

Report to the States of Alderney

Meeting of the 12th October 2022

From: Bill Abel – Chair of Energy Group

Energy Group Members:

States Members; Alex Snowden and Kevin Gentle

Non States Members: Les Stewart and Laurence Page

6th October 2022

Draft Energy Policies and Energy Roadmaps

This report covers the key parts of the Energy Group Mandate and will be the subject of a press release and call for comment from the Community in preparation for the Energy Policies being submitted to the States for approval in either December or early in the new year.

1. Energy Policy

In terms of the major goals of the Island Plan, the attached draft Energy Policies follows the format of the Land Use plan and provides context and background for each Energy Policy which has been developed:

- Energy Policy 1: Sustainability
- Energy Policy 2: Resilience
- Energy Policy 3: Clean Energy
- Energy Policy 4: Affordability
- Energy Policy 5: Opportunities
- Energy Policy 6: Tidal and wave Energy

2. Energy Roadmaps

The attached Energy Roadmaps consider the energy strategy over the short and medium term based on available technologies; changes to electricity tariffs; increasing use of renewable energy supply options; and guidance and support from the States and AEL in terms of energy efficiencies.

The energy roadmaps provide a view of how the Island may need to change (transition) to meet the policies and the longer term challenges particularly for minimising the use of heating oil.

3. Role of Alderney Electricity Ltd (AEL)

The input of Matt Birmingham and James Lancaster has been invaluable in the development of the Energy Policies and of an electricity and energy supply strategy for the Island.

The role of AEL, being the Electricity Concessionaire, is to evaluate the electrical supply policies and determine an effective operational strategy to utilise sources of renewable energy with an initial focus on the use of wind and solar resources.

A part of the Island's transition to the use of solar renewable energy supplies will be the use of any excess solar energy from private sources by AEL and to facilitate this, AEL will need to revise the current tariffs structures and develop an appropriate feed-in-tariff. However, there will be supply conditions as not all 'excess' private energy will be utilised by AEL especially during off-peak periods.

AEL also understands its community role and is evaluating providing a service of energy audits and advice on minimising energy loss in homes and buildings to contain or reduce energy costs. AEL and the States of Alderney need to discuss the future role of AEL as not only being the electricity provider but also as both the Energy provider and Energy Manager on behalf of the States of Alderney.

4. Progress and future role

Significant progress has been made on the key deliveries of the mandate – the policy and strategic options and there is a clear understanding with AEL what it, as the operator, needs to advance and the responsibilities of the Energy Group.

The Energy Group needs to continue with developing EOIs for tidal and wave energy pilot projects (a future ACRE role) and also continue work on offsets for heating oil and the development of hydrogen options for the future.

5. Conclusions and Recommendations

- With the limited dimensions of the Island and the placement of the airstrip the ideal position for medium sized wind turbines is not possible and smaller wind turbines distributed around the Island needs to be evaluated and discussed with the Community.
- There are no constraints to setting up solar arrays and options for arrays at the Fort Grosnez Glacee and Fort Albert. The final site selection will need to be discussed with the community as soon as optimum layouts can be developed.
- The current AEL electricity tariffs need to be revised to provide an equitable allocation of distribution and energy costs; and to encourage domestic and commercial provision of renewable energy.
- The Alderney Electricity Concession needs to be reviewed and updated.
- The Alderney Renewable Energy Law needs to be reviewed as it does not differentiate between on Island use of energy from renewable resources and off island sales of renewable energy.

Attachments::

- Draft Energy Policies
- Draft Energy Roadmaps for Alderney

Alderney Energy Policies

Introduction

To assist the States of Alderney in creating an Energy Policy for the island, the Policy and Finance mandated Energy Group, commissioned a scoping study on the islands energy system and has consulted with energy providers and recognised experts in energy transition. These enquiries have had the following outcomes:

- key constraints have been identified that will impact on the island's journey to a sustainable energy future
- a range of options with the potential to help the island establish a sustainable energy future has been identified
- realistic timelines have been established, dependent on such factors as the level of constraint and the economic and social costs of delivery, segregating actions into:
 - short term (0 to 10 years)
 - medium term (10 to 20 years)
 - long term (beyond 20 years)

The timelines are quantitative estimates based on the scale of the overall challenge. However, it should be recognised that the emphasis must always be on establishing a sustainable energy system as quickly as is practically achievable.

Short-term encompasses those actions which may be delivered despite existing constraints such as guidance on improving building thermal efficiencies (insulation), guidance on more efficient types of oil-fired boilers; revision of the current tariff system; introduction of renewable energy such as solar arrays and wind turbines.

Medium term actions will require further expansion of renewable energy systems; encouragement of Islanders to move to electric vehicles; reduction in the consumption of heating oil by the use of solar thermal panels; and commencement of the initial phases of the upgrade of the town-grid.

Long-term recognises that the move to a wholly sustainable energy system may require technological or other interventions which either do not exist or lie outside the scope of the community's resources within the medium term. The main challenges being the replacement of heating oil by electricity (grid constrained), or a mix of domestic thermal and solar panels together with air or ground sourced heat pumps; or by the use of hydrogen.

.The Strategic Context

- 1.1 Alderney forms part of the Bailiwick of Guernsey with a population of about 2,000. Being a small island, it has limited resources available to meet the considerable demands of:
 - reducing reliance on fossil fuels and improving energy security.
 - developing strategies and approaches towards the generation and consumption of energy and reducing the cost of energy to 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.
- 1.2 Alderney is highly reliant upon imported oil as an energy source for the generation of electricity, for heating and transport. This is not only unsustainable for environmental reasons but will continue to make energy expensive, with limited expectation of being able to reduce the costs to consumers.
- 1.3 Alderney Electricity Ltd. (AEL) has been operating *The Alderney Electricity Concession* for nearly 70 years. AEL focuses on the supply and distribution of electricity, but is also the principle provider and distributor of heating oil and transport fuels.

- 1.4 Alderney has the potential to produce renewable energy from solar, wind, tidal and wave resources with Alderney Electricity Ltd., with the support of the States, now advancing solar and wind generation options.
- 1.5 An effective Energy Policy is an important enabler for the Island's economic wellbeing and development and therefore requires a strategic and focused approach to meet future challenges and to ensure the environmental and economic attractiveness of the Island.
- 1.6 A longer term strategic roadmap for the production, distribution, consumption, and conservation of energy in Alderney is needed.

States of Alderney Energy Policy - Context

This document sets out the principles of the States of Alderney Energy Policy and is expressed as underpinning principles, goals and objectives. It is the result of the research, consultation and engagement with individuals and organisations with relevant expertise, and with the community.

Whilst the format may appear simplistic, the purpose is not to provide a detailed analysis of the many issues, rather the Policy provides a set of guidelines handed down from those tasked with representing the community's interest to those tasked with developing the detailed strategy and plans required to meet the Policy objectives over an extended period of time in an uncertain and complex environment.

In considering any future intervention, subject to Policy, it will be necessary to consider the matter from a range of perspectives including, but not limited to, technological, economic, social, environmental, legal, cultural and behavioural perspectives.

Island Energy System.

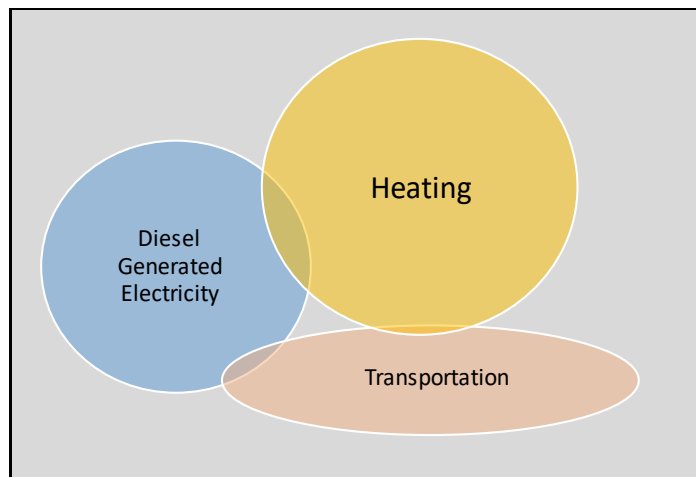
Current Situation

Apart from a small amount of solar, and a small amount of wood and other solid fuels for heating, accounting for less than 1% of total energy supply, Alderney's Energy System is wholly reliant on fossil fuels.

The adjacent diagram shows the major uses of energy as follows:

1. Domestic and commercial heating, including cooking, using fuel oils and bottled gas;
2. Electrical lighting and electrical equipment from diesel generation;
3. Air, marine, road, and rail transport using a mix of petrol, diesel, avgas and kerosene.

At the margins a small amount of electricity is currently used for space heating; water heating and cooking; and to power electric vehicles.

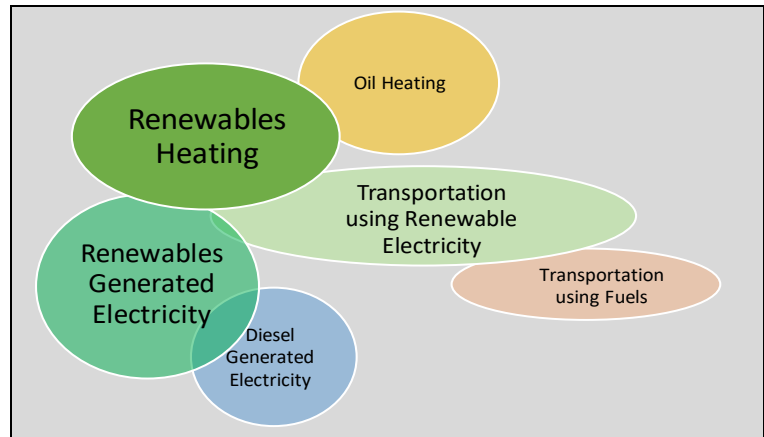


Future Requirements

This Policy needs to consider the island's energy system in its entirety as many parts of the system are complimentary and/or interconnected.

It also needs to consider the endgame of the policy and what the eventual shape of the energy system will be. The policy should help transition the energy system to something that more resembles the mix illustrated in the adjacent diagram.

At the current time it is difficult to anticipate the Island moving to a zero carbon fuel usage system in the short to medium term and until further economic, technological options become available the achievement in the long term is also challenging.



The Island Plan and the underlying Principles of the Policy

The following is the States of Alderney’s Island Plan – Energy Goals which were published in March 2022. The Plan establishes two high level energy goals, and the priorities and the initiatives to achieve these Goals.

Island Plan - Underlying Principles

- **Increase the amount of clean energy used (reduce the carbon footprint)**
- **Reduce energy costs for individuals and organisations**

Whilst these goals provide little direction over the journey to achievement, they do provide the **underpinning principles** for the Energy Policy and a useful benchmark for the evaluation of proposals coming forward.

Energy Strategy

The Energy Strategy sets out a pathway to 2050, it identifies a number of actions and interventions which if successfully implemented will contribute to Alderney achieving a reduction in its carbon emissions in line with other jurisdictions. It will also provide the basis on which to monitor and consult on further interventions that may be needed (carbon footprint).

As a number of policies are developed, new employment opportunities may be created; ranging from installation of insulation through distributed heat systems, domestic microgeneration, and offshore or marine energy services.

Policy 1: Energy Security (External Threats)

Developing and maintaining an appropriate long term strategy to ensure a sustainable and secure provision of energy for the island which maximises the use of renewable energy, thereby, minimising the island's carbon footprint; and provides an equitable distribution of costs (tariffs) across the Community.

POLICY 1: ENERGY SECURITY (External Threat)

- Develop and implement an effective strategy to ensure that the community's energy needs can be met now and into the future.
- Understand the nature of the security of supply risks and to have clear options to mitigate those risks.
- Reduce the island's reliance on fossil fuels by the introduction of sustainable and economically viable sources of renewable energy.
- Maintain the island fuel supply chain for as long as fossil fuels remain essential to the energy.
- Investigate funding sources to upgrade the Island's infrastructure and for renewable energy supply options.

Policy 2: Energy Resilience

As an outcome of the review into energy options for the Island it has become clear that there are a number of short term initiatives which will contribute to the Island's energy resilience and ensure a diverse, safe and resilient supply of energy to meet Island's needs.

POLICY 2: ENERGY RESILIENCE

- Review, advise, and encourage Islanders and businesses to improve their energy efficiency to reduce the Island's reliance on fossil fuels.
- Continue to invest in upgrading the HV and LV distribution grid to facilitate additional power consumption and to provide flexibility to accommodate current and future technology including storage.

Policy 3: Clean Energy

To align with the strategies of global jurisdictions within the Kyoto protocol, Alderney needs to work towards maximising its use of clean energy by 2050.

Clean energy is vital for our future from both an economic development and an environmental sustainability perspective.

POLICY 3: Clean Energy

- The Island must create an energy system which maximises the use of renewable energy, thereby, minimising the island's carbon footprint.
- Encourage private individuals or other commercial enterprises to supply renewable energy to the system.
- Encourage the domestic renewable generation of energy and investigate the provision of an appropriate feed-in-tariff which benefits all consumers.
- Encourage the use of domestic renewable energy for heating.
- Review restrictive legislation and permitting to encourage the up-take of renewables.

Policy 4: Affordability

Energy needs to be affordable for the Alderney Community and in light of the escalating costs of fuels specific initiatives need to be developed to aid energy affordability.

POLICY 4: AFFORDABILITY OF ENERGY

- Review and revise tariffs to provide an equitable allocation of costs for all consumers.
- Provide guidance and support to improve energy efficiency (such as insulation, use of modern boilers, solar thermal) by the use of appropriate technologies to reduce energy consumption.
- Monitor the cost and availability of all energy solutions and the level of available on island technical support.
- The provision of appropriate tariffs to encourage business development.

Policy 5: Opportunities

New energy technology and energy solutions will continue to develop over the coming years and Alderney is in a unique position, being a small self-contained energy system, to grasp any opportunities that develop from those new technologies by either adopting new technologies or acting as a test bed for their development.

POLICY 5: OPPORTUNITIES

- The States, together with Alderney Electricity, and Island business, should continue to engage in assessing and implementing opportunities as they present themselves.
- Ensure that the island maintains robust contacts with Universities and Technical Institutes to take advantage of potential research which can leverage Alderney's self-contained energy system.
- Maintain an available data bank of energy data to attract interest in research.
- Encourage technology developers to consider Alderney acting as a test bed to pilot or advance developing or new technologies.

Policy 6: Tidal and Wave Energy

The position and geography of Alderney as an Island situated in the English Channel adjacent to the France's Normandy peninsular has meant that there are large tidal and wave energy resources.

- The potential of Alderney's tidal and wave resources will take time to be developed as the technology is not sufficiently advanced to significantly reduce the costs. However, there is continued investment in tidal technology and prices continue to reduce.
- This is a significant future resource for Alderney and advances in the provision of Tidal and Wave Energy should be continually monitored (Raz de Blanchard).
- Developers should be encouraged to utilise the Alderney's Tidal and Wave Resources for pilot work both for their benefit but also to improve the attractiveness for Alderney for future large scale developments.

POLICY 6: Tidal and Wave Energy

- Continue to evaluate the options to develop the tidal and wave resources around the island as technology develops.
- Continue to investigate development opportunities of the islands tidal resource for future revenue streams.
- Continue to provide a framework (ACRE) for major developers to access the tidal and wave energy resources and for the Island to become a recognised source of renewable energy.
- Advance pilot or small scale projects of tidal and wave for the supply of energy to Alderney.
- Monitor developments in the “blue” energy sector for potential energy solutions and revenue streams.
- Maintain a watching brief on nearby energy projects for potential partnerships.

Energy Roadmap for Alderney

Preamble

Reports indicate that the current Global Reserves of Oil are due to run out by 2050 and gas by 2060. However, when considering the distribution of oil globally it is likely that oil supplies will be concentrated in less and less suppliers, before these dates are reached, influencing the future prices of oil and gas.

However, it is likely the oil will be available beyond that date at ever decreasing volumes and ever increasing cost.

To speculate on the oil price is difficult as increasing costs of extraction are impacted by political considerations or constraints to global supply. At the turn of the century the price of oil was in the region of US\$10 per barrel (bbl); pre-Covid the price of oil was in the region of US\$50 to \$70/bbl and now we are faced with the price of oil in a range of US\$90 to \$110/bbl. Hence, oil prices are likely to continue to fluctuate (influenced by political and supply constraints) and rise, and the Island needs to advance its strategy significantly in the next 5 to 10 years to offset and contain its energy costs and to minimise its reliance on carbon based fuels.

Introduction

The States of Alderney Energy Working Group has been working with Alderney Electricity Limited (AEL) and has developed a Roadmap for Alderney's future energy supply options. The Roadmap is based on short, medium and long term strategic recommendations by its consultant Ore Catapult Development Services and also considers the challenges that need to be addressed.

A key part of the Roadmap is to ensure that the Island has sustainable, economic energy supplies for electricity, heating, transport, agriculture and shipping whilst minimising the use of carbon-fuels and hence our climate impact. For the Roadmap to be achieved the Island will need to maximise the use of economically viable renewable resources, and maximise the efficiency of the grid and the Island's energy usage.

Although it is recognised that AEL has limited resources at this time, it is critical that AEL must be resourced to manage and advance the renewables energy strategy (power) for the Island and in addition, affordability needs to be addressed with the revision of tariffs.

The Electricity Concession needs to be amended (updated) and the Alderney Renewable Energy Law also needs to be reviewed and the role of the Commission amended to reflect the current and developing situation as regards marine renewable energy. It is recognised that land based renewables are governed by the land use plan and the Building and Development Control Committee.

The costs of AEL to provide renewable energy options for the Island either have to be covered under the tariffs or partly offset as grants from the States for various development projects as has been funded in the past.

At this stage the Roadmaps, although inter-related, are dealt with separately.

Roadmap for Electricity supply for Alderney

⇒ Over the short and medium term a phased, economical introduction by AEL of wind turbines, solar arrays and energy storage to an optimised level of 85% of the current diesel-generated levels of electricity (ref: ODSL Report). However, it is likely that this level may not be achieved due to space constraints, public concerns, and airfield restrictions;

- ⇒ a revised, equitable electrical tariff system which will also allow domestic or other providers of renewable energy to be able to feed power into the grid and to be compensated depending on the level of network loading.
- ⇒ Continuing with the upgrade of the HV grid and an evaluation of the upgrade of the LV grid, the timelines and its funding.
- ⇒ a smart grid system which will allow multiple providers of electricity supply to be, accommodated on a balanced, efficient grid and which can make use of any domestic storage both to balance the grid and to contain the overall costs of the network;
- ⇒ levels of storage will need to be optimised to maximise the increasing mismatch between increasing renewable electricity energy supply profiles and the offtake profile of the Islands electrical energy requirements
- ⇒ pilot tidal or wave energy options, even at cost similar to current levels of FCC of 26p must be undertaken to aid development; to provide energy for the Island in the future; and as a potential source of revenue for the future.

The obvious choice for storage is high efficiency lithium ion type batteries. These batteries are expensive (£500-£600 per kWh) but being modular can be built up to optimise the utilisation of supplies from renewable sources at off-peak times. However, as hydrogen may be a future energy source for the Island it is possible that hydrogen produced during off-peak times can be stored for use in fuel cells or for the heating boiler fuel. Currently the technology is still moving forward and until it becomes commercial at an 'Alderney scale' cannot be planned on.

Roadmap for the reduction of Heating Oil Usage on Alderney

The ultimate sustainable option for heating is the use of electric boilers, however, when one considers that the cost of electrical energy is, currently, some 26p per kWh and the cost for heating energy is some 12p per kWh (price for heating oil at 107p per litre) for a high efficiency boiler, it is difficult to believe that Islanders would want to move to electric boilers until the cost of electricity is comparative to that of oil, or the cost of oil has doubled. At this point the cost of living on the Island may not be sustainable.

However, as **Phase 1 for the Roadmap for the reduction of Heating Oil Usage** the following can be progressed:

- ⇒ to evaluate and provide advice (via States and Energy Working Group) on improved insulation of buildings thus reducing costs to the building owner and reducing the Islands energy needs;
- ⇒ to advise on the use of solar thermal panels (either as combined units (PV/Thermal) or as part of a solar array) to provide hot water thus reducing the need for heating oil. It is anticipated that a reduction in heating oil usage can be in the order of 30% and that payback for an installation could be in less than 5 years – grant/loan funding may need to be provided);
- ⇒ the States, via the Energy Working Group, needs to encourage property owners to upgrade their oil-fired boilers to the most efficient boilers available thus reducing the overall use of heating oil by the Island. It is anticipated that as inefficient boilers are replaced over the next 5 to 10 years then heating oil consumption can be reduced by up to 30%;

Phase 2 for the Roadmap for the reduction of Heating Oil Usage:

Beneficial PPA power supply Contracts from wind turbines and solar arrays may be able to provide electricity at 10p to 15p/kWh, however, the limitations of available space for wind turbines and for solar arrays may not provide excess levels to supply electric boilers.

In order to keep the electric boiler option alive the Town-Grid will need to be upgraded and it is recommended that the work is commenced and completed with a 20 year schedule in mind. The upgrade of the Town Grid is also of value as

- It will need to be replaced and upgraded within the next 10 to 20 years;

- It will facilitate increased electricity use by those households currently constrained;
- It will facilitate some consumers moving to domestic PV arrays and via a feed-in-tariff it will provide some 'discounted' electricity to AEL and benefit the variable cost of electricity to all consumers;
- It will allow 'restricted' consumers to utilise ground- or air-source heat pumps for hot water heating and central heating;
- It will allow 'restricted' consumers to utilise high rate charging units for EVs;
- It will allow the 'smart grid' to access any domestic storage;
- It will allow the Island to link into any Bailiwick Grid to leverage lower prices for electricity that may be available in the future (consider that the Guernsey electricity tariff is some 16p to 20p/kWh at present).

Roadmap for the reduction of fuels used for transport on Alderney

For general transport Island residents will need to transition to electric vehicles (EVs). A target date of **2050** may be possible for a transition from carbon fuels for non-agricultural or industrial vehicles. However, the following needs to be considered:

- The current cost of electric vehicles (EVs) is high, the distances on Island are short and hence the adoption of EVs will be slow.
- Second hand EVs may be available but come with the need for replacement battery packs.
- The scrapping of EVs is challenging as it is understood that there is no clear methodology to dispose of or recycle batteries.
- Due to the relatively low daily distances electric industrial and agricultural vehicles may be an option for the future but available technology and the high cost may be limitations;
- However the use of hydrogen fuel cell powered vehicles as the technology develops may be a more suitable option for the Island if hydrogen becomes available.