ENERGY STRATEGIES, FEASIBILITY STUDIES AND COMMUNITY ENGAGEMENT ON ENERGY TRANSITIONS IN ISLANDS IN THE CHANNEL/MANCHE REGION

DECEMBER 2022

ICE report T3.5.1: Energy strategies, feasibility studies and community engagement on energy transitions in islands in the Channel/Manche region

Gina Kallis, Ian Bailey

About ICE

Supported by Interreg VA France (Channel) England, the Intelligent Community Energy (ICE) project, aims to design and implement innovative smart energy solutions for isolated territories in the Channel area. Islands and isolated communities face unique energy challenges. Many islands have no connection to wider electricity distribution systems and are dependent on imported energy supplies, typically fossil fuel driven. The energy systems that isolated communities depend on tend to be less reliable, more expensive and have more associated greenhouse gas (GHG) emissions than mainland grid systems. In response to these problems, the ICE project considers the entire energy cycle, from production to consumption, and integrates new and established technologies in order to deliver innovative energy system solutions. These solutions will be implemented and tested at our unique pilot demonstration sites (Ushant island and the University of East Anglia's campus), to demonstrate their feasibility and to develop a general model for isolated smart energy systems elsewhere. The ICE consortium brings together researcher and business support organisations in France and the UK, and engagement with SMEs will support project rollout and promote European cooperation.

Table of Contents

Figures

Tables

.

1. Introduction

This report examines findings from research examining how three islands in the Channel/Manche area (Guernsey, Alderney and Ushant) have assessed the potential for, and sought to initiate, sustainable energy transition strategies. It investigates the energy challenges faced by each island and the types of projects that have been proposed. Specifically, it addresses the following questions in order to examine the factors affecting decisions on whether to proceed with projects to exploit the renewable energy resources available around islands in the Channel/Manche area identified in feasibility studies and to establish how far, and in what ways, community engagement has influenced decision-making:

1. What types of energy challenges do island communities in the Channel/Manche area face?

2. What types of energy transition projects have been proposed for island communities in the Channel/Manche area?

3. What forms of community consultation have taken place as part of evaluations of energy transition options discussed in feasibility studies?

4. What types of factors have been considered in the evaluation of feasibility studies? Which have been most decisive in determining decisions of whether to proceed with options outlined in feasibility studies?

5. What lessons do we learn about the ways in which community consultation is currently practised and how it should be practised to achieve people- and place-centred approaches to energy transition?

It builds on previous research around public engagement which emphasises the importance of place-sensitive and context-specific approaches to public engagement on energy and low-carbon transitions (de Groot and Bailey, 2016; Devine-Wright and Boersma, 2020; Gross, 2007; Kallis *et al.*, 2021; Rudolph, 2014; Skjølsvold *et al.*, 2020). It also addresses questions over the appropriateness of proposing large-scale, transformational energy transition projects for island communities that also contribute to strategic national energy priorities compared with a focus on smaller-scale projects that contribute solely to addressing energy issues on the islands themselves (Colvin *et al.*, 2016; Hernández, 2015; Papazu, 2018; Sperling, 2017). This research identifies a series of principles which can help to promote non-discriminatory participation, evidence-led decision-making and balancing of local and wider societal needs in community engagement on energy projects. These include:

- Upstream engagement: to increase opportunities for local views to inform decision-making. Early and accessible information helps groups to make informed decisions and to feel empowered, and how upstream engagement can improve siting decisions (Klain *et al.*, 2017; Rudolph *et al., 2017*). Conversely, 'decide-announce-defend' approaches, where the main elements of projects are decided in advance, can make stakeholders feel devalued and undermined, and lead to proposals that are inappropriate to the contexts involved (Reilly *et al.*, 2016; Wolsink, 2000).

- Maintaining engagement: throughout the planning, construction, operation and decommissioning of projects to maintain trust with affected groups (Dwyer and Bidwell, 2019; Chilvers, 2008; Gross, 2007).

- Two-way communication and knowledge exchange: allowing dialogue on information supplied by engagement organisers (Aitken *et al.,* 2016). Participatory processes may also encourage communities to share local knowledge to help investigate uncertainties and assumptions which, when integrated with technical knowledge, can produce more informed decisions (Aitken *et al.*, 2014).

- Choosing appropriate engagement techniques: ranging from awareness-raising (exhibitions, websites, newsletters) to consultation (surveys, feedback, meetings) and empowerment, often used in combination to broaden participation (Aitken *et al*., 2016; de Groot and Bailey, 2016; Kerr *et al.*, 2014).

- Avoid over-consultation: especially where engagement occurs over long periods and involves different actors, for example, government- and developer-led consultations (Johnson *et al.*, 2016). This risk is heightened in areas with smaller populations and where separate engagement processes happen simultaneously (Dwyer and Bidwell, 2019). The general recommendation is for clear separation or co-ordination to avoid repetition.

- Using trusted gatekeepers: community liaison officers can facilitate engagement by engaging in monitoring, listening, 'bridge-building' and 'advocacy' to build trust, create communication channels, and promote information sharing (Devine-Wright, 2012; Papazu, 2018).

- Offering local benefits: community funds, community ownership, apprenticeships and studentships, educational programmes, and electricity discounts can all be used to compensate communities or fund local benefits (Firestone *et al.*, 2009; Rudolph *et al.*, 2014).

- Community involvement in decision-making: to empower communities rather than subjecting them to decisions imposed by external governing bodies (Aitken, 2014; Kallis *et al.*, 2021).

The following section presents the three island case studies of Guernsey, Alderney and Ushant. Based on a review of policy and local government documents, feasibility studies, and media reports, it explores the energy transition projects that were examined or proposed for each island, the enabling factors and the challenges faced, the forms of community consultation that have taken place, and the issues raised during consultations. The section following this revisits the questions posed in this section and draws on the case study evidence to draw out the main insights gained on the role of community consultation in sustainable energy transitions on non-interconnected islands..

2. Island Case Studies

2.1 Guernsey/Guernesey

2.1.1 Energy Context

Guernsey (Guernesey in French) is heavily reliant on imported electricity from France and back-up electricity from local diesel generators. The island currently sources 78% of its electricity from France using an interconnector through Jersey, whilst the remaining 22% is generated on-island using the local diesel generators. This poses risks with respect to energy security and impending fuel price rises, especially as demand is rising and is forecast to continue to rise at an estimated 3.5% per annum (University of Exeter, 2012). The island has not been as severely affected by the recent energy price rises as the UK mainland because of the energy fixing strategy operated by Guernsey Electricity Ltd (GEL); GEL is the sole commercial electricity supplier on the island and forward purchases a large proportion of its imported electricity up to three years in advance (Guernsey Electricity, 2022). However, it is unclear what will happen when the current contract runs out.

Guernsey has an Energy Policy for 2020-2050, which established that, by 2050, 'the vast majority of Guernsey's energy supplies will come from clean, low carbon sources and residual emissions will be offset'. The policy is broken down into six main objectives:

1. Decarbonisation of the island's energy system in line with international standards and those set by other jurisdictions to mitigate climate change.

2. Security and resilience of supply to withstand infrastructure failures in the system and continue to serve energy needs.

3. Consumer value and choice.

4. Equity and fairness to ensure all consumers pay a share of the maintenance system and, in return, receive equal access to the opportunities that come from technological advances.

5. Supporting a vibrant economy via the development of on-island (including offshore) renewables. It is hoped that a shift to decarbonisation in Guernsey will provide reputational credibility to support the growth of the green finance sector.

6. Greater energy independence, which will increase resilience by reducing exposure to external and geopolitical factors (States of Guernsey, 2020).

The States of Guernsey and GEL have commissioned some work to help understand future energy demand on the island and the potential energy mix on a local scale. They have been exploring a range of options to improve the security of their electricity supply, long term sustainability and price certainty. Research has also been conducted by the University of Exeter exploring similar issues. The findings are outlined in the following section.

2.1.2 Renewable Energy Developments

In 2009, Halcrow Group Ltd conducted a pre-feasibility technical study to explore the potential for the development of Marine Renewable Energy in Guernsey, Herm and Sark (Halcrow Group, 2009). The report stated that the seas around Guernsey, Herm and Sark have the potential for commercially exploitable resources in the form of wave and tidal stream energy. It suggested that, in terms of tidal energy, it was likely there would be an initial focus on potential 'high energy' sites. Conversely, sites with lower intensities were considered unlikely to be commercially exploitable using the technology available at the time.

However, much of the information and data on wave resource was either anecdotal or based on data from measurements taken at a remote location. The report suggested that proper targeted resource assessment and measurement, with the placing of sensors and buoys, was required as soon as practicable to provide evidence to potential developers. It also suggested that:

- A study of skills and training requirements was required to ensure they were in place before any development began. This would help to maintain knowledge and a sense of ownership within the community.
- The commercial risks were diverse and often high with a project of this nature; therefore, correct assignment of risk should be made available at an early stage to the parties best able to manage and minimise it.

The report stated that 'some form of local community benefit is generally considered essential in the establishment of renewable energy farms'. The authors felt it was an important consideration for this study as most residents of the Bailiwick of Guernsey would have some sense of ownership of the seas around the islands. They recommend looking to other case studies where methods of returning funds to the community for re-investment in community projects have been documented for wind farm development.

Following the initial Halcrow study, two further feasibility studies were conducted into offshore wind. The first study in 2011 (Guernsey Renewable Energy Team, 2011) explored two potential development scenarios:

- Minimum Development – 12MW (4 x 3MW turbines)
- Maximum Development – 30MW (10 x 3MW turbines)

The study identified one suitable deployment zone off the Northwest coast of the island, which was selected as it provided a relatively flat seabed and suitable wind resource, sea-state and tidal conditions (Figure 2-1). The rocky nature of this area also meant that it was avoided by large vessels, so the installation of wind turbines would not affect commercial or passenger traffic. The study established that the deployment, operation and maintenance cost would be higher than that for conventional sources but was likely to be comparable with offshore wind farms in the UK, and likely to be lower than current estimates for wave and tidal energy.

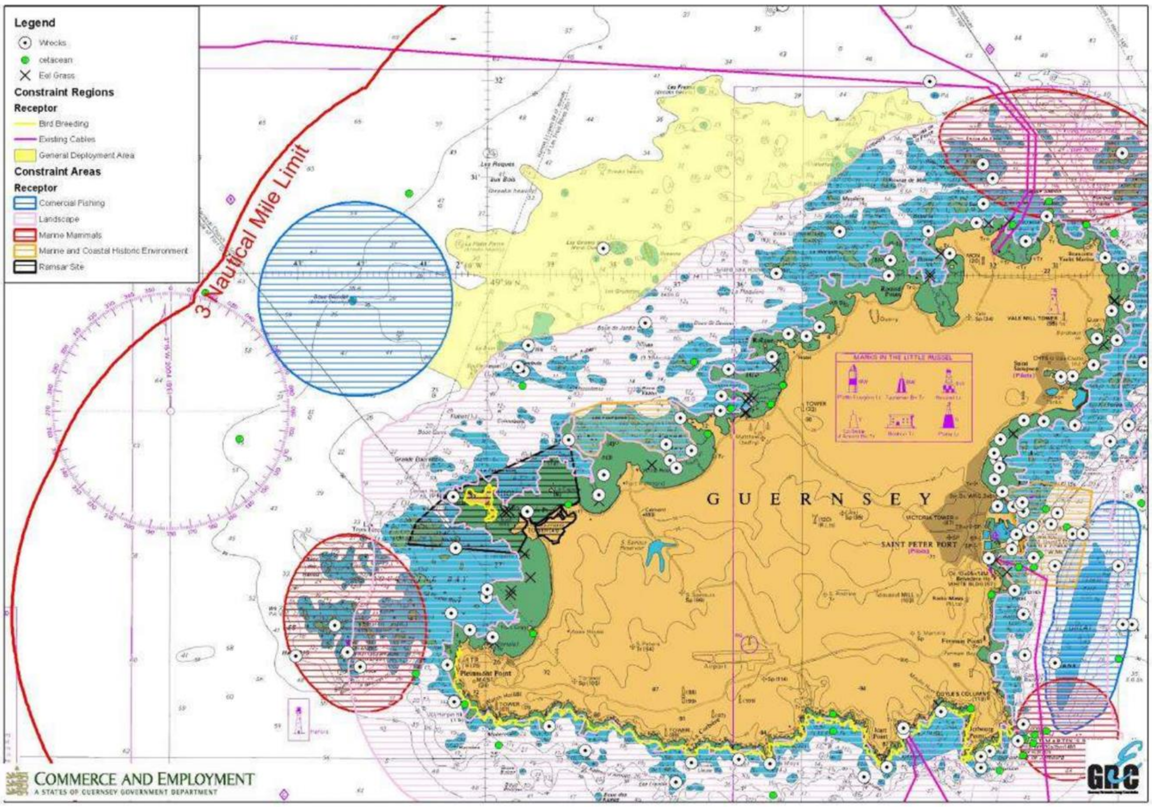

Figure 2-1: Likely deployment area of offshore wind development (with environmental constraints), Guernsey

There were some areas for consideration, however:

Some upgrades in grid capacity may be required, though these were not deemed to be 'insurmountable'. Similarly, connecting the wind turbines to land via a subsea power cable was viewed as 'complicated but doable'. Wind turbines can also present difficulties for aviation radar systems and it was anticipated that the current system at Guernsey Airport would need updating if the wind development went ahead. Another issue identified was the potential noise and visual impact of the development. In its Rural Area Plan, the States of Guernsey's Environment Department have defined the whole of the island's coastline as an 'area of high landscape character'. There is an almost continuous coastal footpath around the island and it is likely that an offshore wind farm would be visible from the coastal footpath, beaches and properties on the Northwest coast, which could be viewed in a negative light by some individuals. Nevertheless, The Guernsey Renewable Energy Forum (GREF) had undertaken an initial survey of public attitudes towards offshore wind energy. Although the sample population was small, the results were generally positive. It was recommended that further public attitude surveys were conducted in association with a Landscape and Visual Impact Assessment. The noise impact of the development was not seen to be a constraint due to its distance from shore.

There were also concerns that the turbines could obstruct the migration routes of sea birds and affect their feeding behaviours; it was stated that further study of this was required. Additionally, a number of potential impacts on commercial and leisure fisheries were identified, due to the need for an exclusion zone. However, this would represent less than 1% of the available sea area and there is evidence that an exclusion zone associated with a wind turbine array could act as a protected area and nursery to encourage recovery of stocks.

Another preliminary feasibility study was conducted in 2016, this time focusing solely on a 30MW (5 x 6 MW turbines) offshore wind project. The study identified three potential development sites: two off the Northeast coast of the island and an offshore floating development off the Northwest coast (Figure 2-2). The latter emerged as the preferred site because it was located in relatively deep water which was most suited to the new floating wind turbine structures. However, this was the costliest option- although costs are expected to fall dramatically as the floating wind industry matures. The lowest cost site was likely to be in the shallow waters off the North Coast (or any coastal site). However, the near shore location had a very high visual impact and other socio-economic impacts (as outlined in the previous feasibility study), so may not have been accepted by the public.

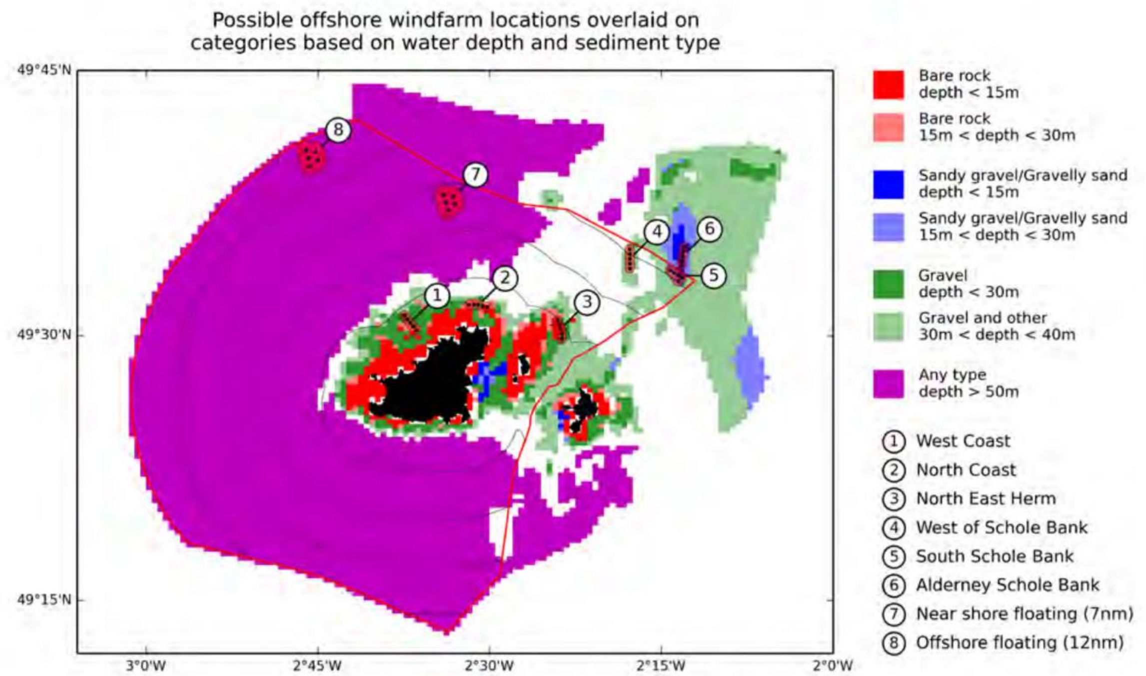

Figure 2-2: Selected sites for offshore wind, Guernsey

The conclusion of the study was that i) there are a range of technically feasible options to develop an offshore wind project off Guernsey and ii) developing a 30MW offshore wind project would achieve the fundamental objectives associated with energy diversification, namely: security; price certainty; sustainability and lower carbon. However, this would come at a price higher than the current energy system on the island. To mitigate this, the authors recommend that the majority of the project is funded by the States of Guernsey to secure the lowest-cost finance. They do, however, set out several project sponsor options, i.e.: public, community, GEL, and developer ownership.

The authors acknowledge that some stakeholder engagement is required which can then be fed back to developers alongside the engineering studies to influence the concept and design.

The University of Exeter has also conducted research (in 2012 and 2013) (University of Exeter, 2012) into the potential for a 30MW offshore wind project and draw similar conclusions to the above studies. Their research suggests that the project could be developed in conjunction with a French offshore wind farm. Additionally, they investigated the potential for a 105 MW (14 turbine) offshore wind development, but state that detailed consultation with Guernsey airport is required to negotiate radar mitigation and there is a need to deploy offshore met mast or floating LIDAR to accurately record onsite wind speeds. They have also explored options for harnessing tidal energy and state that there is 'excellent tidal stream resource'. In 2012/13 a site was located north-west of Guernsey with potential for a 28MW array yielding approximately 40 GWh/yr. It was recommended that further study was undertaken with more accurate data from actual wave buoys to obtain truly representative data.

2.1.3 Consultation

Although there is no documentation of any public consultation conducted in direct relation to the projects mentioned above, in some of their communications, the States of Guernsey refer to a questionnaire survey conducted in 2015 on public acceptability of offshore wind and tidal energy on the island (Wiersma, 2015). The survey asked participants' views on three hypothetical offshore wind and tidal energy projects:

- A 10-turbine nearshore wind project, producing electricity only for Guernsey, owned by the States, and leading to an increase in electricity prices of 5-10%
- A 100-300-turbine wind project, further offshore, mainly for export, likely to be owned by an external investor, and increasing electricity prices by 10-20%
- A 25-turbine tidal energy farm, using wholly submerged tidal turbines, only producing electricity for Guernsey, owned by the States, and increasing electricity prices by 20-30%

Overall, tidal energy emerged as the most supported renewable energy technology in Guernsey (86% of respondents were in support), before solar and wave energy (81%; 80%) and ahead of offshore wind energy (58%). Similarly, while 23% objected to the principle of offshore wind development in Guernsey, only 2-4% objected to development of the other three technologies. Respondents broadly agreed that Guernsey should make use of its natural resources to generate electricity locally (89% agreed), while also commonly indicating that Guernsey needs to become more self-sufficient for its electricity (77% agreed; 10% disagreed) and rely less on other places for its electricity (71% agreed). This illustrates that renewable energy development that utilises local natural resources, enhancing independence and reducing vulnerability, was seen as something that is desirable and acceptable in principle- in essence, 'localness' is important.

Of the three projects described in the questionnaire, the tidal energy farm was the most popular (62% would support; 15% would object), before the small wind farm (51%; 29%), and the large wind farm (33%; 46%). This reflects a common trend whereby there is more public support for technologies in principle than for specific projects. Support for developments also varied by location, with some being deemed more acceptable than others. Some parts of the west coast and the Big Russel near Herm are prime examples of areas that were less widely supported as sites for renewable energy development. This was even the case for tidal energy which used technology that is entirely submerged and therefore not immediately and obviously visible. The author comments: 'This suggests that visual impact is not the only concern when it comes to protecting the most treasured places around the island – people may worry about wildlife or simply wish to keep an area as natural as possible' (p.4).

2.1.4 Summary

Following the release of the above studies, the States of Guernsey Renewable Energy Team (RET) released a strategy document in 2017 which stated they would be turning their focus to 'small scale local developments for local consumption (e.g. solar)' up to 2020. Post 2020, focus would turn to 'larger scale local developments with potential for some export if desired (e.g. offshore wind, tidal, wave).' At present, none of the developments described above have come to fruition, and, despite the above studies providing some promising information, the 2017 document concluded that Guernsey is not well suited to act as a location for advanced trial arrays and it is unlikely that tidal and wave energy will be commercially viable prior to the mid-2020s. However, monitoring of other international tidal and wave projects will continue to see if they demonstrate feasibility by 2025, so there is a chance some development in these areas may take place in the future. The document stated that a 20 to 30MW offshore wind farm *could* be under development in the 2020s and, in the meantime, earlier work would be expanded upon to better understand its feasibility and acceptability.

The RET also set an objective for effective communication as part of their 2017 strategy. They are aiming for ongoing engagement with island residents 'through a well-developed communications strategy, informed stories and balanced reality' to raise awareness and understanding with regards to the local and global position of renewable energy. They are also aiming to engage young people through schools via a schools awareness programme and increase understanding of cable/solar/wind/tide/wave technologies. Additionally, States members and energy policy makers, local businesses and other key stakeholders will be engaged as part of the communication strategy.

Guernsey's Hydrocarbon Programme Board also meet quarterly to discuss interim and long-term solutions for the continuation of the hydrocarbon supply to the island as the 'Not always afloat but safely aground' (NAABSA) vessels that are currently used to import hydrocarbon fuels have limited lifespans. The States have already stated that there will be a continued need for hydrocarbons beyond 2050, highlighting that any shift to renewables will be a gradual one.

2.2 Alderney/Aurigny

2.2.1 Energy Context

Alderney (Aurigny in French) is the northernmost of the inhabited Channel Islands and forms part of the Bailiwick of Guernsey. In March 2018, the island had a population of 2,019, a large proportion of whom live in the town of St Anne. The remainder of Alderney is predominantly rural in character. Alderney faces a range of energy challenges:

- reducing reliance on fossil fuels
- improving energy security
- developing new strategies and approaches towards the generation and consumption of energy
- reducing the cost of energy for its residents and businesses and
- meeting its wider environmental responsibilities in relation to climate change and the reduction of carbon and other greenhouse gas emissions (States of Alderney, 2018).

Alderney is highly reliant upon imported oil as an energy source, including for the generation of electricity. This means prices are subject to global market fluctuations which makes electricity expensive and there is limited expectation of being able to reduce the costs to consumers. This is also unsustainable in terms of environmental impacts. To compound this, Alderney is reliant on an ageing shipping fleet which is responsible for transporting and importing the required fuels. This fleet will need replacement within the coming decade, which will likely lead to further increased energy costs in the future.

Alderney's grid is owned and operated by Alderney Electricity Ltd (AEL) who have been upgrading the grid to bring it up to current safety and switching standards. It is capable of distributing up to 5 MW. However, it is not able to receive domestic renewable energy feeds and is unlikely to be able to do so until further upgrades are completed. Electricity generation on the island is produced via 1-4 500 kW diesel generators with consumers paying approximately 44 pence per unit (more than double the UK average). Households on the island predominantly use kerosene oil for heating and, as of 2022, pay 78.73 pence per litre (approximately 30 pence per litre more than the UK average) (Catapult Offshore Renewable Energy Development Services Ltd, 2022).

The States of Alderney (SoA) Energy Team has identified three key objectives for Alderney's future energy system:

1. Minimising the cost of energy
2. Reducing or mitigating energy supply risks
3. Minimising or eliminating the use of carbon emitting energy sources

2.2.2 Renewable energy developments

In 2015, The Energy Saving Trust was invited to complete a study supporting the Development of the States of Alderney Island Energy Policy as part of the development of the overall Alderney Strategic Plan (Energy Saving Trust, 2015). Its study explored energy demand issues and energy supply, then gave recommendations for the future; these were provided for the short- (0-5 years), medium- (5-10 years) and long-term (10-20 years), and are summarised in Table 2-1:

Table 2-1: Energy Saving Trust study options, Alderney

Short-term	Medium-term	Long-term
Heating demand reduction programme	Community microgeneration	UK Government Electricity Market Reform
Review of current electricity supply	Establishing an Alderney Energy Service Company	Additional community renewables capacity
Energy storage	Consider viability of phased mothballing/decommissioning of existing oil generators	Integration with large-scale renewables and links to France and England
Phased grid upgrades		

Although the majority of options listed above are more small-scale, some medium to large-scale renewable energy options were explored. The study concluded that a single or small cluster of commercial scale wind turbines could make a substantial contribution to, or even meet all of, the island's energy demands (including heat and electricity). However, a number of constraints were identified, including:

- Nature conservation; in particular avoiding bird strikes from the native seabird population
- Public perception; there was likely to be public opposition to wind power due to visual and other impacts
- Identifying a viable site with appropriate spacing from dwellings
- Ensuring no negative impact on the airport (such as impeding radar signals)
- Ensuring adequate energy storage capacity is in place and upgrading of the electricity network to connect the wind energy system

At the time of the study, Alderney Commission for Renewable Energy was carrying out a Regional Environmental Assessment of Renewable Energy, which included reviewing the potential impact of wind energy on the native bird population. It was suggested that the results of this assessment could be used to inform future decision-making around potential wind energy developments, as well as informing coverage in any public consultation on energy. The researchers concluded that if larger scale wind turbines were not possible due to the constraints outlined above, there may be opportunities to deploy smaller wind turbines alongside community PV.

The study also explored options for anaerobic digestion of organic waste (AD). It found that Alderney has a number of sources of organic waste that could be used as feedstock, including:

- Animal and process waste from a dairy farm
- Animal waste from pig farms (a total of around 250 animals)
- Green and kitchen waste from the island's residents (green waste was estimated at 250 tonnes per year, but this included woody material which is unsuitable as a feedstock)
- Human waste from the 1,900 residents (part of which is treated while the rest is dumped as raw sewage)

The study concluded that, although a more detailed review of the quantity of waste from each of these sources was needed to determine the appropriate scale of digestion for Alderney, it was likely that only a small "farm-scale" biodigester would be possible. However, such a system could still make a meaningful contribution to electricity and heat generation on the island as well as management of organic waste. Siting was not considered at this stage.

Additionally, the study explored options for solar photovoltaics (PV) and suggested that one area of the island's electricity generation network could be upgraded and PV deployment focused in that area. Larger arrays could be installed as a community project, with residents and/or local businesses being offered the opportunity to buy-in through share ownership in a larger project or through direct ownership. This would enable investment in PV from individuals and organisations that were unable to install PV on their own buildings. The authors concluded that approximately 745 kW of PV would provide around 10% of the island's annual electricity demand per year. The capital cost of a series of 100-300 kW arrays adding up to 745 kW total generation was estimated to be between £820,000 and £900,000 in 2015, but the authors note that the cost could be spread by building capacity steadily with a number of smaller installations and allowing investment from local residents and businesses. The avoided electricity cost (at 31p/kWh) would be over £220,000 per year.

The study also mentions tidal energy and refers to the FAB Project, describing it as 'a ground-breaking, strategically important renewable scheme providing substantial amounts of electricity to France and England as well as providing the island's electricity supply'. The FAB Project aimed to build an electrical interconnector underwater and underground between France and Great Britain via the island of Alderney. In 2022 the route was adjusted so that it would no longer make landfall in Alderney. More details about this development are discussed below.

In 2022, Offshore Renewable Energy Catapult Development Services Limited (ODSL) was commissioned by The States of Alderney Policy and Finance Committee's Energy Team to complete an island energy systems scoping study (Catapult Offshore Renewable Energy Development Services Ltd, 2022). The aim of this was to establish the 'potential hybrid 'mix' of power supply and storage technologies which exist or are being developed, and that could meet the island's strategic energy system objectives' (p. v). Again, short-, medium- and long-term scenarios were provided.

In the short-term, the study concluded that the installation of a single refurbished onshore wind turbine would be the most suitable option. ODSL's modelling indicated that it could displace approximately 700,000 litres of diesel per year, saving almost £400,000 in diesel fuel costs. ODSL suggested that this could be funded through a competitive tender, whereby Alderney offered to fund the project via an agreed power purchase agreement- enabled by the fuel cost saving expected by the installation. The turbine would be owned and operated by a private developer, which would also fund the initial capital cost and ongoing maintenance. The researchers estimated that approximately £200,000 of the fuel cost savings could be retained to use for other initiatives or to offset consumer bills.

Another finding noted in both the Energy Saving Trust study and ODSL's study was that the introduction of domestic renewable heat production would be challenging due to grid constraints and high electricity costs. Both studies suggest that Alderney's housing stock should be surveyed to gain a better understanding of the current context of home insulation and heating systems and, based on these findings, an appropriate insulation/heating programme could be delivered. ODSL suggest that, to do this cost effectively for all households, The States of Alderney could create a community energy group. This could support local residents to identify potential home energy savings and perhaps even co-ordinate bulk procurement of products and installers to maximise cost efficiency.

In the medium-term, the ODSL study recommended a mix of onshore wind and solar PV combined with battery storage; it states that the optimal mix of solar and onshore wind appeared to be approximately 50:50 with a suggested renewable capacity of 3-4 MW. This could: 'reduce diesel fuel consumption by as much as 82%; enable the grid to be operated with only a single 500 kW diesel generator; and enable the current AEL generator engine fleet to be halved'. Additionally, up to 3 GW of tidal stream resource was identified in Alderney's territorial waters; however, without an interconnector and subsequent route to market, as well as the ability to pay a higher than market price feed-in tariff for still developing technologies, it was concluded that it was unlikely this location would be attractive to developers in the short- and medium-term.

In the long-term, the study suggested that focus could be shifted to hydrogen production. It concluded that this could play an important role in helping Alderney to unlock its tidal stream resource and potentially remove its reliance on fossil fuels for the heating system. Alderney's location next to the world's busiest shipping lane would also be beneficial to this shift. The study recommended that progress and development of hydrogen options should be monitored and evaluated in the future.

As stated previously, the FAB project was also being planned in Alderney. The project is being jointly developed by RTE (Réseau de Transport d'Electricité) and FAB Link Limited. Its original aim was to build an electrical interconnector underwater and underground between France and Great Britain via the island of Alderney. It would have allowed a maximum transmission of 1400 MW, and it was anticipated that this would contribute to increasing the capacity of energy trade between the two countries. The original plans for the project would also have enabled tidal power generated in Alderney's territorial waters to be exported to European markets. It was anticipated that Alderney would be able to receive less expensive energy from Europe via FAB Link (FAB (France-Alderney-Britain), 2022a).

The FAB project's current shareholders are Transmission Investment and Alderney Renewable Energy (ARE) and it has received funding from the European Commission through the Connecting Europe Facility. It has also been recognised as a "Project of Common Interest" by the European Union following support received from the French and UK governments. The project was put on hold in 2017 due to Brexit; however, in March 2022 an agreement was entered into by FAB Link Limited and RTE to review and reassess the project. They are aiming to resume the project and have set a new schedule for completion- a provisional target for Commercial Operation has been set for the end of 2028.

The FAB project has been controversial. In 2016 a demonstration and several public meetings were held by islanders who felt that more independent information and public engagement was needed about the development (ITV News, 2016). There were also concerns the project could affect graves on the island from the Second World War (Alderney News, 2021). In 2019, the project was at the centre of a multi-million pound ‘corruption’ investigation, with a consortium of residents making allegations of financial impropriety. In return for allowing infrastructure on its shores, it was reported that Alderney would receive £70,000 per year in compensation. However, the group of residents alleged that private individuals were set to benefit from the project by millions of pounds (Bailiwick Express Guersney Edition, 2021). In March of this year, the Chair of the island's Policy and Finance Committee expressed scepticism about the benefits the project would offer the island and concerns that the FAB Link may not allow Alderney to benefit from exporting future tidal power generated in its waters. He stated: ‘there is no technology that allows you to plug into DC cables, so you’ll need a double converter set and a transformer set in the middle of the island’ (Bailiwick Express Guernsey Edition, 2022).

In July 2022, the partners of the project made the decision to alter the route of the cables so they no longer need to make landfall on Alderney. They claimed this was due to ‘ongoing uncertainties around the need for Alderney to export electricity’. It also means fewer permissions, approvals and licenses are required and it will make the project more cost and time efficient (FAB (France-Alderney-Britain), 2022b).

There has also been much interest in the development of a tidal project in The Race of Alderney (also known as *Raz Blanchard* in French), which is a well-known location for strong tidal currents. In the early 2000s, the Alderney Commission for Renewable Energy (ACRE) commissioned AEA to prepare a strategic assessment of the impact of tidal and/or wave energy development within the territorial waters on the island and its community (AEA Group, no date). It explored two hypothetical tidal developments – one of 1GW and another of 3GW. The study found that there was sufficient power for a tidal development, but that wave power density was too low for the technology used to operate profitably. It noted that revenue to the States of Alderney from tariff levied could be between £0.93 million and £1.87 million from a 1GW array depending on the amount of electricity generated. A 3GW array could yield between £2.8 million and £5.6 million. An estimated 6,149 tonnes of CO2 emissions from the use of fuel oil generated electricity could be saved if tidal energy replaced the island’s existing power plant.

The study identified potential environmental impacts from the installation and later operation of tidal stream devices and cable laying. These included disturbance to sediment, noise and vibration, adverse effects to fish caused by EMF, and collision risk with marine mammals. It was noted that potential changes in the tidal currents in the vicinity of the device could change sediment dynamics and the local benthic ecology and that there could also be indirect effects on sea birds, if for example, their prey was disturbed. There was the possibility that some environmental impacts may be limited, however. For example, the impact of sediment disturbance during cable laying could be minimised by the rapid disperse of the sediment. Additionally, the use of gravity-based devices such as OpenHydro’s open centred turbine would not require drilling to secure them to the sea floor, limiting the resultant noise disturbance.

More recently, Simec Atlantis Energy has agreed a joint venture with the Development Agency for Normandy (AD Normandie Développement) for the Normandie Hydrolienne project, which will deploy up to 2GW of power from the Alderney Race. It is anticipated that the initial 7-20MW site will pave the way for a broader project, which will provide the island of Alderney with access to the wider energy market, enabling the island to decarbonise and reduce its power costs, whilst building strong supply chain benefits in Cherbourg and across Normandy (SAE, 2021).

2.2.3 Consultation

The FAB project team conducted pre-application consultation on a draft Application File in the hope that subsequent applications would be 'better developed and better understood by the public' (FAB Link Ltd, 2016). It also wanted to give local stakeholders the opportunity to influence project design, particularly the alignment of the onshore and offshore cable routes in the UK and Alderney, and to give feedback on the proposed installation methods, environmental effects and mitigation measures.

Regulations of the European Parliament and the Council of the European Union (TEN-E Regulation (EUR Lex, 2013)) require a Concept for Public Participation (CPP) to be prepared by the promoters of Projects of Common Interest (PCIs) for submission to the relevant national authorities. FAB Link Ltd issued a CPP which set out the scope of the preapplication consultation and some principles for public participation. These were:

i) The stakeholders affected by the FAB Project would be extensively informed and consulted.

ii) Consultations were to be undertaken at the earliest stage where sufficient information was available to adequately inform the stakeholder(s) in question and at a time where the project was still at a formative stage and permit applications had not been submitted.

iii) The developers would use the information and representations provided through these consultations to help identify the most suitable sites and routes for the project.

iv) Within two months of the commencement of public consultation in either the UK or France, the developers were to establish a vehicle for cross-channel public consultation through a shared website. This website would provide information to all stakeholders, including interested members of the public, along with a mechanism to provide feedback on the project proposals. This would be in addition to other mechanisms of public consultation.

The draft Application File and other relevant documents were made available to the public online and physically at two locations in Alderney from 25th July to 5th September 2016. Letters were sent out to households, businesses and key stakeholders in the UK and Alderney inviting them to take part in the consultation. A series of public meetings was also held in both locations. These described the project and gave attendees the opportunity to ask questions, offer advice and register comments. One of the events in Alderney was held at a slightly later time to give second homeowners more of an opportunity to attend. However, some stakeholders felt that this and the timing of the consultation during the peak tourist season was inappropriate and prevented some individuals from taking part. Questionnaires were distributed out to visitors at events and they were given the choice as to whether to complete them immediately or to post them at a later date. 277 questionnaires were completed in total; 352 people were recorded as having visited the three events in the UK and 290 people were recorded as having attended the single event in Alderney. A communications company based in East Devon (KOR Communications) acted as a point of contact for members of the public throughout the UK consultation period, while the FAB Project team acted as a point of contact for members of the public in Alderney.

In their consultation report, the FAB project team detailed the comments made by the public, their response and any resultant changes made to the proposal, application documents and/or plans. Local residents in both the UK and Alderney raised a number of concerns; Table 2-2 details some of those points raised by Alderney residents.

Table 2-2: Responses to FAB Project consultation

Local resident responses to draft application	FAB Link Ltd response
Requests made for the FAB Link project to include the proposed converter station that would be required for the future Race Tidal project.	The FAB Link project does not require a converter station on Alderney and any converter station would be part of the Race Tidal project application.
Clarification sought on the specification and feasibility of utilising the spare bandwidth of the proposed FAB Link fibre optic capacity for the island to improve broadband operation.	Refer to sections of documents which detail the nature and potential configuration options of the fibre optic cables, suggesting these details were already covered.
Assurances sought that the cables underneath the beaches/landfalls would be safe, with regards to the level of electric and magnetic fields (EMF).	Refer to Chapter 6 (Air Quality and Health) of the planning application which states that the levels of EMFs from the proposed development would be well below the guideline public exposure reference levels set to protect health.
Concerns raised regarding potential security risk posed by underground cables on Alderney.	FAB commissioned a specialist risk management consultancy to provide an objective threat assessment in line with UK Government and Security Service methodology and protocols- The FAB Link Interconnector was not considered to be classified as Critical National Infrastructure.
Potential for disruption to the World War Two graves of slave workers, mostly Jews and Russians.	The cable route was selected to avoid the known extent of the cemetery and is also outside a proposed 'buffer zone' which defines a no-excavation area. It is proposed that the construction work is monitored by suitably qualified and experienced archaeologists, with additional archaeological resources available to be used if required.

In addition, some residents questioned the value of the project for Alderney and the reasons for routing the cable across the island besides the opportunity to harness tidal energy in the future. FAB Link Ltd responded by reiterating the reasons for running the cables via Alderney which were cited in their application and also stated that additional information would be incorporated into the offshore and onshore environmental reports. Some residents sought clarification on the programme of construction activities; again, FAB Link Ltd referred them to the six-month time plan set out in their application and also stated that the project description would be amended to provide clearer assumptions for the construction programme.

Some local residents raised concerns about the consultation process; specifically that consultations had not been undertaken in compliance with the Concept for Public Participation, that there was not sufficient information available to review, that it had been undertaken too late to influence proposals and that different perspectives were not fully considered. FAB Link Ltd were direct in their response and strongly stated that the consultation had taken place with all stakeholders in the manner described in the CPP. No changes were made to the consultation process, nor were any additional consultation actions taken in response to this concern.

A number of issues were also raised by various local stakeholders. In particular, The Alderney Wildlife Trust and The Alderney Society raised concerns that the project application did not meet UK standards as they identified a number of inconsistencies between the onshore and offshore approaches and suggested that the two elements of the report structure be reconciled to ensure that they have followed the same basic requirements for both jurisdictions. They also requested further information and/or clarity in the following areas:

- The investigation of alternative routes within the Alderney terrestrial onshore and marine near-shore elements of the proposal
- The alternatives to simple excavation through the beach area if bedrock is too close to the surface
- The details of hydrological assessment through the Longis Common section of the cable route

They also identified a number of discrepancies in the documents that were shared. As a result and prior to the decision not to route the FAB Link through Alderney, FAB Link Ltd amended plans for the underground cable route.

The concerns raised by local residents and stakeholders were largely about protecting valued assets, whether that be the local environment or historical artefacts. They were also related to ensuring that it was not only the developers who received benefits from the project, and that these were gained by local people as well. Additionally, concerns were raised around some elements of the consultation process and wanting to ensure it was just, timely and fair. FAB Link Ltd's responses to these concerns were largely about clarifying things that had already been explained in the application documents- although they stated that some sections would be edited to ensure clarity. Besides the one change made to the cable routing, there was not strong evidence of plans being significantly adapted to ease the publics' concerns. This raises some questions about the flexibility of the consultation process and whether there was much scope to drastically amend the original plans for the project.

As the Energy Saving Trust and ODSL studies are both feasibility analyses rather than definitive proposals or applications, there are no statutory requirements for consultation. However, an informal "Alderney-style" consultation was reported to have taken place on elements of the short- and medium-term options suggested by ODSL to gauge public sentiment. The indication is that there was no large-scale opposition to the potential wind and solar developments suggested in the report.

2.2.4 Summary

Following ODSL's 2022 study, Alderney's Energy Group began exploring options to install some refurbished wind turbines on the island (States of Alderney Office of the President, 2022). Expressions of interest are planned to be issued to wind turbine suppliers to confirm the cost benefits, suitable siting locations are going to be investigated, and visual and environmental impacts need to be assessed. The Energy Group also note that consultation with the community on this option is required. The Group has suggested that although solar arrays will not have a large impact on overall costs, they require a relatively low investment cost and their use will contribute to a reduction in household costs and the island's carbon footprint. This is an area which is being advanced by AEL. It is also likely that some form of storage will be required when introducing renewable energy supplies to the AEL grid. Additionally, the Groups is keen that improved insulation, particularly for older houses, is explored to offset heating oil use. These developments would contribute to achieving the Energy Team's three key objectives with regard to the island's electrical system.

2.3 Ushant/Ouessant

2.3.1 Energy Context

Ushant (*Ouessant* in French) is an island community located off the Northwest coast of Brittany in the Iroise Sea, at the southern end of the Western entrance to the English Channel/Manche. The island's electricity demand is met by supply from five diesel generators; one 500kW unit and four 1.2MW units which are controlled to match the electricity demand on the island grid. The island is an electrically isolated system; there is no interconnector cable from Ushant to the mainland or to other inhabited islands. In 2017, EDF installed a 1MW, 0.5 MWh Lithium-Ion battery on the island to improve the efficiency of the generators by providing stored energy to assist in meeting short term spikes in demand and reducing the need to start another generator (Hardwick *et al.*, 2018).

Electricity costs in Ushant are high and are forecast to increase further. The marginal cost of electricity production is expected to be €252/MWh by 2032, with the overall cost of supply anticipated to be as high as €400/MWh. However, in 2018, electricity prices for residents remained the same as those experienced by mainland consumers, with standard domestic tariffs set at around €150/MWh depending on consumption. The difference was made up by a general levy or a surcharge on energy suppliers that covered the geographical tariff equalisation, as well as renewable energy subsidies called the *Contribution au Service Public* *de l'Electricité* (CSPE) or the Contribution to Public Electricity Service (Fitch-Roy and Connor, 2018).

Ushant is a publicly administered commune, meaning that potentially controversial changes to its energy system are a matter for co-operative decision-making. The electricity network and present generation equipment supplying homes and businesses on Ushant are owned and operated by EDF and its distribution subsidiary, Enedis. The state-owned firm is therefore a major stakeholder in any changes to the system, but under French law it is possible for independent generators and prosumers to connect to, and provide energy through, the existing network (T1.1.2).

In 2015, Ushant joined the SMILEGOV project through its membership in *l'Association Les Îles du Ponant* (AIP) and subsequently in the European Small Islands Federation (ESIN). The objectives of SMILEGOV, which is funded by the European Commission, are to establish a clear picture of the island's energy consumption, its emissions, and how it is it supplied with energy. This information will then be used to help formulate an action plan for a more sustainable future energy system. As a result, detailed information is available on Ushant's energy consumption (Pleijel and Bredin, 2015).

The island set an aim to have 70% of electrical generation from 36 renewable technologies by 2020 and 100% renewable generation by 2030 (T1.1.1). Environmental protections in place on the island and Ushant's reliance on the summer tourist industry mean that some renewable technologies may not be suitable for widespread deployment on or around the island. Additionally, Ushant has an uneasy history of attempts to install renewable energy, particularly onshore wind. In the 1980s, two attempts to exploit the island's wind resource were disrupted by technical problems, resulting in two wind turbine developments being dismantled. However, there have been some more recent successes.

In 2015, a prototype 1MW tidal stream energy conversion device manufactured by Sabella was installed in 55m of water in the Fromveur Passage two kilometres from Ushant. By the end of the year, the device was able to contribute up to 50kW of power to the Ushant electricity system, producing a total of 50MWh by the end of the testing campaign, a little over a year later (Sabella, 2015; 2016a). The device was removed to shore in Brest in July 2016 and a second testing campaign was planned (Sabella, 2016b). In addition, a 54kWp solar PV array was installed on the roof of a municipally owned sports centre by SDEF (the domain network operator for the region) in 2017; however, its impact on the island's grid system is not clear.

Energy efficiency in Ushant has improved in recent years as the island's administration and SDF have implemented a number of energy saving measures:

- The distribution of low energy LED light bulbs to replace older less efficient lighting; 5,748 bulbs have been distributed, saving an estimated 264MWh every year.
- The renovation of street lighting throughout the island with energy efficient LEDs; 119 LEDs have been installed, saving an estimated 19.8MWh per year.

- A scheme to enable islanders to exchange older high-energy refrigerators with new and efficient models. 138 devices have been exchanged, saving an estimated 34.5MWh per year.

It has been suggested that these actions have resulted in a 19% reduction in electricity consumption (T1.4).

2.3.2 Renewable energy developments

In 2018, team members from the Intelligent Community Energy (ICE) project conducted resource assessments for three renewable generation technologies: solar PV, wind and tidal stream. As mentioned previously, a 54kWp solar PV array was installed on the roof of the sports centre in 2017 and further options for solar were explored. The study suggested that there was sufficient resource to provide a large quantity of electricity via solar to the island during the summer months. However, the demand for energy was greatest during the winter when solar is limited in the amount of energy it can produce. Additionally, the daily demand profile in winter did not fit with solar generation as the largest usage peaks occurred after dark. This limitation meant that other sources of generation would always be required, even with an extensive expansion of PV.

Additionally, it was likely that the size of a PV installation would be limited by Ushant's electrical supply infrastructure; in France, this was typically 6, 9 or 12kW for domestic properties (Fournisseurs Electricite, 2018). Properties would not be able to export more power than the maximum rated value of their grid connection. Larger PV arrays could be installed on commercial buildings and larger domestic properties, however, provided there was a higher rated three-phase electrical connection.

In terms of ground-mounted solar PV, impact assessments and public enquiries are required for installations larger than 250kW. The ICE study states that: 'coastal and landscape protection legislation, the use of land for livestock grazing and Ushant's status as part of the Regional Natural Park of Armorique mean that sites are somewhat limited and local resistance to such developments can be expected. For this reason, small ground-mounted or rooftop options should be explored and exploited to the greatest extent possible before considering commercial-scale ground mounted PV, despite the possible cost and performance benefits of these systems'.

At the time of the study, several sites were also being considered for development of rooftop solar panels by SDEF, including a youth hostel and the town hall. GIS mapping showed that, in addition to public buildings, there were over 1,000 other rooftops which potentially had suitable space and orientation to make solar PV possible. If these sites were exploited, then a large amount of the island's summer demand could be met.

The study also investigated the potential for wind generation. It found that wind energy generation on Ushant was sufficient to achieve the 70% (2020) and 100% (2030) renewable targets if combined with battery storage and further solar and/or tidal generation. It modelled energy generation using three commercially available and commonly deployed wind turbines of differing sizes:

- A 300kW rated turbine with a rotor diameter of 33m, deployed on a tower 35-47m high
- An 800kW rated turbine with a rotor diameter of 53m, installed at a hub height of 60-73m
- A 2MW turbine with a diameter of 90m, installed between 80- 105m about the ground.

It concluded that a single wind turbine would be sufficient to fulfil all the island's electrical needs. Although there was a large seasonal disparity in electrical demand and 60% of electrical use occurring in the winter months (October – March), wind generation was distributed in almost the same seasonal proportions.

The study did not identify a specific site for the installation of a wind energy project. However, it noted that access for construction vehicles would need to be considered, as would geological terrain and the need for a suitable cable route to the island's electrical grid. Planning consent would be needed and local issues would also need to be overcome before any development could be progressed. It was noted that a negative opinion of wind technology had persisted within the community since the failed project in the 1980s. This was highlighted when a proposal to install a meteorological mast, planned as part of a resource measurement campaign, was refused in 2018. Planning law on Ushant would also make installation very challenging, given the island's geographical constraints and distinctive natural environment. Although it may have been feasible from a legal perspective to build new onshore wind, local and non-government organisation opposition to development was likely to mean that there was little real prospect of pursuing wind energy in the immediate future.

Finally, the study explored tidal characteristics around the island to assess the potential for tidal generation. The model output for both tidal level and tidal current at the sites examined near Ushant concurred with observed and predicted values. The study noted that a Sabella D10 turbine (like the one deployed in 2015) could provide approximately 15% of the island's electrical requirements. During periods of generation surplus, the entire island's electrical requirements could be met and, where the turbine was generating more power than the island's demand, the output could be used to charge energy storage systems or discarded. During periods of generation deficit, other sources of generation would be required to supply any unmet demand.

The sites at the Fromveur Passage, where the Sabella D10 project was deployed in 2015, were found to be particularly well-suited to tidal current energy exploitation. The large tidal current in this location makes shipping dangerous, so there were no specific constraints related to marine traffic. A number of environmental constraints were identified, however (these are summarised in the figure below), as Ushant is situated within a Marine Nature Park and the region is a Marine Protected Area under the Oslo-Paris convention. Some areas are also listed under the European Habitats and Birds directives and as a UNESCO biosphere reserve.

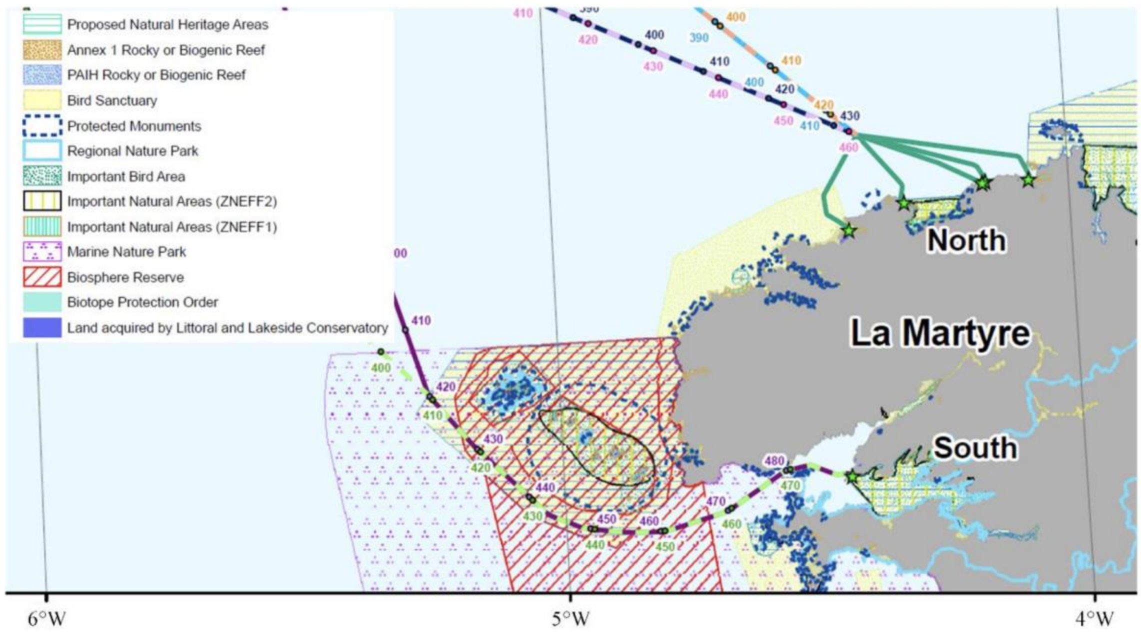

Figure 2-3: Environmental designations and constraints at the Fromveur Passage, Ushant

Before a tidal project can proceed, an environmental permit would need to be issued by the French Government and permission to occupy the seabed would have to be obtained from the local prefecture. Obtaining an environmental permit would require an environmental impact assessment (EIA) that included s statutory requirement to hold an element of public consultation. The general feeling was that the popularity of tidal energy among the local community and limited resistance from local fishers would mean that a future permit would be likely to be granted.

The study concluded that one of the main challenges to achieving 100% renewable generation on Ushant would be finding a way to align the electrical generation periods for renewable technologies with peak demand times. Most of the renewable technologies discussed in the report had intermittent generation periods that did not match the times of peak consumption. The energy system would require one or more of the following in order to overcome this challenge:

1. Sufficient reserve generation from on-demand sources (e.g. biomass generator) to cover peak loads.
2. Sufficient energy storage installed to enable energy to be delivered at non-generating times.
3. Further energy efficiency measures implemented and changes in the behaviour of consumers to spread load in order to better correlate with times of generation.

2.3.3 Consultation

As mentioned previously, Ushant is situated within the Parc Naturel Marin d'Iroise (Iroise Marine Nature Park), the aim of which is to protect both wildlife and cultural heritage, and to develop marine activities such as fisheries and seaweed farming in a sustainable way.

The Marine Nature Park authorities and the wider public were accepting of the Sabella tidal installation in 2015 primarily due to a wide-reaching communication and consultation strategy among public bodies, sea users, island residents and the general public (T1.4).

Though their engagement with the ICE project, Ushant residents have made widespread calls for a transition to a more sustainable energy system and some have argued that the project aligns well with these calls (Island Innovation, 2020). As far back as 2000, residents and the mayor were calling for renewable energy developments on the island. However, Ushant remained 'locked into' its fossil fuel dependent system at the time as a result of the immaturity and cost of renewable energy technologies. Additionally, a renewable energy transition was not on EDF's agenda and they had not yet developed a climate change mitigation agenda. The fact that local legislation designated a large part of the island as a protected landscape area and prohibited developments within 100 metres of the shore also acted as a barrier to the development of renewables. Even in later years when technological advances made a sustainable energy transition more technically and economically feasible, the political agenda remained focused on opportunities for larger developments at a regional and national level and a localised energy transition was not prioritised by decision makers.

The ICE project has conducted some public consultation with local residents and stakeholders at different stages of the project. It has invited expressions of interest from the public and invited those who have shown an interest to consult around the smart grid network. It has used a range of media to inform locals about its process and individuals were able to choose the form and duration of participation which most suited them. It has disseminated information leaflets and organised multiple public workshops and meetings to share up to date information about the project. It also organised a flagship interactive exhibition to explore the island's sustainable energy transition. Nevertheless, ICE has not so far managed to empower locals to the extent that it hoped. Much of the consultation could be described as taking a tokenistic approach because the Ushant public have not had opportunities to affect project outcomes and engagement activities have concentrated mainly on information provisions. Even though local residents helped to instigate momentum for a sustainable energy transition, they have had limited control over the directions this has taken or have not been part of a delegated partnership. A 'decide-announce-defend' approach has so far tended to dominate.

ICE also encountered social barriers to participation, as some locals did not wish to participate in ICE events. This was because they did not have the time, expertise, know-how or interest to attend. The organisation of multiple engagement events and the prolonged 20-year transition process appears to have contributed to participation overload and fatigue among some residents. Additionally, failed early attempts by some residents to initiate a sustainable energy transition contributed to a feeling that their participation was not regarded as important or valued.

2.3.4 Summary

Despite these drawbacks, the aims of the ICE project do align with local interests and most of the public are supportive of the technologies that have been introduced. Reflecting on these experiences, ICE project team members drew the following conclusions about the role of community consultation in sustainable energy transitions on islands. They argued that complete energy democratisation is an important goal to strive for but might not be achievable in practice and that 'sub-optimal' forms of participation may be inevitable to strike a balance between (i) enabling members of island communities to voice opinions and provide meaningful input into decision-making and (ii) ensuring energy transition strategies are technically and economically feasible and proceed in a timely fashion. Securing effective community participation and community mandates for renewable energy transitions requires the adoption of context-sensitive techniques that prioritise understanding and reflecting community needs and concerns in the types, sizes and locations of renewable energy projects developed rather than the use of standard 'best practice' guidelines in different island contexts. Energy transitions need to be examined in socio-technical terms – and not just as technical challenges – because the success of many projects depends on social acceptance.

3. Discussion

Based on the above case studies, this section re-examines the questions identified in the introduction.

What types of energy challenges do island communities in the Channel/Manche area face?

Island communities in the Channel/Manche area face a range of energy challenges. These fall within the following themes/areas:

- Energy security: many islands depend almost entirely on imported fuel to power their energy systems. There is a need to diversify energy production sources and, importantly, for islands to generate their own energy from renewable sources to increase their independence and resilience because they are non-interconnected to mainland grids. This will also allow the islands to withstand potential infrastructure failures in the system and ensure a more reliable flow of energy to residents and businesses (de Groot and Bailey, 2016).

- Rising fuel prices: because of their reliance on imported fuel, the island communities examined are susceptible to external price fluctuations. Although some islands have price fixing strategies to reduce the financial impact of energy price rises for residents, these are usually limited in extent and cannot always be maintained. The 2022 energy crisis has increased already high prices and there is limited expectation of being able to reduce the costs to consumers. Many renewable energy options, particularly those involving offshore generation, are also expensive. Subsequently, there is a need to consider which technologies are technically and economically feasible while ensuring energy prices are manageable for residents and businesses.

- Decarbonisation of energy systems: most islands in the Channel/Manche area have set targets to reduce their reliance on fossil fuels in the coming years. Because some islands rely almost entirely on fossil fuels, significant changes need to be taken to fully transition to renewable energy sources. Some technologies which appear to be suitable (including offshore technologies) are still in their experimental stages or have not yet reached the economies of scale to be price competitive and it is unclear how they might be implemented (Wiersma, 2015). Additionally, most of the islands' electricity transmission grids need to be updated for them to be able to distribute more centrally generated electricity in ways that meet the needs of different parts of the island.

- Democratisation of energy: the lack of currently utilised indigenous energy sources means that island residents lack the capability to choose their energy sources. Lack of energy democracy is also characterised by the fact that most of the islands have a monopoly electricity provider and cannot switch energy sources in the same way mainland customers can, especially in the UK. Other constraints affecting the energy choices residents can make relate to grid constraints, which limit the ability of residents to install household renewable energy technologies that might enable export of surplus energy into the local grid (Island Innovation, 2020).

What types of energy transition projects have been proposed for island communities in the Channel/Manche area?

The types of projects considered for Ushant, Alderney and Guernsey have varied in technology type, scale and connectivity but have generally been oriented towards addressing the challenges of supply reliability and energy affordability identified for each island while also seeking to promote the development of low-carbon energy sources. Other features of the energy feasibility studies conducted on the islands were the inclusion of short-, medium- and long-term options and the inclusion of both large-scale projects, all of which involved offshore developments, and smaller-scale land-based developments. For example, proposals were discussed for a 30MW offshore wind farm near the coast of Guernsey before attention turned towards 'small scale local developments for local consumption (e.g. solar)' as part of its 2017 energy strategy. The exploitation of tidal stream energy around Alderney was proposed as part of the FAB interconnector, which would have allowed transmission of 1400 MW of electricity between the UK and France. However, discussions have since centred towards the short- and medium-term options identified in the Offshore Renewable Energy Catapult study, a single refurbished onshore wind turbine and a mix of onshore wind and solar PV combined with battery storage with an overall renewable energy capacity of 3-4 MW. However, discussions remain ongoing at the time of writing in December 2022 on the deployment of up to 2GW of tidal stream power capacity in the Alderney Race.

Ushant remains the only one of the three islands where plans to install offshore energy have come to fruition with the deployment of the Sabella D10 project in the Fromveur Passage in 2015. This project had the capacity to provide approximately 15% of the island's electrical requirements and meet all demand during periods of generation surplus. Again, therefore, the scale of renewable energy development remains at a relatively small scale relative to the area's available offshore energy resources. Other activity on Ushant consisted of the installation of a 54kWh solar PV array on the roof of the sports centre in 2017 and proposals for a wind turbine of 300kW, 800kW or 2MW to meet the island's electricity needs. The general pattern emerging, therefore, is one in which expansive narratives of islands as arenas for strategic energy development have been foregrounded and ambitious proposals explored to address local energy and regional/national energy goals but then been scaled back to smaller projects with more of a single emphasis on meeting the energy needs of individual islands (Kallis *et al*., 2021; Skjølsvold *et al.*, 2020).

What forms of community consultation have taken place as part of evaluations of energy transition options discussed in feasibility studies?

The ways in which community consultations have been conducted have varied markedly between islands. In Guernsey there was no formal consultation process linked to a specific proposal. However, a parallel academic study was conducted at the same time local governing bodies were discussing renewable energy options, which investigated the public acceptability of offshore wind and tidal energy in relation to three hypothetical projects (Wiersma, 2015; Devine-Wright and Wiersma, 2020). These ranged from a small(er) scale 10 turbine development to a much larger 100-300 turbine project. Because the study explored public perceptions of hypothetical developments, it examined public attitudes towards the principle of renewable energy and tested the boundaries of support and opposition to different sizes of project, recognising that public support can reduce significantly when specific developments are proposed.

In Alderney, the public consultation process for the FAB project followed European Union guidelines and a Concept for Public Participation was prepared, which set out some participation principles. In addition to holding public meetings, the consultation involved a two-way system of communication in which residents and stakeholders were invited to respond to project application documents with members of the FAB team responding to these comments. However, FAB's responses to comments submitted by residents and local stakeholder groups appeared mainly to involve managing comments and defending existing plans rather than making substantive changes to the project. It could therefore be interpreted as observing consultation protocols but falling short of an empowering approach to community relations.

Other than the FAB project, consultations on the Energy Saving Trust and ORE Catapult studies for Alderney appeared to consist of informal discussions around different energy transition scenarios, including a public exhibition. No documentation of these consultations could be located, so there is limited direct indication that decision-makers sought or achieved representativeness of the spectrum of potential opinions that might surround the different energy project types discussed in the reports. Informal consultation can be seen as a more appropriate approach for feasibility studies, where the main focus is on testing public opinion on ideas rather than seeking opinions on formal proposals or planning applications (Colvin *et al.*, 2016). However, questions can be raised about whether such consultation processes are more likely to engage the 'already engaged' and court polarities of opinion (the stronger opponents and the avid supporters), rather than enabling a democratised – or even reliable – engagement process and yardstick of public opinion (Aitken, 2014; Aitken *et al.*, 2016; Rudolph *et al.*, 2014).

The consultation process in Ushant utilised a variety of engagement techniques, including sharing information leaflets, arranging workshops and exhibitions, and an annual survey of energy usage and conditions on the island. However, apart from the surveys, these activities focused largely on information provision and there was not a great deal of opportunity for the public to affect project outcomes. This arguably resulted in the local communities having limited control over the direction of the sustainable energy transition strategy (Kallis *et al.*, 2021). This was compounded by other issues, included a very lengthy consultation process consisting of multiple engagement events that contributed to consultation overload and fatigue among the community, particularly given delays in the installation of renewable energy projects. In addition, there were challenges around how to engage people with limited time or with limited perceived expertise and/or interest (Chilvers, 2008; Devine-Wright, 2012). Some of the consultations did not have a clear end point because they were hypothetical and this potentially contributed to a perception that the community's input was not really valued and the consultations did not yield clear benefits (Dwyer and Bidwell, 2019).

The majority of these public engagement activities have taken place 'upstream' (e.g. to gain feedback on feasibility studies) or in the early stages of project developments. This is widely regarded as good practice for increasing opportunities for local views to inform decision-making (Klain *et al.*, 2017; Reilly *et al.*, 2016). However, the majority of consultations have focused on feasibility studies and project concepts, both of which are hypothetical. The first risk from this approach is that community attitudes to general ideas often vary significantly from their opinions on specific proposals (de Groot and Bailey, 2016). Additionally, where feasibility studies include more speculative, large-scale projects, such as the FAB interconnector link through Alderney or large-scale offshore wind development near Guernsey, this may inflate local expectations on the possible outcomes from consultations when there may be only a small possibility the larger projects will be implemented for technical or economic reasons, and create more general scepticism towards developers and local authorities if the developments do not happen. More speculative consultations can also be time consuming and draw attention away from energy transition projects that stand a greater chance of implementation (Firestone *et al.*, 2019; Johnson *et al.*, 2016; Kerr *et al.*, 2014). There have also been variable consultation practices and there is evidence that some of the consultations have been problematic in terms of participation, and particularly empowerment, as locals have had few opportunities to influence project design and outcomes (Aitken *et al.*, 2016).

What factors have been considered in evaluations of feasibility studies and which have been most decisive in determining whether to proceed with options outlined in feasibility studies?

Cost and grid capacity constraints have been the two main factors determining decisions on whether to pursue options outlined in feasibility studies to the proposal, planning application or construction phases in all the three cases study islands. Both can generally be considered as constraining factors on the progression, scale and timing of projects and, in many cases, have led to more ambitious options being abandoned or deferred for the foreseeable future in favour of smaller-scale developments. Cost concerns have particularly centred on the initial capital requirements of large-scale projects and the resulting implications for energy prices and the mechanisms used for financing and distributing costs. For example, the cost of the FAB project was estimated at approximately €750m and potentially higher if it was routed via

Alderney. In contrast, the capital cost of a series of 100-300 kW solar arrays on Alderney to add 745 kW of generation was estimated to be £820,000-£900,000 in 2015 and could potentially be spread by building capacity steadily over a number of smaller installations that could be designed to allow investment from local residents and businesses (Catapult Offshore Renewable Energy Development Services, 2022). Additionally, projects of this scale were judged to be capable of producing net financial benefits to the island within time horizons of as short as five years through avoided electricity and fuel-import costs.

Grid capacity and distribution issues have been another major limiting factor on the progression of large-scale options identified in feasibility studies. While grid upgrades were seen as potentially necessary but not insurmountable for a medium-scale onshore wind development on Guernsey (between 4 and 10 3MW turbines and 10 x 3MW turbines), the most populous of the three islands examined, in most cases the capacity of the grid was seen as technically or economically unfeasible and even smaller-scale developments, such as the medium-term scenario wind and solar options for Alderney, required grid upgrades and the installation of battery storage systems (Catapult Offshore Renewable Energy Development Services, 2022; Energy Saving Trust, 2015). Similarly, on Ushant, proposals for wind energy generation in conjunction with solar and tidal generation to achieve 70% and 100% renewable generation by 2020 and 2030 respectively required battery storage to match energy demand and supply within the existing grid network. One option to address grid constraints and reduce household energy costs being actively considered by Alderney is the improvement of insulation for older houses. This would also be important in facilitating the deployment of ground- and air-sourced heat pumps that would enable distributed generation to avoid placing strains on the Alderney grid system.

A third set of factors that has informed evaluations of the options discussed in feasibility studies and energy strategies is the views of members of local community members and stakeholders who expressed opinions during consultation processes. There have been generally high levels of community support for the options proposed, particularly those that were perceived to have lower impacts on the visual amenity on and around the islands, such as tidal stream projects, and for those that most obviously addressed local energy priorities, such as supply irregularity and energy costs, and brought tangible benefits to the island. Some options that might be regarded as more contentious, such as the siting of onshore wind turbines on Alderney, did not appear to have provoked strong opposition. However, there is also evidence of opinions being shaped by previous experiences with particular technologies (de Groot and Bailey, 2016; Kallis *et al.*, 2021). On Ushant, residents' scepticism towards proposals for a wind turbine were informed by memories of technical problems that led to the dismantling of two turbine developments located on the island in the 1980s. This combined with planning barriers and non-government organisation opposition led ICE project researchers to conclude that there was little real prospect of pursuing wind energy on Ushant in the immediate future despite the time that had elapsed since the 1980s projects.

Other community concerns raised about energy transition projects included their potential impacts on historically and culturally important sites (e.g. the effect of the FAB project on Second World War Russian and Jewish slave graves on Alderney) and the implications of larger projects for existing infrastructure. These included concerns about interference to Guernsey airport's navigation system that might result from the construction of a large offshore wind farm but also instances where features of the local area were seen as enabling renewable energy development (Wiersma, 2015). These included Alderney's proximity to major shipping lanes as a facilitator for the production and export of hydrogen energy (though this remains very much at the conceptual stage) and Fromveur Passage as a promising site for tidal stream energy because of its unsuitability for commercial shipping (Pleijil and Bredin, 2015). However, projects with high levels of perceived impacts on visual amenity, such as the location of a large offshore wind farm near Guernsey, were less well-received. Conversely, developments that were judged to have limited impacts on established industries (e.g. tidal energy proposals on Ushant were seen as having few impacts on fishing) were seen as more likely to gain approval at the permitting stage, whereas conflicts between fishing and energy (e.g. offshore wind developments around Guernsey discussed in the 2011 Halcrow report) were regarded as more problematic by local stakeholders (Halcrow Group, 2011).

It is difficult to be sure how far community views influenced decisions on whether to conduct further investigations on the energy options discussed in the feasibility studies. However, the overriding considerations for larger projects appear to have been primarily economic with a rationale that the investment required was not justifiable, and community views do not appear to have been a significant shaper of decisions. The other major reason to defer or not proceed with projects relates to technical issues (particularly grid constraints) and, again, community views appear only to have contributed peripherally to decisions. Both outcomes add weight to the assessment that local communities may become sceptical about the commitment to major energy transitions on the islands and to associated consultation processes (Kallis *et al.*, 2021; Sperling, 2017). There is greater evidence of community views being taken into consideration for smaller-scale projects where economic and technical constraints are less prominent (Hernández, 2015; Kerr *et al.*, 2014). The main foci of discussion for smaller projects has been the location and size of the development (e.g. a single or multiple wind turbines) which, although not transformative, have the potential to improve energy security and affordability and to contribute to the decarbonisation of local energy supplies (Skjølsvold *et al.*, 2020).

What lessons do we learn about the ways in which community consultation is currently practised and how it should be practised to achieve people- and place-centred approaches to energy transition?

Consultation is occurring and some good practices are being applied: The indications from the three case-study islands are that consultation has become built into discussions on energy transition options and that some areas of good practice are being practised regularly. These include beginning consultations early, at the point of feasibility studies, when a range of options on technology, scale and siting are theoretically available and communities have the opportunity to have a real say in deciding which options to progress (Aitken *et al.*, 2016; Rudolph *et al.*, 2017). Other good practices identified include the use of a variety of engagement techniques and there is evidence that, in some cases, consultancies, developers and local authorities involved in conducting and deciding on feasibility studies are engaging in two-way dialogue with residents and stakeholder groups (Aitken, 2014; de Groot and Bailey, 2016; Kerr *et al.*, 2014).

Tensions arise between early consultation and ensuring plans are sufficiently developed: Several of the early consultations have centred on feasibility studies, which increases the potential for local engagement to raise expectations that major projects that are unlikely to come to fruition will go ahead (Kallis *et al.*, 2021). The fact that many larger projects are discontinued for reasons that are often foreseeable indicates a need for greater emphasis to be placed on ensuring that consultations on feasibility studies are grounded in realism so as not to create high expectations which are then frustrated. If such realism does not exist, island communities are likely to become exasperated and annoyed by consultations and other processes that do not address their energy concerns (Skjølsvold *et al.*, 2020). This is likely to lead to loss of trust in developers and governing bodies and erode the appetite of communities to get involved in future transition initiatives (Devine-Wright, 2012). Lower participation in later consultations also reduces the chance of the benefits of community engagement – democratisation of decision-making, the use of local knowledge, and appropriate scaling and siting decisions – being lost (Firestone *et al.*, 2009; Rudolph *et al.*, 2014).

Extended consultations create frustration and confusion, so clear timelines and route maps are needed: Early consultations on feasibility studies can also be premature and create frustration and confusion when engagement processes extend over time periods and multiple events. Communities may lose sight of which projects are still under consideration and the stage each project has reached. Developing a clear timeline and route map from the commissioning of feasibility studies to development proposals and project consenting and planning would help to counter feelings that people are becoming engaged in endless rounds of consultation with no real outcome (Colvin *et al.*, 2016; Johnson *et al.*, 2016; Kallis, 2021).

Community input remains marginal on larger projects despite their potential impact on islands: The evidence suggests that community input is not always meaningful and has had only a minor influence on decision-making. Sometimes this outcome may have influenced the design of consultation processes or been a product of their design (Hernández, 2015; Papazu, 2018). Examples of these difficulties include where consultations do not appear to consider issues of inclusivity and/or representativeness or where community engagement seems to offer two-way dialogue but responses to comments are mainly used to justify existing decisions and lead to limited substantive change to the design of projects (Kallis *et al.*, 2021). The end result of this can be engagement that appears tokenistic, which can again lead to loss of faith in the process and those organising it (Aitken *et al.*, 2016; de Groot and Bailey, 2016).

4. Summary

This document has examined the types of energy transition projects that have been, or are being, proposed for islands in the Channel/Manche area, ranging from small scale (e.g. single turbine or small solar developments) to larger scale projects. It has investigated the forms of community consultation that have taken place, the extent to which community and local stakeholder views have influenced decisions on whether to pursue options discussed in feasibility studies, and other key factors which have been considered in evaluations of the feasibility of options to promote sustainable energy transitions for islands in the Channel/Manche area. The main findings from the study are highlighted below:

- Community consultation appears to be 'standard practice' in island energy transitions; however, the ways in which it is conducted varies markedly between islands. Although it often follows some of the recommendations for good practice in community engagement (i.e. early, or 'upstream' engagement, two-way communication flows and the use of a range of engagement techniques) it is often problematic in terms of participation and empowerment as other factors often mean that locals do not have significant influence over project design and outcomes, except for smaller-scale developments.

- Early consultation has been problematic where it has raised expectations prematurely that large-scale transformative projects that may not come to fruition will be developed. This can lead to scepticism among local communities and a reluctance to get involved in consultations on future energy projects.

- Economic considerations (particularly high initial investment costs, long payback periods and a lack of downward pressure on energy prices) and grid capacity constraints have been the two main factors determining decisions on whether to pursue options outlined in feasibility studies.

- Initiatives to promote sustainable energy transitions for island communities need to consider the most appropriate time to initiative community engagement processes, in particular whether to hold early, upstream discussions on feasibility studies that are hypothetical prior to establishing their technical and economic feasibility or to delay engagement until the feasibility of all options has been established. In both circumstances, engagement organisers should ensure that engagement information and events communicate clear and well-evidenced assessments of the likely economic and technical feasibility of each option to enable community members to make informed judgements about proposals. Clear timelines and route maps for the development of energy projects should also be communicated to avoid consultation fatigue and loss of trust.

References

AEA Group (no date) Strategic tidal stream assessment for Alderney, https://tethys.pnnl.gov/sites/default/files/publications/Strategic_Tidal_Stream_Assessment_for_Alderney.pdf

Aitken, M. (2014) E-Planning and public participation: addressing or aggravating the challenges of public participation in planning? *International Journal of e-Planning Research*, 3 (2), 38-53, https://doi.org/10.4018/ijepr.2014040103.

Aitken, M., Haggett, C. and Rudolph, D. (2014) Wind farms community engagement good practice review, https://www.climatexchange.org.uk/media/1854/exec_sumary_-_wind_farms_community_engagement_good_practice_review_14_06_16.pdf.

Aitken, M., Haggett, C. and Rudolph, D. (2016) Practices and rationales of community engagement with wind farms: awareness raising, consultation, empowerment, *Planning Theory & Practice*, 17 (4), 557-576, https://doi.org/10.1080/14649357.2016.1218919.

Alderney News (2021) FABlink project undecided about Alderney routing, http://www.aynews.gg/news/could-fablink-be-back-on-the-agenda/

Bailiwick Express Guernsey Edition (2021) Alderney's chief minister in the dark on FAB link 'progress report' https://gsy.bailiwickexpress.com/gsy/news/alderneys-chief-minister-dark-over-fab-link-progress-reports/#.Y5cx23bP1D-

Bailiwick Express Guernsey Edition (2022) FAB Link misunderstandings create "havoc" in Alderney, https://gsy.bailiwickexpress.com/gsy/news/possible-fab-link-creating-havoc-alderney/#.Y5cypnbP1D-

Catapult Offshore Renewable Energy Development Services Ltd (2022) Alderney future power supply scenarios: Scoping study, http://www.alderney.gov.gg/CHttpHandler.ashx?id=155533&p=0#:~:text=Total%20current%20electricity%20demand%20on,giving%20network%20losses%20of%207.5%25

Chilvers, J. (2008) Deliberating competence: theoretical and practitioner perspectives on effective participatory appraisal practice, *Science, Technology, & Human Values*, 33 (3), 421-451, https://doi.org/10.1177/0162243907307594.

Colvin, R.M, Witt, G.B. and Lacey, J. (2016) How wind became a four-letter word: lessons for community engagement from a wind energy conflict in King Island Australia, *Energy Policy*, 98 483-494, https://doi.org/10.1016/j.enpol.2016.09.022.

de Groot, J. and Bailey, I. (2016) What drives attitudes towards marine renewable energy development in island communities in the UK? *International Journal of Marine Energy*, 13, 80-95, https://doi.org?10.1016/j.ijome.2016.01.007.

Devine-Wright, P. (2012) Fostering public engagement in wind energy development: the role of intermediaries and community benefits, J. Szarka, R. Cowell, G. Ellis, P. Strachan and C. Warren (Eds.), *Learning from wind power*, Macmillan, Palgrave, 194-214

Devine-Wright, P. and Wiersma, B. (2020) Understanding community acceptance of a potential offshore wind energy project in different locations: an island-based analysis of 'place-technology fit', *Energy Policy*, 137, 111086, https://doi.org?10.1016/j.enpol.2019.111086.

Dwyer, J. and Bidwell, D. (2019) Chains of trust: energy justice, public engagement, and the first offshore wind farm in the United States, *Energy Research & Social Science*, 47, 166-176, https://doi.org/10.1016/j.erss.2018.08.019.

Energy Saving Trust (2015) Supporting the development of the States of Alderney island energy policy, http://www.alderney.gov.gg/CHttpHandler.ashx?id=84944&p=0

EUR Lex (2013) Regulation (EU) No 347/2013 of the European Parliament and of the Council of 17 April 2013 on guidelines for trans-European energy infrastructure and repealing Decision No 1364/2006/EC and amending Regulations (EC) No 713/2009, (EC) No 714/2009 and (EC) No 715/2009, *Official Journal of the European Union*, L 115/39, https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:115:0039:0075:en:PDF

FAB (France-Alderney-Britain) (2022a) The "FAB" project (France – Alderney – Britain) is to build an electrical interconnector underwater and underground between France and Great Britain via the island of Alderney, https://www.fablink.net/.

FAB (France-Alderney-Britain) (2022b) FAB Project makes final route selection for interconnector, https://www.fablink.net/fab-project-makes-final-route-selection-for-interconnector/

FAB Link Ltd (2016) FAB France Alderney Britain interconnector consultation report, https://www.manche.gouv.fr/contenu/telechargement/29653/212986/file/7-06-FAB+Consultation+Report+December+2016.pdf

Fitch-Roy, O. and Connor, P.M. (2018) ICE report T1.1.2 Policy Issues An overview of renewable energy policy and regulatory considerations in Ouessant and the UEA campus, https://www.ice-interreg.eu/_files/ugd/fa3d30_3b0a7ca935a448c39f5787c386df5c10.pdf

Firestone, J., Kempton, W. and Krueger, A. (2009) Public acceptance of offshore wind power projects in the USA, *Wind Energy*, 12 (2), 183-202, https://doi.org/10.1002/we.316.

Fournisseurs Electricite, 2018. Puissance compteur EDF. https://www.fournisseurs-electricite.com

Gross, C. (2007) Community perspectives of wind energy in Australia: The application of a justice and community fairness framework to increase social acceptance, *Energy Policy*, 35, 2727–2736. https://doi.org/10.1016/j.enpol.2006.12.013.

Guernsey Electricity (2022) Will Guernsey be affected by the energy crisis in Europe? https://www.electricity.gg/about/news-blog/2022/will-guernsey-be-affected-by-the-energy-crisis-in-europe/

Guernsey Renewable Energy Team (2011) Feasibility study into offshore wind energy: Stage 1 Report, http://www.guernseyrenewableenergy.com/documents/managed/DOC345%20Feasibility%20Study%20into%20Offshore%20Wind%20Energy.pdf

Halcrow Group (2009) Guernsey renewable energy commission pre-feasibility technical report November 2009, http://www.guernseyrenewableenergy.com/documents/managed/DOC127%20prefeasibility%20study%20report%20rev%203-0.pdf

Hardwick, J. Zheng, S., Smith, H.C.M., Fitch-Roy, O., Williams, J., Connor, P.M., Sundaram, S. and Iglesias, G. (2018) ICE report T1.4 - A community specific assessment of local energy, https://ore.exeter.ac.uk/repository/handle/10871/34276

Hernández, D. (2015) Sacrifice along the energy continuum: A call for energy justice, Environmental Justice, 8 (4), 151-156, https://doi.org/10.1089/env.2015.0015.

Island Innovation (2020) Intelligent energy solutions for isolated territories: The Ushant case study, https://islandinnovation.co/videos/intelligent-energy-solutions-for-isolated-territories-the-ushant-case-study/

ITV News (2016) Anger grows in Alderney over cable plans, https://www.itv.com/news/channel/2016-09-15/alderney-residents-attend-states-meeting-on-nuclear-power-cable

Johnson, K.R., Kerr, S.A. and Side, J.C. (2016) The Pentland Firth and Orkney Waters and Scotland – planning Europe's Atlantic gateway, *Marine Policy*, 71, 285-292, https://doi.org/10.1016/j.marpol.2015.12.006.

Kallis, G., Stephanides, P., Bailey, E., Devine-Wright, P., Chalvatzis, K. and Bailey, I. (2021) The challenges of engaging island communities: Lessons on renewable energy from a review of 17 case studies, *Energy Research & Social Science*, 81, 102257, https://doi.org/10.1016/j.erss.2021.102257.

Kerr, S., Watts, L., Colton, J., Conway, F., Hull, A., Johnson, K., Jude, S., Kannen, A., MacDougall, S., McLachlan, C., Potts, T. and Vergunst, J. (2014) Establishing an agenda for social studies research in marine renewable energy, *Energy Policy*, 67, 694-702, https://doi.org/10.1016/j.enpol.2013.11.063.

Klain, S.C., Satterfield, T., Macdonald, S., Battista, N., and Chan, K. (2017) Will communities "open-up" to offshore wind? Lessons learned from New England islands in the United States, *Energy Research & Social Science*, 34, 13-26, https://doi.org/10.1016/j.erss.2017.05.009.

Papazu, I. (2018) Storifying Samsø's renewable energy transition, *Science as Culture*, 27 (2), 198-220, https://doi.org/10.1080/09505431.2017.1398224.

Pleijel, C. and Bredin, D. (2015) Energy audit on Ouessant, https://europeansmallislands.files.wordpress.com/2013/01/ouessant.pdf

Reilly, K., O'Hagan, A.M. and Dalton, G. (2016) Moving from consultation to participation: a case study of the involvement of fishermen in decisions relating to marine renewable energy projects on the island of Ireland, *Ocean & Coastal Management*, 134, 30-40, https://doi.org/10.1016/j.ocecoaman.2016.09.030.

Rudolph, D. (2014) The resurgent conflict between offshore wind farms and tourism: underlying storylines, *Scottish Geographical Journal*, 130 (3), 168-187, https://doi.org/10.1080/14702541.2014.914239.

Rudolph, D., Haggett, C. and Aitken, M. (2014) Community benefits from offshore renewables: good practice review, https://www.climatexchange.org.uk/research/projects/community-benefits-from-offshore-renewables-good-practice-review/.

Rudolph, D., Haggett, C. and Aitken, M. (2017) Community benefits from offshore renewables: the relationship between different understandings of impact, community, and benefit, Environment and Planning C: Politics and Space, 36 (1), 92-117, https://doi.org/10.1177/2399654417699206.

Sabella (2015) Sabella D10, first tidal turbine to export electricity on French power grid. http://www.sabella.fr/fiche.php?id=252&lg=gb

Sabella (2016a) Sabella D10 has generated more than 50 MWh from tides. http://www.sabella.fr/fiche.php?id=254

Sabella (2016b) End of the Sabella D10 first campaign of tests. http://www.sabella.fr/fiche.php?id=257

SAE (SIMEC Atlantis) (2021) Raz Blanchard, https://simecatlantis.com/tidal-stream/raz-blanchard/

Skjølsvold, T.M., Ryghaug, M. and Throndsen, W. (2020) European island imaginaries: examining the actors, innovations, and renewable energy transitions of 8 islands, Energy Research & Social Science, 65, p. 101491, https://doi.org/10.1016/j.erss.2020.101491.

Sperling, K. (2017) How does a pioneer community energy project succeed in practice? The case of the Samsø Renewable Energy Island, *Renewable and Sustainable Energy Reviews*, 71, 884-897, https://doi.org/10.1016/j.rser.2016.12.116.

States of Alderney (2018) Draft Alderney Energy Policy, http://www.alderney.gov.gg/CHttpHandler.ashx?id=123367&p=0

States of Alderney Office of the President (2022) Billet d'État Wednesday 18th May 2022, http://www.alderney.gov.gg/CHttpHandler.ashx?id=153029&p=0

States of Guernsey (2017) Renewable Energy Team (RET) Strategy: Preparation for long term renewable development 2017 and onwards, https://www.gov.gg/CHttpHandler.ashx?id=148291&p=0

States of Guernsey (2020) States of Guernsey energy policy 2020-2050, https://www.gov.gg/CHttpHandler.ashx?id=123716&p=0

University of Exeter (2012) Guernsey renewable energy feasibility report: in co-operation with the Guernsey Renewable Energy Team, http://www.guernseyrenewableenergy.com/documents/managed/RENEWABLE%20ENERGY%20FEASIBILITY%20REPORT%20-%20AN%20EXETER%20UNIVERSITY%20STUDY.pdf

Wiersma, B. (2015) Public acceptability of offshore wind and tidal energy in Guernsey: Summary report, https://www.gov.gg/CHttpHandler.ashx?id=148289&p=0#:~:text=In%20general%2C%20tidal%20energy%20emerged,offshore%20wind%20energy%20(58%25)

Wolsink, M. (2000) Wind power and the NIMBY-myth: institutional capacity and the limited significance of public support, *Renewable Energy*, 21, pp. 49-64, https://doi.org/10.1016/S0301-4215(97)80002-5.

Xodus Group (2016) Offshore wind - preliminary feasibility final report: States Of Guernsey, https://www.gov.gg/CHttpHandler.ashx?id=148290&p=0