches to structuring GEL post-unbundling. In all instances, the primary focus was on separating the competitive activities in generation from the remainder of the business. We also considered whether it was necessary to split network activities into two separate entities, and whether it was necessary to separate retail supply activities.

Our position in our initial Consultation Report was that functional unbundling was the most appropriate for Guernsey, where divisions are separated (personnel and resources) and able to make independent decisions, although both could report to the same Board (as was the case when Bord Gais in Ireland was originally unbundled).

Our rationale was based on cost and practicality, and recognition that this is a light-touch form of separation. In addition, our work was based on an understanding that relevant, targeted competition was an important outcome for Guernsey for reasons including increasing renewable generation at lowest cost to consumers. However, these proposals were based only on high level assessment of the costs and benefits and we noted that further detailed work would be required to assess the changes that would be required to put a functionally unbundled structure in place, and the associated costs and timing. Unbundling of GEL also demonstrates to third parties that the States of Guernsey supports non-discrimination.

The following table sets out key considerations of different forms of unbundling for GEL, including a high-level view of pros and cons of the different options.

Table 9. An overview of approaches to unbundling and their pros and cons

Type of unbundling	Description	Commentary	Pros	Cons
Accounting	The company is required to separate the bookkeeping of its various activities, highlighting the costs and revenues that derive from each of them, as well as transfer pricing for flows between business units. The information made available increases transparency and would allow a regulatory authority or States body to better assess the adequacy of the tariffs proposed for the regulated activities and to detect possible instances of cross-subsidisation.	<p>It is necessary for GEL to be able to demonstrate that it understands its costs. We expect that this will be delivered through full accounting unbundling. Such unbundling should give the clarity on marginal costs which investors need. This should be undertaken regardless of any further unbundling decisions.</p> <p>Depending on the protections which can be put in place for investors, accounting unbundling could be sufficient to deliver some competition in generation. This approach may result in higher costs for investment as investors may adjust their risk appetite to account for GEL not being functionally unbundled, although this depends on the contracts put in place and the regulatory oversight implemented to ensure fairness.</p>	<ul style="list-style-type: none"> <li>• Relative simplicity to implement</li> <li>• Easy to understand what is required</li> <li>• Minimum change for GEL or sector</li> <li>• Provides the requirement for GEL to understand its actual costs of doing business such that it can make improved decisions to support the delivery of the preferred supply pathway. For example, increasing understanding of generation and network costs could enable GEL to explore the use of 3rd parties to provide existing back-up generation services (currently provided by GEL).</li> </ul>	<ul style="list-style-type: none"> <li>• May seem insufficient to external parties if there is a desire to introduce meaningful competition in which there is ongoing investment in generation which could result in changes to dispatch and merit orders. In such an instance, investors today will want to be sure they are protected by contracts there is more of a perceived risk.</li> <li>• It may be seen as a minimal step, and without regulatory oversight there is still a risk of cross-subsidisation (perceived or otherwise).</li> </ul>
Functional	The firm is required to reorganise its internal structure and attribute responsibility for its network and competitive activities to different units that can take decisions independently one from the other.	This was our proposed position in our Consultation Report. This proposal was based on cost and practicality and recognition that this is a light-touch form of separation. However, we noted that further detailed work would be required to assess the changes that would be required to put a functionally unbundled structure in place, and the associated costs and timing.	<ul style="list-style-type: none"> <li>• Has been deployed in many jurisdictions and as such is well understood.</li> <li>• Although greater than accounting unbundling, there is a relatively low level of change to how the sector will function.</li> <li>• Generation separated from</li> </ul>	<ul style="list-style-type: none"> <li>• For the scale of GEL it will be difficult to separate overlapping roles given the size of the company. This would result in an increase in costs as likely to require additional personnel and some separation of management. Functional unbundling is more costly</li> </ul>

			the remainder of business, giving clarity to third parties that there can be a level playing field for competition in generation.	than accounting unbundling.
Legal	A separate legal entity is established and tasked with network activities. Due to this higher degree of separation, its management is supposed to operate more independently. However, the legally unbundled entity may still be owned by the previously vertically integrated company through a holding company.	Legal unbundling is unnecessary for the Guernsey electricity market. Given the scale of GEL operations, the size of the market and the cost of running additional businesses, the limited benefits of legal unbundling are expected to be outweighed by the costs of undertaking this.  The increased separation provided by legal unbundling provides increased transparency, but this comes with associated challenges – in particular those of cost and complexity.	<ul style="list-style-type: none"> <li>This greater level of unbundling provides clear separation into different companies so as to make independence clearer.</li> </ul>	<ul style="list-style-type: none"> <li>This is increasingly complex, and costly. Having legally separated entities would result in more staff being required to do roles which are duplicated across the businesses. We expect there would be duplication in back-office functions mainly e.g. HR, payroll etc. which could lead to outsourcing.</li> <li>Legal unbundling will take longer to implement than accounting or functional unbundling.</li> </ul>
Ownership	A company owning and operating a network cannot be active in any competitive segment of the supply chain nor have an interest in any company involved in those activities. Similarly, an electricity generator cannot have any stake in a fully unbundled network company.	Full ownership unbundling is disproportionate for the Guernsey electricity market. Based on our assumption that all elements of GEL will continue to be owned by the States of Guernsey, this does not represent a genuine opportunity for unbundling.	<ul style="list-style-type: none"> <li>This level of unbundling provides clear separation of owners.</li> <li>It also supports a move towards privatisation (where this is desired).</li> </ul>	<ul style="list-style-type: none"> <li>Overly complex for a small market.</li> <li>Further, it is seen as inappropriate given it is unclear who would own the generation business (assuming networks stayed under States ownership).</li> </ul>

## 5.3 What unbundling choices are realistic for GEL?

Although the decision on unbundling is heavily impacted by the decision on a preferred supply pathway, we believe that any unbundling should be limited to either accounting or functional unbundling.

This is due to a desire to provide a fit-for-purpose framework which takes into account considerations of the scale of the market, the level of change required, the level of competition expected and the costs associated with making the changes and the likely future ownership structures of GEL.

The decision on changes to GEL's structure and operation will be directly impacted by the decisions taken on the preferred supply pathway – in particular whether or not there will be the ability to spill excess generation on a 2nd interconnector and if there will be 3rd party investment in large-scale generation.

If competition isn't necessary and new generation can be introduced either by States of Guernsey financing or based on bilateral contracts with 3rd party investors, accounting unbundling may be sufficient to provide comfort to investors. Even if more significant changes are to be made, it does not necessarily mean functional unbundling must be undertaken, but we note that the more complex the market operations, the more likely functional unbundling is to be a reasonable approach to take.

Delivering functional unbundling would require GEL to establish a standalone generation unit, including designated staff. This will require work to be undertaken to provide a detailed cost benefit analysis to confirm the unbundling costs to be recovered, the development of detailed unbundling plans including business continuity plans through unbundling and the States of Guernsey/regulator to confirm how unbundling costs are to be recovered over time.

## 5.4 What changes are required to GEL's structure and operations to facilitate the market changes and operations under the preferred supply pathway and when do they need to happen?

### 5.4.1 Accounting unbundling

Even if a decision is taken to not pursue any further level of unbundling, we recommend that a decision be taken on whether or not GEL be required to undertake accounting unbundling with transfer pricing implemented between the different parts of the organisation (i.e. enabling transactions between different parts of the organisation to be recognised at fair, arms' length prices and therefore provide clearer visibility of the true costs of different aspects of operations).

To support the development of the Guernsey electricity sector, GEL needs to be able to demonstrate how its costs are spread across the different parts of the business. This is important to enable future tariffs to be cost-reflective, to help with tariff approval processes, to determine funding priorities within constrained budgets, to identify operational efficiencies and to support the determination of target prices for competitive new generation.

GEL currently provides back-up capacity to balance the network and reduce the risk of outages. It is possible that other companies could provide the same services at lower costs. In order for GEL to be able determine the potential value of these services, GEL must first set out its costs of providing the same services.

In addition to 3rd party generation services, it is important that the cost allocation happens so that GEL can demonstrate cost efficiencies and show they have cost-reflective tariffs and sufficient funds to support ongoing investment and maintenance of the network. Provision of improved data would also enable GEL to demonstrate how their operational costs change with the introduction new technologies e.g. more micro-renewables, smart meters, a 2nd interconnector, new grid-scale renewable generation and

whether/how it impacts the life of their existing assets This exercise needs to be undertaken regardless of preferred supply pathway.

The implementation of accounting unbundling would see GEL perform an analysis of their financial information, including revenues and costs, and make an allocation of these figures between their business lines based on defined rules. For example, staff costs could be split between system operations, network operations, generation etc.. based on roles, responsibilities and the average time a staff member spends on each of these functions during the year. The initial set up of these rules and criteria may take some time, however once implemented they can be re-used to quickly generate future information.

The information produced should be granular in nature to enable detailed analysis to take place as outlined above, it may also need to be enhanced over time with additional attributes as third party discussions take place and the strategy evolves. Disclosure of this information can be limited to appropriate channels. For example GEL may retain detailed workings and analysis internally, with information shared with the States of Guernsey where appropriate, but wider public disclosure could be limited to aggregated figures provided they achieve sufficient transparency to encourage third party investment and engagement.

#### **5.4.2 Introduction of a Single Buyer**

In the case of accounting or functional unbundling, we are also proposing the establishment of a Single Buyer function within the networks function of GEL to be the counterparty for internal contracts, for internal cross-department transfers or for contracting with 3<sup>rd</sup> parties. The Single Buyer would be a function which sits within the System Operator (SO) business as the SO requires knowledge of the contracts and generation availability and would act as a single source of information to support dispatch in the most cost-effective manner.

We do note however that if there is no (or very limited) third party investment into the electricity market expected over the period to 2050, then the introduction of a Single Buyer may not provide significant benefits beyond the existing framework.

Under a Single Buyer model, the Single Buyer is tasked with buying power from IPPs, usually through PPAs and selling it directly to consumers or to the retail supplier. The Single Buyer would become responsible for managing the interconnector contract as a source of generation. The setting up of a Single Buyer within the SO business would provide a counterparty for all generation contracts at grid scale and a single source of information for dispatch.

Given the limited number of total third party transactions expected, we would not envisage that the Single Buyer would need to be a separate legal entity (unless this became a limiting factor for third parties which could not be appropriately managed through contracts) - rather it would be a functional collection of skilled members within GEL that have the expertise to sufficiently review, discuss and agree contractual terms with generators whilst bearing in mind the strategic directions provided by the States of Guernsey. There would however be a need to define operational policies and procedures relating to the Single Buyer function and the agreed contractual procedures, as well as mechanisms to keep the Single Buyer information confidential from other parts of GEL to avoid conflicts of interest - but we would expect much of this could be leveraged from previous GEL experience.

#### **5.4.3 Direction to GEL**

Regardless of the decision to set up a Single Buyer, the framework should provide clear guidance to GEL on its requirement to take actions to deliver the preferred supply pathway at lowest cost to consumers (or similar). This is expected to require guidance on the process that should be followed if an investor wants to propose a new project (for example through the strategy document, or through specific objectives set by the shareholder). This is aimed at delivering the preferred supply pathway while minimising costs and risks - i.e. avoiding unnecessary investment in overly-complex projects or deploying technologies which are yet to be fully proven.

In addition, the States of Guernsey could set timescales when new generation options for specific time periods can be considered - similar to a tender but without guaranteeing that new generation will be commissioned unless it is cost effective. Regardless of approach, the details need to be agreed with GEL, while there should be guidelines to make sure that GEL is not required to divert significant resources to look at new schemes.

We understand that the preferred supply pathway suggests that Guernsey's demand needs to 2050 can be met most economically by a 2nd interconnector and a 90MW offshore wind farm, with additional solar. The current position on the preferred supply pathway does not preclude additional generation being commissioned during this period but there would be a number of factors that would need to be considered in developing an investment case. These include:

- How any new proposed generation fits within the States of Guernsey direction to deliver the preferred supply pathway at lowest costs to consumers.
- The costs of existing generation and associated contracts.
- The implications for network capacity and operations.
- The expected cost of electricity from the new generation and its impact on tariffs.
- The terms of the interconnector contracts (e.g. costs, take or pay volumes) and any constraints associated with export / spill of excess generation.

If, as anticipated, GEL publishes a long-term network plan and demand forecasts, and these are in line with the preferred supply pathway, it is expected that investors would be able to take account of these in bringing forward new generation opportunities.

#### **5.4.4 Interconnector Contracts**

As part of any decision to implement a 2nd interconnector, it will be necessary to review the 1st interconnector contract in line with the proposed 2nd interconnector contract to confirm the combined contracts will offer the desired service at appropriate costs for consumers. The largest area of concern identified relates to changes to how the GJ interconnector contract is structured. Currently, the contract assumes that Guernsey will take a relatively consistent load from the interconnector. This is reflected in how the contract is structured, as well as the prices paid for electricity taken through the interconnector. Transitioning the GJ interconnector to being a back-up which is only used when essential will be a significant change from current usage and the contract will need to be changed to reflect this.

We note, it is currently assumed that the GF1 interconnector contract will be agreed with the ability to spill excess generation. A suitable contract will need to be agreed which allows this spillage (or any pre-planned export) to be undertaken, and to provide a counterparty to take the electricity from Guernsey. It is seen as prudent for States of Guernsey/GEL to explore in more detail the feasibility to obtain such a contract and associated offtake agreement relatively soon such that other approaches to the preferred supply pathway can be developed if necessary. We recognise that strategically, such discussions will need to be undertaken cognisant of other ongoing discussions related to the GF1 interconnector.

#### **5.4.5 System Operation capability**

The introduction of greater renewable penetration and a second interconnector with the ability to spill excess generation will mean that GEL is required to manage a more complex network than has been the case to-date. In order to facilitate this, GEL will need to establish a more mature System Operation capability than is currently in place. Among other technical changes, GEL will need to be more active in managing supply and demand (largely taken from the GJ interconnector), implement clear rules for capacity on the interconnector for spillage (if this is appropriate) and determine fair approaches to curtail generation in case of an operational challenge (e.g. excess generation in Guernsey at a point when spillage is not feasible).

We understand that a more detailed analysis of how the network will need to be managed will form the basis of the next phase of Siemens' work.

#### **5.4.6 Long-term network planning**

To support necessary investments in the network, it is expected to be beneficial for GEL to develop a long-term investment plan to provide clarity on how the network will evolve and likely investment needs. This is yet to be confirmed, but if it is taken forward by States of Guernsey, GEL will be required to develop long-term plans beyond those made to-date. The plans would need to be in line with the preferred supply pathway to facilitate the State of Guernsey's proposed pathway to net zero. These plans should help GEL

clarify their needs and provide transparency to other users over where future network investment is expected.

There is likely to be a need to include some level of oversight on the plans – both that the plans are reasonable and align with the preferred supply pathway, and that GEL are following them appropriately in developing their network.

#### 5.4.7 Other operational practices

There will be a need to adapt some of GELs operational practices. GEL should have an obligation to dispatch to keep costs to a minimum subject to other constraints such as interconnector contract requirements, contracts with other third parties, fuel contracts, emissions criteria etc. The SO part of GEL needs to dispatch plant according to a form of merit order, based on information it has been provided on marginal costs. This merit order will need to be updated in line with the chosen strategy.

## 5.5 What actions could GEL undertake internally in support of cost allocation and unbundling activities?

We understand activities are already being undertaken within GEL to support cost allocation which could be used to support accounting unbundling, if this is proposed. We would expect GEL to be undertaking the following as part of this:

*Table 10. Suggested actions to support GEL cost allocation*

Area	Overview
<b>Generation costs</b>	Understand the costs associated with each generation unit, including determining the costs of each asset providing different services to the network (e.g. load following, frequency support, black-start). This understanding is crucial to be able to consider whether other parties could provide such services more efficiently – for example if tenders were introduced to provide back-up generation services, the GEL Single Buyer would need this data to understand if GEL or a 3rd party bidder should provide the services. This is needed under all pathways - even if there isn't a proposal to add competition currently. If GEL feels their assets are too old to provide the service efficiently they will be able to use this understanding of costs to request support for upgrading/replacing assets or to contract with a 3rd party to provide these services.
<b>Network costs</b>	Understand the costs of providing electricity through different regions of Guernsey, recognising that costs will vary based on levels of demand, distance from generation and network capacity. This would also include the costs of managing spill or larger micro-generation on the system. This will be needed under all pathways but to varying degrees as the complexity on the grid increases.
<b>FTE requirements</b>	Determine the actual FTE requirements for roles which are currently undertaken by an individual who sits across different parts of the electricity value chain e.g. where a specific individual has a position which involves roles in generation and system operation. Use these to suitably allocate personnel costs to roles (which may be across different businesses).
<b>Wider operational costs</b>	For all parts of the business, GEL needs to understand the operational costs of each part of the business. The cost aspect of this should be addressed across all pathways for improved efficiency of operations. More detailed analysis will only be required for pathways where functional unbundling is required.

<b>Long-term costs</b>	For each area, provide a view of how these costs are expected to change over time as the electricity sector develops in line with the preferred supply pathway.
<b>Cost-reflective tariffs</b>	<p>Develop customer tariffs so that they become more reflective of the costs of expanding and running the electricity network. Costs should be reasonably apportioned across all consumers who are connected to the network. We understand that GEL have recently taken steps to increase the relationship between tariffs and network costs, by shifting elements of customer tariffs onto a standing charge. Using the cost data, determine the cost components driving tariffs and assess whether they are cost-reflective so they can produce evidence for discussions with the States of Guernsey. This will be needed under all pathways but the details and analysis required will differ. Customer education will also be important - if costs are going to increase (which is possible) then there will need to be a combined activity between GEL and States of Guernsey to explain/justify/inform.</p> <p>It may be necessary to develop a new approach to setting and approving tariffs.</p>
<b>Network investment plan</b>	Develop an initial long-term plan for network investment, replacement and expansion that takes account of the preferred generation pathway, as well as the demand pathways being developed by Siemens. This will support the development of the cost-reflective tariffs mentioned above. The long-term plan should be based on the preferred supply pathway and a set of agreed demand scenarios. We would expect the demand scenarios to also consider Guernsey's use of other fossil fuels (which electricity could be a substitute for).

# 6. Framework decisions: Regulation

## 6.1 Introduction

This section considers what structures of regulation may be necessary in the event that competition is to be introduced. If competition is not introduced, there may still be need for regulation - in particular in providing oversight of long-term network plans developed by GEL and in overseeing the setting of customer tariffs, but this would be less extensive and could make use of similar organisational structures which we outline below.

Creating an independent regulator is one way of establishing decision-making processes which are independent of existing political institutions. However, there are other ways of achieving the same aim. We first consider why the States of Guernsey might want to establish independent decision-making. We then consider what form that decision-making might take.

### 6.1.1 Why establish an independent decision-making process?

There are two potential, linked reasons why the States of Guernsey might want to establish an independent decision-making process:

- **Challenging decisions** – The States of Guernsey might envisage the need for future decisions which it will be difficult or impractical for existing political institutions to make in a timely way; and/or
- **Investor confidence** – The States of Guernsey might conclude that independent decision-making processes are needed to underpin third party investment.

It is possible to envisage future decisions which will be challenging for existing political institutions. For example:

- We have proposed that customer tariffs should become cost-reflective over time. It is likely that any net zero pathway will require significant investment in the electricity network. Unless this investment is funded directly by the States of Guernsey, it will be associated with increases in electricity prices which might prove unpopular with the electorate. The States of Guernsey may conclude it is easier for these decisions to be made through a process that is independent of existing political institutions. It may also be necessary to provide a route for customers to escalate issues to, in instances where they do not believe that GEL is providing the service they require.
- The net zero pathways are intrinsically long-term in nature. They imply the need for sustained and consistent investments over more than one political cycle. Again, this might argue in favour of ensuring that decisions on the long-term investment plan are kept at arm's-length from political institutions.

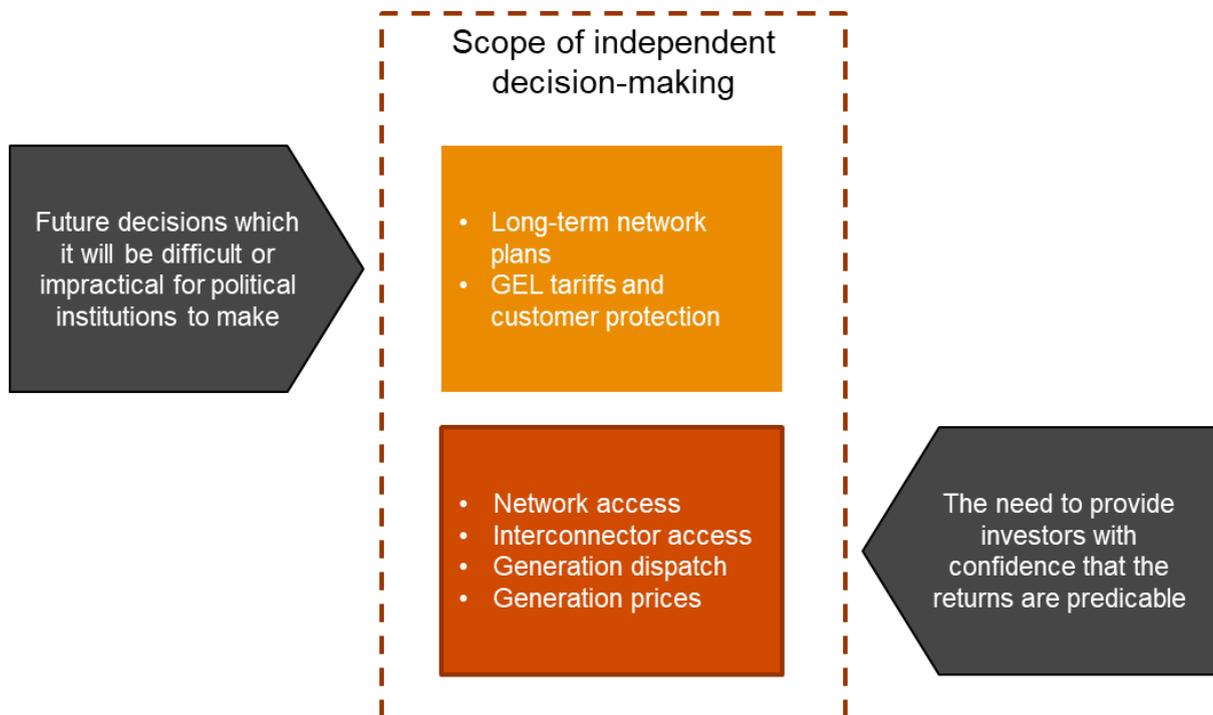
Some pathway choices require third party investment. In order to raise funding from third parties, it will be necessary to provide investors with confidence that the returns on their investment are predictable. Key to building this confidence will be ensuring that decisions made by GEL that impact on the returns investors make are made in an objective, transparent and fair way. For example:

- **Network access** – investors will want to understand the terms under which their generation can access the electricity network, and these terms will need to be fair and transparent. They will also want to understand how network access arrangements might change over time as further new capacity is brought online and in particular how this may impact the dispatch of their assets.
- **Interconnector access and tariffs** - investors might be concerned that access to the second interconnector would be granted preferentially to GEL's generation capacity or that access will be granted on terms which favour GEL. This is only applicable where sufficient capacity of 3rd party generation is installed such that multiple parties may be looking to export / spill excess generation.
- **Dispatch** – it is possible that the operation of renewable generation will be constrained by network constraints, or export / spillage constraints. Investors will want to ensure that generation dispatch decisions do not unduly favour GEL generation.
- **The price paid for renewable generation** – investors will either want prices to be determined upfront, or for prices to be a transparent reflection of market circumstances, independent of the interests of GEL.

Thus, if the States of Guernsey choose a pathway that involves third party investment in renewable generation, it is likely that investors will require independent processes to determine: network access, interconnector access, generation dispatch decisions and generation prices.

Figure 3 below summarises this position.

Figure 3. Drivers for independent decision-making



### 6.1.2 What form might an independent decision-making process take?

There are different ways of securing the confidence that investors will require. For example, through a contract between the States of Guernsey and the investors (which could limit the freedom of the States of Guernsey to take decisions that would have an adverse impact on the investor). Establishing an independent regulator (whose powers and duties would include ensuring market participants are treated in a fair and non-discriminatory way) can also achieve the same result. And, as explained below, there are options between these two extremes which offer varying levels of confidence to investors.

Under a contracting approach, the key decisions, or the principles that will guide the decisions, will be set out in the contract. Under the regulated approach, the defined powers and duties of the regulator would limit the freedom for the regulator to make unwelcome decisions.

The choice between agreeing a contract or establishing an independent regulator (or other approach) comes down to how easy it is to translate the likely requirements of investors into a legal contract. Where it is not practically feasible to capture investors' current or future requirements in a contract (which may need to be explored with investors), it is often easier to rely on a competent regulatory authority, with appropriate duties, to make independent decisions.

An independent regulator could be the GCRA or a new body. The States of Guernsey should direct the regulator through a Strategic Direction Statement, but from an operational perspective, the regulator should be independent.

Recognising that Guernsey is a relatively small electricity system, complexity should be kept to a minimum and regulation should be light touch. We have heard concerns that it may be difficult to ensure the regulator remains light touch. We understand these concerns. There are a number of reasons why the scope of regulatory activities can broaden over time:

- Regulators face the issue of asymmetric information. In other words, the organisations that they regulate have more information on their operations, and more accurate information, than the regulator does. This can result in a situation where a regulator makes burdensome requests for information.
- Even in the best regulated markets, things can go wrong. A common response to problems is to layer-on additional regulations and levels of scrutiny. It is often difficult to remove these additional layers when the difficulties that caused them have been resolved. Thus, over time, the regulatory framework can become increasingly complex.
- Understandably, regulators are often concerned at the risk of a legal challenge to their decisions or public criticism. This can lead them to seek more and more robust evidence to support their views.
- Finally, it can happen that the trust between a regulator and the organisations it regulates can break down. In these situations, interactions between the parties can become more burdensome than they need to be.

If the States of Guernsey is concerned about the risk of disproportionate regulations, it might be worth considering whether there are alternatives to establishing a regulator that provide a better way to address the need for independent decision-making.

There are three key characteristics of an independent decision-making process for Guernsey:

1. who scrutinises proposals put forward by GEL;
2. who decides on the appropriate course of action; and
3. the route through which decisions are appealed.

The *Table 11* (below) defines and comments on the merits of several alternative approaches, including the contracting approach.

Options 3 and 4 in *Table 11* below introduce a concept that we did not explore in our Phase 1 report: negotiated settlement. By way of explanation, this is a process through which relevant industry parties work together to secure an outcome through negotiation. This is a model of regulation that has been used to underpin some international transmission projects, in aviation and in the Scottish water industry. It requires industry participants to have the knowledge and capability to engage with GEL, and that stakeholders (including GEL) are fairly well aligned in their views (attempts at securing a negotiated settlement can break down when confronted by widely divergent views).

Table 11. Options for structuring independent decision-making and how they align to the key characteristics

Characteristic	Option 1 – Contracts	Option 2 – open and transparent consultation	Option 3 – negotiated settlement	Option 4 – technical expert	Option 5 – “thin” regulator	Option 6 – “full” regulator
Who scrutinises GEL proposals?	Contracting parties	Industry, through GEL consultation	Industry, through GEL consultation	An independent technical expert appointed for the purpose	An independent technical expert appointed for the purpose	Independent regulator
Who decides on the course of action?	GEL	GEL	Industry (through negotiated settlement)	Industry (through negotiated settlement)	Independent regulator (which might only comprise a few individuals)	Independent regulator (which would need to comprise a larger team)
The route for an appeal	The dispute mechanism set out in the contract (which could be an independent regulator*)	An independent appeal body (which could be an independent regulator*)	An independent appeal body (which could be an independent regulator*)	An independent appeal body (which could be an independent regulator*)	An appeal body* (different from the regulator)	An appeal body* (different from the regulator)
Observations	Depends on the ability to define a contract. A properly designed contract can create a lot of confidence for investors.	Requires confidence that GEL will take proper account of industry views. May not create sufficient confidence for investors.	Requires informed and relatively aligned industry participants. May not create sufficient confidence for investors.	Requires relatively aligned industry participants. May not create sufficient confidence for investors.	Risk of increased regulatory burden. Likely to create confidence for investors.	Higher regulatory costs as a result of a broader range of regulatory activities). Risk of increased regulatory burden. Likely to create confidence for investors.

\*The bodies outlined here are examples and the exact structure which can be deployed is flexible and dependent on what can be suitably established and maintained in Guernsey.

### 6.1.3 What other areas of oversight would need to be considered?

The models presented above provide various structures for independent oversight of GEL with greater or lesser degrees of regulatory structure. As part of this oversight there are several areas which will be important to consider, in particular who is responsible for owning and monitoring these areas.

We summarise the functions which need to be allocated and overseen as follows:

Table 12. Areas to be overseen by an independent regulator or other body

Function	Overview
<b>Contracting and dispute resolution</b>	As above, providing a route for independent resolution of contractual disputes where required as well as ensuring that contracts entered into by GEL are meeting the strategic objectives of the States of Guernsey.
<b>Reviewing and monitoring long term plans</b>	Ensuring that long term plans set by GEL are appropriate under the defined strategy and that these are maintained and updated over time.
<b>Setting expected service levels</b>	Defining the expected levels of service provided to customers and monitoring these to ensure they are upheld and action is taken to remediate issues.
<b>Setting efficiency targets</b>	Defining and monitoring efficiency targets for GEL and ensuring these are met and monitored.
<b>Setting tariffs</b>	Independent oversight of tariff decisions to ensure that changes properly reflect GEL's cost base and investment requirements whilst also considering end consumers.
<b>Consumer protection</b>	Providing independent protection for consumers and ensuring there is a channel through which complaints and issues can be raised and resolved, particularly given GEL is the sole retail supplier for the island.

Classically all of these roles would form part of the remit of a full, independent regulator. In a model which aims to deliver a lighter-touch regulatory structure these roles can be taken on by other bodies (for example an industry body / panel). It is possible that the States of Guernsey could fulfil one or more of these roles, and indeed the STSB already has oversight of setting tariffs - however should this be the preferred route - the States of Guernsey should consider how they balance both a regulatory / oversight role alongside their existing role as shareholder of GEL via the STSB.

In such a scenario, we would suggest that a body within the States of Guernsey (separate from the STSB) with a remit for fulfilling the chosen oversight function(s) may be more appropriate. This is however balanced with the fact that Guernsey is a small island and States' members with the appropriate skills and expertise may need to take roles across both bodies. Ultimately the decision will be driven by the perceived need for independent oversight of each function, and if States' ownership is sufficient to achieve this (through the STSB or otherwise). The States of Guernsey may also consider that certain functions (such as consumer protection) would not be sufficiently independent if they were managed internally and are therefore more appropriate to be served through an entirely separate body (such as an industry group or consumer council).

## 6.2 Why is the regulation required and is there an alternative approach?

As explained above, there are two potential, linked reasons why the States of Guernsey might want to establish an independent decision-making process:

- **Challenging decisions** – The States of Guernsey might envisage the need for future decisions which it will be difficult or impractical for existing political institutions to make in a timely and consistent way; and/or
- **Investor confidence** – The States of Guernsey might conclude that independent decision-making processes are needed to underpin third party investment. Where the States of Guernsey is reliant on third party investments in renewable generation, investors will be looking for clarity in the way the regime operates and will desire predictable revenues.

*Table 10* (above), sets out a range of options for the way that independent decision-making could be achieved without necessarily putting in place a full independent regulatory authority.

## 6.3 Based on the level of competition to be introduced, what level of regulation might be required to support an effective framework and how could it be implemented?

As explained above, in circumstances where it makes sense to establish an independent regulator, the scope of regulation should be guided by the needs of the third party investors and customers. It is likely that investors will have concerns that include:

- The terms under which their generation can access the electricity network, to provide assurance that third party generation will not be prevented from operating as a result of network constraints or as a consequence of unnecessarily high tariffs.
- The access arrangements for the interconnector(s) to export excess generation – investors might be concerned that access would be granted preferentially to GEL's generation capacity.
- Decisions to dispatch generation, to provide confidence that generation will be used in a predictable way.
- The price paid for renewable generation, which should be driven by market characteristics, rather than interests of GEL or States of Guernsey.

As noted above, the scope of regulation may be driven by other factors, including the need to provide a different approach to determining tariffs for customers and a need to develop and monitor a long-term network plan.

## 6.4 What levels of regulation could be implemented?

*Figure 3* (above), explains how the scope of independent decision-making will vary according to the problem that States of Guernsey is seeking to address.

*Table 11* (above), sets out a range of options for the way that independent decision-making could be achieved.

We do not believe that the States of Guernsey should pursue a “zero regulation” model as there will always be a need to have some level of control and structure over areas such as tariff setting and monitoring of GEL.

## 6.5 Which parties would it cover and why?

The main party that should be subject to regulation is GEL. Introducing regulation beyond GEL would result in greater cost and complexity than is required to provide confidence to investors, and support delivery of the wider ambitions for the sector.

## 6.6 What impact, if any, does unbundling GEL have on required regulation?

As explained above, there are different forms of unbundling.

Accounting unbundling will be helpful in any situation where the confidence of investors is critical to the delivery of the States of Guernsey’s aims. This is because accounting separation will help ensure prices and tariffs to be set in a cost-reflective way. This is true whether confidence is provided through a contractual framework or by establishing an independent regulator.

However, given the nature of the Guernsey market, and the anticipated level of competition, we do not expect other forms of unbundling, if adopted by the States of Guernsey, to impact materially on the nature of regulation. For example:

- The most extensive form of unbundling would involve the legal separation of generation and other GEL activities. As both separated entities would ultimately be owned by the States of Guernsey, separation in and of itself would not increase investor confidence.
- Similarly, separation will not change the need for a long-term network investment plan which may require the creation of an independent regulator, for the reasons explained above.

# 7. Outcomes and decisions

## 7.1 Outcomes of a workshop on the market framework

This document has set out a wide range of potential options for each area of the market framework alongside 12 key decisions which, when made, provide direction on which options are most relevant for the States of Guernsey based on their chosen strategy.

A workshop was held with the Committee *for the* Environment & Infrastructure and Electricity Strategy Steering Group members on 28 November 2022 to discuss these decisions in detail. The group provided a response on each of the key decisions which in turn provided an indication of the required market framework for delivery of the chosen supply pathway.

The decisions taken by the group reflect a desire for a pragmatic framework that:

- Provides confidence to investors to facilitate the development of renewable generation assets and provide protections to consumers, while being cognisant of the specific characteristics of Guernsey's electricity market and its small scale
- Maintains the flexibility necessary to support future changes, while positioning the market to deliver the preferred supply pathway
- Enables the introduction of 3rd parties to support investment in large-scale generation and may present opportunities for 3rd parties to provide services in some other parts of the generation value chain where desired (e.g. back-up generation).
- Does not introduce competition in all aspects of the value chain, in particular not in ownership and management of the network or the interconnector, nor in retail energy supply to domestic customers.
- Maintains the current position of GEL being responsible for the majority of activities across the Guernsey electricity sector, but within a clear long-term policy context and a strengthened approach to oversight by SoG in that context.

*Figure 4* below outlines how these decisions align to the market framework components which we outlined in our previous PwC Consultation Report, and full details of the discussions held by the Committee for the Environment & Infrastructure and Electricity Strategy Steering Group members on the 12 key decisions is provided in *Table 12*.

Finally, we provide an indicative work plan of next steps and timelines for activities which the States of Guernsey could undertake in order to put this framework into action. This is outlined in *Figure 5*.

Figure 4 - Outline of the indicative framework structure based on the decisions taken and aligned to the components of our previous PwC Consultation Report.

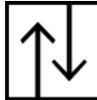
 <p><b>Renewable Generation</b></p>	 <p><b>Thermal Generation</b></p>	 <p><b>Interconnectors</b></p>	 <p><b>GEL Structure</b></p>	 <p><b>System Operation</b></p>
<p>There is a strong desire to involve third parties in renewable generation on the island, particularly as a route to fund development projects.</p> <p>The framework decisions point to a contract-led structure for engaging these parties with competitive tenders or bilateral negotiations to identify preferred suppliers.</p>	<p>Competition can be investigated within back-up generation by GEL, but only to the extent that (1) it aligns with the strategic objectives of the States of Guernsey and (2) that costs for GEL to provide equivalent services are fully understood.</p> <p>This would be limited to back-up services for grid management.</p>	<p>A second interconnector will be developed and put in place.</p> <p>On the basis that this cable can support the spillage of electricity to the European grid, GEL will remain the sole party who can manage this spillage and will contract with third parties as a Single Buyer to obtain access to electricity from installed generation.</p>	<p>Accounting unbundling will be pursued for GEL to fully understand costs to deliver services and enable a better assessment of where additional competitive tensions could be introduced into the market.</p> <p>GEL will put in place, and maintain, a long term investment plan which will provide clarity to investors and support competition.</p>	<p>GEL remains responsible for system operation however new dispatch order rules and increased technology capabilities are expected to be required in order to manage intermittent renewable generation coupled with export. This will need to be incorporated into a review of the merit order</p>
 <p><b>Network Operation</b></p>	 <p><b>Regulation</b></p>	 <p><b>Retail Supply</b></p>	 <p><b>Customer Participation</b></p>	
<p>GEL also remains responsible for network ownership and maintenance.</p> <p>Understanding of GEL's cost base can support the investigation of future competitive tensions in network maintenance and upgrades.</p>	<p>There is limited appetite for a full independent regulatory body, however it was identified that some form of independent body should be in place to support consumer protection.</p> <p>The direction of travel is for a States of Guernsey internal body to take on most of the responsibilities of a regulator to support better alignment with the strategy, but a separate body may need to be set up to manage consumer protection (e.g. a consumer council).</p>	<p>GEL will remain the sole retail supplier of electricity on the island. It is not appropriate to introduce additional competition for retail supply given the costs and the size of Guernsey.</p> <p>On-island generators (e.g. via Solar installations) would contract with GEL as Single Buyer in order to deliver electricity into the grid with appropriate tariffs set to encourage development.</p>	<p>Community energy schemes were identified as a mechanism which could be investigated but as a lower, future, priority to enable consumers to generate their own renewable electricity.</p> <p>There was an appreciation that as technology improved and changed, there may be additional participation options that could be incorporated.</p>	

Table 12. Discussions held and decisions made on each of the 12 key decisions posed above by Committee for the Environment & Infrastructure and Electricity Strategy Steering Group members on 28 November 2022

Area	Question posed	Discussion notes	Decision made
<b>Competition</b>  <i>(More info: Section 4)</i>	How will offshore wind and large-scale solar investments be funded?	<ul style="list-style-type: none"> <li>● It was noted that SoG/GEL would not have the capacity to afford a large scale investment project in renewable energy off their own balance sheet.</li> <li>● In addition, it is expected that additional skills and capabilities would need to be brought into the island to deliver such projects.</li> <li>● Therefore some level of third party involvement will be required - be that another government or private sector external company.</li> <li>● There are various different mechanisms that the States of Guernsey (and/or third parties) could use to raise funding (e.g. Green Bonds - which whilst not very attractive in the current economic market, conditions are expected to improve) that would need to be investigated for suitability.</li> <li>● An important linked consideration is the ability to export / spill energy via a second interconnector to France. A parallel discussion being held by GEL with EDF needs to be concluded but the working assumption is that this is possible.</li> <li>● Noted that depending on the approach, project risk can either sit with a third party (who build, own and operate) or with GEL (with a procurement process to support the build and/or operation).</li> <li>● Third parties will look for a guarantee on return so the contracting party (GEL) would need to provide stability</li> </ul>	Third party involvement is needed for both funding and/or delivery of large scale generation assets (be that private and/or other governments).  <b>Suggested Actions:</b> <ul style="list-style-type: none"> <li>- Tender documents and structures can be written.</li> <li>- Options and mechanisms for raising debt finance, feasibility, appetite, income, and collaborative approaches, can be explored by the States of Guernsey, GEL and/or other parties.</li> <li>- Latest view on cost of assets to be incorporated from further Siemens' analysis of the preferred supply pathway.</li> <li>- Solar investment can likely occur sooner. In-scope locations and processes for bidders can be established (where 3rd party involvement is desired) - used as a test bed ahead of later wind investments.</li> </ul>

		<p>through their contractual approach (assuming there is not a regulatory mechanism for this) and may also need to cap these returns at a certain point to protect consumers.</p> <ul style="list-style-type: none"> <li>Joint ventures were identified as an approach that had been deployed successfully (i.e. third party + States delivery) although attractiveness depended on the investor and their preferences.</li> </ul>	
<p><b>Competition</b> <i>(More info: Section 4)</i></p>	<p>Will there be further investment in large-scale renewables?</p>	<ul style="list-style-type: none"> <li>Many members identified that there was an appetite to support future investment in renewable generation outside of an initial offshore wind farm.</li> <li>It was however recognised that this would in reality be infrequent, and likely limited to a small number of additional projects in the future such as further wind investment or as certain technologies - such as tidal power - mature.</li> <li>The introduction of a more complex framework to support what is only a handful of expected investments may not be necessary - Investors need a mechanism to understand returns and access the network on a non discriminatory basis - but this could be handled through contractual terms / PPAs rather than regulation.</li> <li>It was noted however that contractual terms are hard to change and it's often difficult to forecast future situations in order to contract for them. Investment in the UK is often based on the understanding that Ofgem makes decisions in a practical and fair way.</li> </ul>	<p>Door to future investment should be open but plan to manage through contracting to limit regulatory complexity. Important to support future technology improvements e.g. Tidal.</p> <p><b>Suggested Actions:</b></p> <ul style="list-style-type: none"> <li>Confirm that the preferred supply pathway includes a realistic view of the intended future investment options.</li> <li>Provide sufficient direction to GEL to follow the preferred supply pathway but also ensure there is ongoing dialogue between the States of Guernsey and GEL where future options arise so they can be evaluated against the strategy and investigated appropriately.</li> </ul>
<p><b>Competition</b></p>	<p>How will access to the interconnector</p>	<ul style="list-style-type: none"> <li>The decision here was identified as between a more simplistic model - where GEL is the only entity which can</li> </ul>	<p>GEL is the only entity that can export / spill on the interconnector. However who bears the price risk on this</p>

<p><i>(More info: Section 4)</i></p>	<p>be managed if there is the ability to export or spill electricity?</p>	<p>manage export or spillage on the interconnector - or a more complex model where GEL may contract with parties to provide access to export or spill via the interconnector for periods of time.</p> <ul style="list-style-type: none"> <li>● It was decided that the additional complexity was unlikely to bring benefits for Guernsey and the system operation is simpler where GEL is the sole exporter via the interconnector.</li> <li>● Third parties would contract with GEL on commercial terms to secure a price for generated electricity and it would be GELs responsibility to dispatch this to homes or to export / spill it to France.</li> </ul>	<p>energy is still to be determined based on contracting.</p> <p><b>Suggested Actions:</b></p> <ul style="list-style-type: none"> <li>- Consider including this approach within a Strategic Direction Statement. By Strategic Direction Statement we mean a summary of the final electricity strategy once debated and agreed. The purpose of this statement would be to have a public summary of the target operating state of the electricity market and allow stakeholders (such as third party investors and GEL) to have a clearer understanding of plans (in this case the fact that third parties would be contracting with GEL for access to export or spill excess generation).</li> </ul>
<p><b>Competition</b> <i>(More info: Section 4)</i></p>	<p>Will you consider introducing competition in other parts of the value chain?</p>	<ul style="list-style-type: none"> <li>● It was clarified that competition in “other areas” was limited to: <ul style="list-style-type: none"> <li>○ Building offshore wind farms, large scale solar and other forms of renewable energy.</li> <li>○ 3rd party investment in renewable generation</li> <li>○ Back up generation services</li> <li>○ Meter and network support</li> <li>○ Interconnector installation services</li> <li>○ Community energy schemes</li> </ul> </li> <li>● Clarity was provided on what “back-up” services could represent. This would be the supply of small volumes (kW / MW) of capacity to the network at times of peak demand</li> </ul>	<p>Consensus was to investigate competition in other areas as outlined once GEL costs are better understood.</p> <p><b>Suggested Actions:</b></p> <ul style="list-style-type: none"> <li>- Revisit and update existing mechanisms to give direction to GEL and how to monitor progress against targets.</li> <li>- GEL to perform and finalise cost exercise and then use this to inform what is possible in terms of value generation across competitive areas.</li> </ul>

		<p>to avoid spinning up thermal plant and aim to reduce cost and carbon footprints whilst balancing demand on the grid.</p> <ul style="list-style-type: none"> <li>• It was also noted that further understanding of GELs cost base would support investigation of competition in these areas by allowing costs to be better compared.</li> <li>• In general, it was agreed that investigation of competition in these areas was sensible although noting that some risks remain such as reliance on sole suppliers and fully understanding GELs cost base.</li> </ul>	
<p><b>Competition</b> <i>(More info: Section 4)</i></p>	<p>Will you use licensing to enable competitive markets or a tender / bilateral negotiation approach to deliver targeted competition supported by licences?</p>	<ul style="list-style-type: none"> <li>• It was discussed and agreed that tenders and bilateral negotiations were the preferred method to engage with third parties rather than a licence based approach which would require more complexity and regulatory structure to manage and ultimately not provide significant value where there were a low volume of entrants expected.</li> </ul>	<p>Tenders and bilateral negotiations are the preferred approach rather than using licensing to enable a wide range of third parties to enter into the market across the electricity value chain. Licences would still need to be issued to new generators to cover obligations, they just would not facilitate market entry directly as in the UK market (see Table 5 above for more commentary).</p> <p><b>Suggested Actions:</b></p> <ul style="list-style-type: none"> <li>- As above - develop approach and supporting documents for running tenders and bilateral negotiations.</li> <li>- Decide who can bid and what process bidders will follow.</li> </ul>
<p><b>Unbundling GEL</b> <i>(More info: Section 5)</i></p>	<p>To what extent should GEL be unbundled?</p>	<ul style="list-style-type: none"> <li>• Discussion was tabled on the various unbundling approaches and what they would mean for GEL.</li> <li>• Accounting unbundling was discussed in more detail and what it would mean practically for GEL. It was highlighted that whilst there would be some initial set up to allocate</li> </ul>	<p>Consensus to pursue accounting unbundling for GEL to support greater transparency over costs and allocations. Functional unbundling is not deemed necessary at this stage.</p>

		<p>costs and calculate figures, this should be maintainable going forward such that ongoing effort would be reduced.</p> <ul style="list-style-type: none"> <li>Historically GEL had pursued a similar approach but due to changing demands and a lack of competition locally it was paused as it was not deemed to provide sufficient value.</li> <li>In the current market state however, as complexity is being introduced and competition is being targeted, this unbundling and additional reporting would provide a number of benefits including helping to benchmark competitive tenders and attract external investors.</li> <li>Given the small size of GEL and the overlapping roles in place, it was felt that unbundling beyond accounting was not necessary at this stage.</li> </ul>	<p><b>Suggested Actions:</b></p> <ul style="list-style-type: none"> <li>Establish the most appropriate mechanism to ensure this accounting analysis is delivered and meets requirements (e.g. via STSB).</li> <li>Align on expectations with GEL (including on who has access to the accounting unbundling information) and ensure that analysis provides sufficient breakdown across the value chain to support competitive analysis.</li> </ul>
<p><b>Unbundling GEL</b> <i>(More info: Section 5)</i></p>	<p>Will GEL have a Single Buyer function?</p>	<ul style="list-style-type: none"> <li>The “Single Buyer” concept was discussed, outlining that it would be a central body responsible for managing contracts with electricity generators (including back-up service providers and the interconnector(s)).</li> <li>Ultimately there has to be someone responsible for setting and deciding upon contracts and it was felt sensible that this should be centralised under GEL who have expertise in this area, rather than splitting the ownership across a number of parties.</li> <li>It was also identified that GEL would need to be provided with strategic guidelines and parameters to follow when setting these contracts in order to ensure alignment to the electricity strategy, and this could be set by the States via STSB.</li> </ul>	<p>Yes. Agreed to centralise capability within GEL to manage third party contracts on the understanding this should represent an expansion of existing capabilities. This is not expected to require a separate legal entity, rather a collection of functional expertise within GEL and defined procedures (discussed in Section 5.4 above), although there may be a requirement for additional, specialist expertise to fill skill gaps (see below).</p> <p><b>Suggested Actions:</b></p> <ul style="list-style-type: none"> <li>Understand existing GEL structures and resources who support the contracting process.</li> <li>Outline the scope of “Single Buyer” within GEL and begin a discussion to understand any resource and skills gaps that may be required to set up - this could focus on Solar initially as that</li> </ul>

		<ul style="list-style-type: none"> <li>• A key point of contracting that would remain separate however would be for sea-bed leasing which would be via the States of Guernsey - so it was noted that third party discussions would need all heads around a table to support a joined up approach.</li> </ul>	investment can occur faster.
<b>Direction to GEL</b>  <i>(More info: Section 5 and 6)</i>	Will GEL be required to set a long-term investment plan?	<ul style="list-style-type: none"> <li>• It was discussed and noted that setting a central plan is separate to how projects will be funded. It is important to identify areas where network reinforcement / upgrades etc.. will need to be targeted over time and the expected costs.</li> <li>• There was broad alignment to pursue a long term plan from GEL.</li> <li>• It was noted that GEL already has elements of this in place, but that further work could be done in the context of the certainty provided by a long-term electricity strategy for the island. There will be a need to clarify requirements and expectations as well as ensure there is a route to oversee and monitor the plan (expected to be directed and monitored through the STSB).</li> <li>• The setting of such a plan would also provide confidence to investors and show that the marketplace is dynamic and help to identify opportunities for third party involvement.</li> </ul>	<p>Yes. Considered important to pursue at pace to ensure the content of the plan is not impacted by GEL perceptions of potential funding. Rather the plan should provide a realistic view of the investments necessary to deliver the planned necessary network to underpin the preferred supply pathway (and which will follow from the Siemens' network study). Oversight is required to ensure transparency and sufficient detail is achieved (e.g. through the STSB).</p> <p><b>Suggested Actions:</b></p> <ul style="list-style-type: none"> <li>- Establish the core components of a long term plan which would be required and compare these to existing documents maintained by GEL. We would expect that GEL would create the initial proposed components / plan structure and then the States of Guernsey could suggest comments and adjustments to refine this.</li> <li>- Create an oversight and reporting mechanism as part of a regulatory/oversight function to monitor progress and updates to the plan as well as provide direction to GEL (this could align with the unbundling approach).</li> </ul>
<b>Regulation</b>  <i>(More info:</i>	What level of regulation is	<ul style="list-style-type: none"> <li>• An overview of options for applying regulatory-style oversight were discussed and presented.</li> </ul>	5 out of 6 regulatory components outlined can be owned and managed within the States through the STSB or other States body. An independent body (e.g. consumer council)

Section 6)	desired?	<ul style="list-style-type: none"> <li>● 6 core areas of regulatory function were presented and discussed in turn which were: <ul style="list-style-type: none"> <li>○ Contracting and dispute resolution</li> <li>○ Reviewing and monitoring long term plans</li> <li>○ Setting expected service levels</li> <li>○ Setting efficiency targets</li> <li>○ Setting tariffs</li> <li>○ Consumer protection</li> </ul> </li> <li>● Discussion focused on the 6 areas outlined above and an understanding that each role needed to be owned by a certain party and this could be bundled into a regulator, or separated between States and/or other entities.</li> <li>● The broad consensus from the group was that a low / limited level of regulation was preferred, and that where possible an independent regulator would not be implemented (although there was agreement that consumer protection needed to be overseen by an independent body - which could be a community support scheme rather than a regulator). It was also noted that regulation in other areas (such as the competition law) would potentially still apply.</li> <li>● It was noted that there had been historical challenges with regulation in Guernsey, particularly in aligning the policy goals of the States with the regulatory direction. Therefore it was important that whatever solution was proposed ensured alignment towards the strategy.</li> </ul>	<p>is required for consumer protection.</p> <p><b>Suggested Actions:</b></p> <ul style="list-style-type: none"> <li>- Set out definitions of each core regulatory area (identified in the 6 bullet points across) and the proposed ownership approach. This will involve defining what roles and activities will fall under each area, who is responsible for delivering on these roles, and how they will be monitored, updated and communicated going forward.</li> <li>- Identify where there are changes required from existing structures (e.g. where separation of shareholder and regulatory function may be required).</li> <li>- Once roles and responsibilities are defined, agree relevant funding mechanisms for any independent bodies (e.g. a consumer council) who would own the consumer protection function).</li> </ul>
------------	----------	---	---

		<ul style="list-style-type: none"> <li>● Given the scale of Guernsey, there was also a risk identified that introducing additional bodies could duplicate the roles performed without clear direction and mandates.</li> <li>● The possibility of a consumer body (such as the Consumer Council in Jersey) was tabled which could own certain roles as an alternative to a fully fledged regulator.</li> <li>● Contracting would be handled by GEL as part of the new Single Buyer function, however overall direction and strategy would be set by the States of Guernsey (to ensure contracts aligned to the Energy Policy objectives). There would in addition be a mechanism considered to allow third parties to escalate concerns within the contracting process to the States of Guernsey for resolution.</li> <li>● It was noted that disputes which cannot be settled between contracting parties and/or through States intervention were expected to be handled via the courts and expert witnesses may need to be appointed to support the judicial process.</li> <li>● In relation to long term plan reviews and setting service and efficiency levels the discussion noted these were all reasonable roles to sit within the States of Guernsey as part of a regulatory/oversight role so alignment to the strategy could be considered when reviewing and setting targets.</li> <li>● Similarly setting tariffs is currently undertaken by the STSB with support from external experts and this was believed to be an appropriate route to continue, accepting that an increased availability of cost information from GEL would be required to ensure cost reflectivity and timely</li> </ul>	
--	--	--	--

		<p>setting of tariffs.</p> <ul style="list-style-type: none"> <li>Customer protection was clearly signposted as a role which needed to be external to the States of Guernsey and an independent body - however it was felt that a regulator was not necessarily best placed to support, particularly given funding for the existing regulatory structure comes from the utility companies. As a result a different body with a different funding mechanism may be required, such as a Community Scheme.</li> </ul>	
<p><b>Regulation</b> <i>(More info: Section 6)</i></p>	<p>How would any regulation be structured?</p>	<ul style="list-style-type: none"> <li>See notes above from the discussion on regulation.</li> <li>In summary - the initial direction was to understand and define the roles and responsibilities in each of the 6 regulatory areas - and the majority (5 out of 6) of these would be suitable to include within the States of Guernsey's remit via the STSB (or other States' body).</li> <li>Consumer protection was identified as the sole role which required an independent body to own and manage, although it was thought this could be handled through a community scheme rather than a fully fledged regulator, particularly where funding for the scheme could be separated from the utility companies.</li> </ul>	<p>Limited regulation is being targeted. The key area where an independent body (e.g. a consumer council) was deemed necessary was for consumer protection but this may not necessarily need to be an independent regulator.</p> <p><b>Suggested Actions:</b></p> <ul style="list-style-type: none"> <li>In line with actions noted above.</li> </ul>
<p><b>Customer tariff setting</b> <i>(More info: Section 5 and 6)</i></p>	<p>How will customer and spill tariffs be set going forward?</p>	<ul style="list-style-type: none"> <li>As noted in the discussions above, the STSB (or a similar body within the States of Guernsey) will retain control over the setting of tariffs going forward.</li> <li>It was noted however that increased information availability would help this process, in addition to continued consultation with external experts to ensure</li> </ul>	<p>The States (via STSB or other States' body) will retain the responsibility for setting tariffs, however the process can be redefined and improved with enhanced unbundled GEL cost data in order to set more cost reflective tariffs (for example by providing a greater breakdown of data to evaluate fixed vs variable costs).</p>

		tariffs can be reviewed appropriately and in good time.	<p><b>Suggested Actions:</b></p> <ul style="list-style-type: none"> <li>- Define what adjustments are required to the existing tariff setting process such as trigger points / frequency of the reviews, required input data etc.. Input from GEL should be sought here to ensure that these discussions happen frequently enough to support investment decisions and consider the right data, but ultimately the decision on approach should be set by the States of Guernsey (assuming they are taking on the role of tariff setting as part of an oversight function).</li> <li>- Confirm if STSB or other States' bodies will take ownership of the process and develop terms of reference. A terms of reference / policy document should be in place to cover all oversight functions, but these could be separated if this is believed to be more appropriate / efficient.</li> </ul>
<b>Timing</b>	When are these changes required?	<ul style="list-style-type: none"> <li>• There was limited explicit discussion of the timings for implementation, however the group indicated their desire to be pragmatic and take relevant actions as soon as possible.</li> </ul>	<p><i>Figure 4</i> below provides an indicative timeline of proposed actions based on the above decisions.</p> <p>This timeline is one possible example and can be adapted as required and as more information is gathered.</p>

A summary of the proposed actions, their relative effort, and indicative timings can be found in *Figure 4* below. These are estimated based on our latest understanding of the desired market framework and the preferred supply pathway but are of course subject to revision and change as the project progresses and as new information comes to light.

**To summarise - in the short term (2023-2024) we believe that effort should be focused on:**

- *(States of Guernsey)* Summarising the decisions taken on the preferred supply pathway and market framework and outlining a **strategic direction statement** as part of the Electricity Strategy which can inform and guide stakeholders (and form the basis of direction given to GEL).
- *(GEL w/ input from States of Guernsey)* Pursuing the **accounting unbundling** of GEL (including finalisation of the existing cost exercise which is underway) and obtaining sufficient information on the cost of their operational duties to help inform future competitive analysis.
- *(GEL w/ input from States of Guernsey)* Develop the **long term investment plan** for GEL which should align with the strategic direction statement to ensure that all parties are moving towards the desired outcomes and to provide greater clarity to investors.
- *(GEL w/ input from States of Guernsey)* Develop **tender documents and procedures**, as well as investigate the options for contract structuring to provide greater certainty to third party investors.
- *(States of Guernsey w/ input from GEL)* Prioritise **on-island solar** investment (through a combination of tariffs and public communications - including clarity on planning / licensing requirements) as a mechanism to trial (in a more lightweight manner if 3rd party investment is required) the proposed market mechanisms ahead of a larger scale wind farm investment.
- *(States of Guernsey)* Outline the principal **regulatory functions** which will be implemented and who will be responsible for implementing them (be that the States of Guernsey or otherwise). The strategy can outline the approach to regulation in principle. Details of the implementation including specific policies and procedures can be set afterwards.
- *(GEL)* Establish with certainty through GEL whether the **spillage of excess electricity** will be possible via a second interconnector to validate that the proposed direction is viable.

Figure 5. Updated indicative work plan based on the decisions made by the Committee for the Environment and Infrastructure

☆ Priority item

# Indicative Prioritised Work Plan

Low Effort (<6m)
Moderate Effort (6-12m)
High Effort (12m+)

	High priority (2023-24)		Market planning (2024-25)		Market implementation (2025-27)	Market operation (2026-28 onwards)
<b>SoG Led</b>	Confirm framework and agree implementation approach	☆ Validate funding options (e.g. Green Bonds)	Use GEL cost analysis outputs to benchmark performance, set goals and assess competitive options.	Develop roadmap for implementation including milestones / targets	Publicise change	
	Develop method to direct and monitor GEL	☆ Issue strategic direction statement				
<b>GEL</b>	☆ Accounting unbundling & publish cost analysis	Structure and set up Single Buyer function	Ongoing reporting to monitor progress against strategy	Develop new dispatch rules / merit order	Implement new IT systems	
	☆ Develop long term costed investment plan	☆ Develop contract structures for third party generators	Identify and develop new IT to support new structure	Target competition for network and other support services		
<b>Generation</b>	Confirm capacity needs over next 10 years	☆ Set out approved scope for Solar development based on States targets.	Use Solar investments to trial framework ahead of larger scale wind (e.g. network management / contracting / regulation)	Hold tender for renewable generation (wind and solar) - dependency on tender and contract documents		
<b>Legal</b>	Review laws to enable framework	☆ Develop tender documents and processes alongside GEL (including bid process and prerequisites)	Develop laws (if required) to enable competition, unbundling and new entrants			
<b>Regulatory</b>	Review STSB / Committee focus and role. Define preferred structure of relevant bodies.	☆ Confirm principles and regulatory scope through the strategy	Implement Consumer Council (or equivalent body) to take on consumer protection role.	Set market operation targets (efficiency / service etc.) Agree cost recovery rules and approve tariffs	Implement market operation rules	Review structure as strategy develops. Adjust structure if required.
<b>Customers</b>	Review GEL tariff structure (who sets / what levels etc.) once cost analysis is completed	Network charges review for tariffs (once cost analysis is completed)	GEL to review meter stock New tariffs implemented	Assess opportunities for customer demand reduction		
<b>Interconnector</b>	Progress interconnector contractual discussions and firmly establish export capability	Set out interconnector operation principles (including approach for export)	Approve and develop second interconnector			
<b>Associated work</b>	States of Guernsey develop policy on (1) energy efficiency, (2) innovation schemes in electricity sector and (3) community energy support as part of wider pathway work.		Run innovation study			

## 8. PwC contacts



### Nick Vermeulen

Territory Senior Partner, Guernsey, PwC CI

T: +44 7781 111526

E: [nick.vermeulen@pwc.com](mailto:nick.vermeulen@pwc.com)



### Ali Cambray

Engagement Director, PwC CI

T: +44 7700 838337

E: [alison.cambray@pwc.com](mailto:alison.cambray@pwc.com)

This document has been prepared only for the States of Guernsey and solely for the purpose and on the terms agreed with the States of Guernsey in our agreement dated 10 June 2022.

We accept no liability (including for negligence) to anyone else in connection with this document.

You should not act upon the information contained in this publication without obtaining specific professional advice. No representation or warranty (express or implied) is given as to the accuracy or completeness of the information contained in this publication, and, to the extent permitted by law, PricewaterhouseCoopers CI LLP, its members, employees and agents do not accept or assume any liability, responsibility or duty of care for any consequences of you or anyone else acting, or refraining to act, in reliance on the information contained in this publication or for any decision based on it.

© 2023 PricewaterhouseCoopers CI LLP. All rights reserved. PwC refers to the PwC network and/ or one or more of its member firms, each of which is a separate legal entity. Please see [www.pwc.com/structure](http://www.pwc.com/structure) for further details.



Committee *for the*  
Environment & Infrastructure

Sir Charles Frossard House  
La Charroterie  
S Peter Port  
Guernsey  
GY1 1FH  
+44 (0) 1481 227000  
environment&infrastructure@gov.gg  
www.gov.gg

President  
Policy & Resources Committee  
Sir Charles Frossard House  
La Charroterie  
S Peter Port  
GY1 1FH

6 June 2023

**THE STATES OF DELIBERATION**  
**of the**  
**ISLAND OF GUERNSEY**

**COMMITTEE *FOR THE* ENVIRONMENT & INFRASTRUCTURE**

**ELECTRICITY STRATEGY FOR GUERNSEY**

Dear Sir,

**Preferred date for consideration by the States of Deliberation**

In accordance with Rule 4(3) of the Rules of Procedure of the States of Deliberation and their Committees, the Committee *for the* Environment & Infrastructure requests that the Electricity Strategy for Guernsey be considered at the States' meeting to be held on 5 July 2023.

Yours faithfully,

H L de Sausmarez  
President  
Committee *for the* Environment & Infrastructure

c.c. propositions@gov.gg