Jersey's Climate Conversation

Factsheet – Renewable energy

In order to meet the target of limiting the global average temperature increase to below 2°C there needs to be a shift away from carbon-based energy sources to low carbon alternatives.

What is renewable energy?

Renewable energy is energy that is produced from ongoing natural processes that continuously replenish. This form of energy is consistently renewed and therefore cannot be depleted.

Different types of renewable energy technologies

Solar photovoltaic (PV) systems – a method for generating electric power by using solar cells to convert energy from the sun into a flow of electrons by the photovoltaic effect. Solar cells produce direct current **electricity** from sunlight which can be used to power equipment or to recharge a battery.

Solar thermal panels – a solar thermal system uses the energy from the sun to heat up water to use in the home. The water in the panel absorbs the heat from the sun and runs from the panel to your hot water cylinder. If needed the pre-heated water can be further heated in the cylinder. Solar thermal panels are not to be confused with solar PV systems, which use the energy from the sun to generate electricity.

Wind - the use of wind to provide mechanical power through wind turbines to turn electric generators for electrical power.

Hydropower - a form of energy that harnesses the power of fast-running water to generate electricity**.**

Geothermal - the thermal energy generated and stored in the Earth, which is harnessed by geothermal power plants to produce electricity.

Tidal - harnessed by converting energy from tides into electricity using various methods, such as turning turbines. It is an extremely predictable energy source; however, it is not widely used yet due to the large cost associated with developing appropriate technology and infrastructure for it.

Wave – a relatively new technology derived from the force generated from driving waves at sea. It is produced and harnessed by electricity generators that are placed on the surface of the sea - it is not commercially available yet.

Modern biofuels – modern bioenergy technologies include liquid biofuels produced from sugar cane and other plants; bio-refineries; biogas produced through anaerobic digestion of residues; wood pellet heating systems; and other technologies. These can be used for transport and heating fuel. There are concerns with the use of biofuels that displace land that could be growing food crops or the use of palm oil whose production has been linked with deforestation in countries like Indonesia and Malaysia.

To what extent biofuels are truly low carbon will vary between the different products used and the processes involved in their production and transport. The highest standard of biofuels come with sustainability certificates showing their origin and content.

Traditional biofuels – the burning of fuelwood, forestry products, animal and agricultural wastes. Traditional biomass was an important energy source for a long period of human history. It remains an important source in lower-income settings today.

Hydrogen – hydrogen is a low carbon fuel, but electricity is needed to split water into hydrogen and oxygen. Therefore, for the lowest carbon impact, the electricity used should be low carbon. Producing hydrogen is currently costly but the costs are falling rapidly as technology develops and becomes commercially available.

Benefits and challenges posed by renewable energy

Renewable energy provides many benefits, but consideration also needs to be given to the challenges that they raise.

Benefits (note not all benefits apply to all the technologies)

- Clean and sustainable ways of generating electricity
- Diversifying the supply of energy
- Increasing the security of the energy supply
- Reducing air pollution
- Reducing greenhouse gas emissions
- Reducing demand for finite resources
- Small-scale renewables can reduce running costs
- Small-scale renewables can payback the cost of installation due to avoided energy costs

Disadvantages

- As renewable energy is generated from natural sources, there can be a problem with intermittent supply, for example when the wind is not strong enough or during hours of darkness.
- This means that energy needs to be stored in batteries or that a constant back up supply of electricity must be made available for when the renewable source is not producing energy.

- The high cost of replacement of energy generating technology especially for emerging technologies like hydrogen
- Some renewable energy has higher cost to the consumer; however, this is changing as the technologies develop
- The physical space required for some technologies (eg solar panels or wind turbines) and the resulting changes to the appearance of the natural environment and landscape where they are installed

Renewable energy in Jersey

Currently 95% of Jersey's electricity is imported from France. Of which 60% comes from nuclear power and 35% comes from tidal. The remaining 5% is produced at Jersey's energy recovery facility. The carbon associated with Jersey's imported electricity from France (95%) is accounted for in the French inventory but we have calculated it and refer to it as Scope 2 emissions recognising that as the energy is produced for Jersey's use, we need to account for the emissions that result from that energy generation.

This means that for carbon accounting purposes, any reduction in the amount of imported electricity to Jersey will not result in a reduction in Jersey's Scope 1 reportable greenhouse gas emissions. A reduction in use of imported electricity will reduce our Scope 2 emissions. Because the electricity sold to Jersey is very low-carbon, there would be minimal overall (Scope 2) carbon benefit from switching from mains electricity to electricity generated on-Island from renewable technologies.

Nuclear is a low carbon, but not renewable, energy source. Jersey is a signatory to nuclear power related environmental agreements, which address nuclear waste and reprocessing plants. Information on Jersey's use of nuclear power can be found on Jersey Electricity's website.

Potential for renewables in Jersey

Utility-scale renewables refer to the capacity for renewable energy systems to supply sufficient energy to the grid to power large scale operations.

Feasibility studies have been conducted to assess the potential for utility-scale renewables in Jersey. This includes tidal power[1]. Generating tidal power would require significant capital investment. Meeting the aims of security and sustainability are likely to involve capital investment in the short-run, and higher unit costs for the electricity produced.

[1] Tidal Stream Industry update for Government of Jersey www.gov.je/SiteCollectionDocuments/Government%20and%20administration/R%20UK%20Tidal%20Stream%20Industry%20Update%20Final%2021.03.2018.pdf

For Jersey to generate offshore renewable energy at the current time when it is more expensive to produce than hydrocarbon-based energy, will require someone to pay this higher cost. Elsewhere, power produced from renewable sources currently receives government subsidies (from the UK or the EU) to reduce the costs for the consumer. That subsidy is not available to Jersey so if we were to generate our own renewable power, we would have to find funding. Over time this is expected to be less of a problem as the technology improves and becomes cheaper, as it has with onshore wind.

There is currently no utility-scale renewable generation on the Island. There are two auto-producing wind turbines and three medium-scale photo-voltaic projects at Woodside Farm, Queens Road and Jersey Dairy. Medium-scale developments or commercial operations require environmental impact assessments to ensure there are no other negative environmental consequences.

The development of renewable energy on the Island is unlikely to be implemented at a scale that could replace the Island's existing primary source of energy supply. However, introducing renewable energy schemes could help support some energy independence and resilience, whilst contributing to a continued reduction in the Island's Scope 2 carbon emissions (or Scope 1 emissions if the generated electricity replaced the on-Island use of fossil fuels).

Policies in the Island Plan guide what kind of renewable energy installations can take place. Existing polices allow utility scale projects on a case-by-case basis. Larger-scale renewable energy developments will typically be considered as installations which serve multiple domestic properties, and large or multiple business premises, beyond that which is already permitted by the Planning and Building (General Development) (Jersey) Order 2011. For detail of these policies, please look at the new 'Bridging Island Plan', which will be released for consultation in April 2021.

Jersey small scale renewables and their potential

It is possible to generate smaller amounts of heat and power from renewable sources to meet individual and community needs. Specific technologies include solar thermal panels, photovoltaic systems, ground and air source heat pumps, micro wind, combined heat and power and biomass.

High quality, well installed systems can deliver annual cost savings through avoided energy costs. These cost savings can payback the installation costs in approximately less than a decade at current prices. However, access to the upfront capital costs is required. Financial incentives are offered in other jurisdictions (such as the UK) to provide consumers to make it easier for them to make this initial investment.

As well as generating electricity or heat that you use on site, it is possible to sell it back to the utility company. This is called a feed in tariff (FiT). Jersey Electricity pays

6.77p/kWh for customers that generate excess electricity and feed it back into the grid. This is approximately the price paid for a unit of low-carbon electricity purchased from France.

In many countries the feed in tariff is more than the basic price of an alternative unit of grid electricity. This is because the renewable electricity is lower carbon than the grid electricity and governments want to encourage its production. In Jersey, there is currently no additional financial incentive for self-generation beyond the basic unit price, as the carbon content of grid electricity is already very low.

Calculating the payback time on the initial investment in the installation is important in decision making for renewable energy projects. The feed in tariff can allow for a faster payback time.

In line with the Energy Plan, the Planning and Building (General Development) (Jersey) Order 2011 currently permits, in many cases, the installation of equipment for the generation of electricity and / or heat from renewable sources. This includes the installation of solar panels, air and/or ground source heat pumps and a single wind turbine. This means that these developments do not require planning permission, but applicants are always advised to check before they go ahead.

Increasing renewable energy generation

There are a number of tools at our disposal that could increase the uptake of renewable energy generation:

- Planning Regulations – potential requirement for all new builds to have domestic small-scale renewables, or for a percentage of renewable electricity to be generated on site;
- Planning Regulations – future proofing buildings to be able to easily adopt domestic small-scale renewables infrastructure into homes;
- Potential for smart grids using domestic small-scale renewables.

If we had more small-scale renewable generation in the Island we would need to consider the following:

- Renewable electricity is intermittent so 'self-generators' are likely to need to keep purchasing some mains electricity;
- Jersey Electricity invest in the grid on the basis of the number of units of electricity they can sell. If they sold significantly less units, they would have less money to invest in the grid. We all still need to use and maintain the grid to transmit electricity (self-generated or mains electricity) and to have mains electricity available when intermittent sources aren't generating. It is argued that that 'by-passing the grid' through self-generation has the potential to put electricity prices up for all customers;

- This 'de-centralising' of the grid is a challenge that all generators and electricity companies face as the price of small-scale renewable energy generation and battery storage falls around the world;
- JE charge a 'stand-by' charge to large scale renewable generators to account for the fact that these larger scale self-generators are bypassing the grid. This charge is currently not made on small domestic-scale self-generators;
- JE also operate a 'roof lease' model whereby the building's owner/occupier enters an 'airspace lease agreement' for 25 years if the roof space is sufficient to generate more than 50kWh of power. JE arrange to supply, install, commission and operate the solar at no cost to the property owner. JE harvest the electricity at an agreed price for up to 20 years.

Read more about renewable energy:

- Pathway 2050: An Energy Plan for Jersey: https://www.gov.je/SiteCollectionDocuments/Government%20and%20administration/R%20Pathway%202050%20An%20Energy%20Plan%20reduced%20(size%201.3mb)%20DM%2020140325.pdf

- Jersey Electricity - Solar PV arrays https://www.jec.co.uk/about-us/projects/solar-pv-arrays/

- Tidal Stream Update to the States of Jersey, 2018 www.gov.je/SiteCollectionDocuments/Government%20and%20administration/R%20UK%20Tidal%20Stream%20Industry%20Update%20Final%2021.03.2018.pdf

Facts and figures on renewable energy technologies around the world

The renewable energy industry is among the largest growing sectors of the global economy, due to declining costs and technological advancements. In 2019, around 11% of global primary energy came from renewable technologies.

Figure 1 below shows the amount of global renewable energy generation, which has more than doubled in output since 2000. Hydroelectric power is the largest modern renewable source, as traditional biomass is not included, accounting for 60% of global renewable energy generation. Wind (20%) and solar power (10%) are both rapidly growing. 'Other renewables' (10%) refer to geothermal, new biomass, waste, wave and tidal.

In terms of the global energy mix, 16% of global primary energy came from low-carbon sources in 2019. Low-carbon sources are the sum of nuclear energy and renewables. 11.4% came from renewables; and 4.3% came from nuclear.

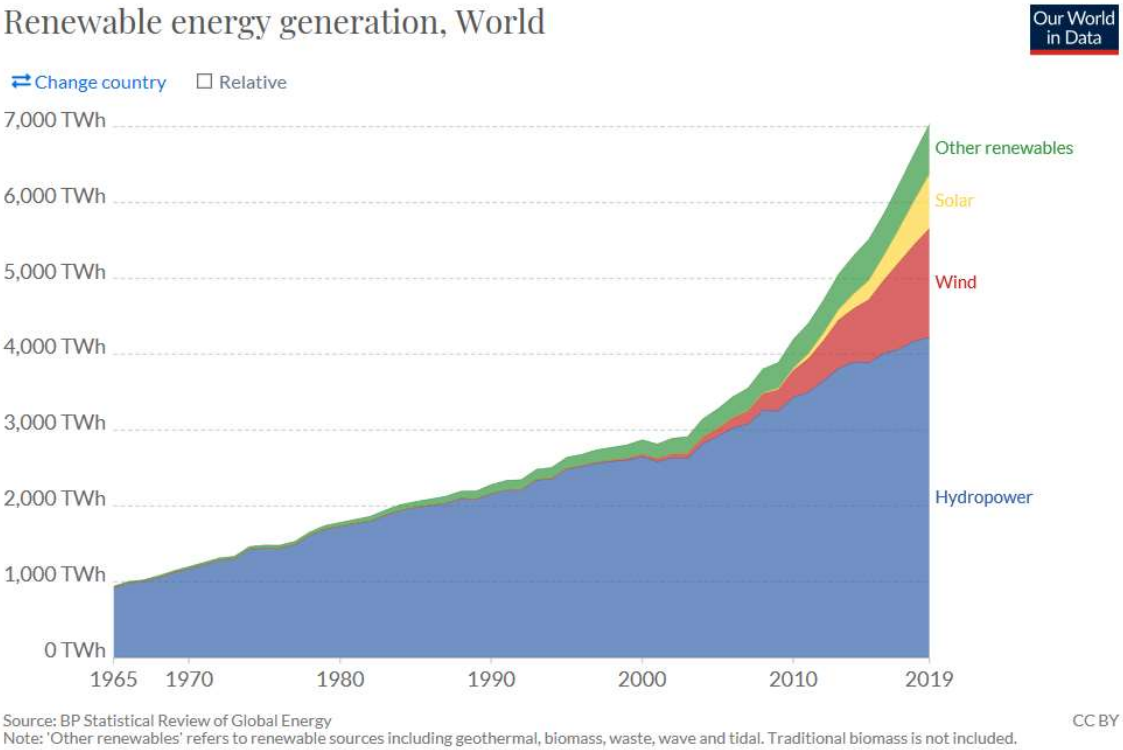

Figure 1 - Global Renewable Energy Generation.

UK

The UK is the world leader in offshore wind, with more installed capacity than any other country, accounting for 53.75% of the UK's renewable energy supply. Renewables

provide nearly a third of UK power, with offshore wind powering the equivalent of 4.5 million homes annually.

France

In France, hydroelectricity is the second largest source of electricity generation, behind nuclear power, and is the primary source of renewable electricity.

France's Energy Policy aims to double the share of renewable energies by 2030. Over 70 percent of France's electricity is currently produced by 58 nuclear reactors. 14 of them are to be closed by 2035, when nuclear should be reduced to 50 percent of the electricity mix. France is evolving its energy mix in order to significantly increase the share of renewable energy, in addition to nuclear energy.

Currently, renewable energy provides 20% of France's electricity, in which wind power alone provided 7.2 percent of France's national electricity consumption in 2019. The remaining 10% is powered by fossil fuels.

Sources:

- https://ourworldindata.org/renewable-energy
- https://www.renewableuk.com/page/WindEnergy
- https://ourworldindata.org/energy-mix
- Akinsemolu, A.A., (2020). The Principles of Green and Sustainability Science. Springer Singapore