The Weekend Essay

Decarbonisation and diversification –

Wind is the Island's only option for large-scale renewable energy right now, writes Dr Mark Leybourne, an Islander who has dedicated his career to finding ways to harness nature's power. He currently leads a global programme on offshore wind for the World Bank

TO some Islanders, the idea of a multi-billion-pound offshore wind farm will sound like the latest far-fetched proposal that is doomed to fail, but I strongly believe Jersey has the fundamentals for success and is going at it in the right way.

I admit, however, that I am slightly biased, as I lead a global programme on offshore wind at the World Bank and have spent the past 16 years of my professional career working to find ways to harness the awesome powers of the ocean.

Like most Islanders, I have a strong affinity and connection with the sea. Growing up in Jersey, I was fascinated by the power of the tide, waves and wind, and how they influenced our daily lives. Studying at Victoria College, followed by a degree in aerospace engineering and PhD in offshore renewable energy at the University of Southampton, gave me the foundation to better understand the potential energy of these natural resources and how they can be harnessed.

I have since analysed every offshore renewable energy resource available to the Island and, while Jersey's waters feature powerful tides and waves, neither is currently an economical solution. Right now, the Island's only large-scale renewable energy option is offshore wind.

My first work in the Island was in 2011, when I came back to advise the Government of Jersey on the feasibility of tidal-stream energy, which uses the speed of the water flow (tidal stream) to generate electricity.

Although Jersey has areas of fast-flowing water, due to technical, environmental and economic constraints, only about 20% of this resource can be used. Despite popular belief, tidal stream could, at most, supply only about 13% of the Island's annual electricity demand.

Unfortunately, our tidal-stream resources are limited and, as much as I don't like to admit it, are not as good as the conditions found off Alderney or France.

Tidal stream is still a maturing technology that is not yet commercially available. The largest tidal-stream array is a demonstration project, comprising four turbines with a total output of only 6MW – enough to power a few thousand homes.

The next generation of projects are still being planned and will be four or five times larger. For example, a 30MW tidal farm, deployed in Jersey's best site, which is within the Ruau Channel, off Rozel Bay, would produce around 36GWh per year, which is equivalent to less than 6% of Jersey's annual electricity demand.

With today's technology, the cost of electricity from this project would be at least three times greater than that Jersey Electricity currently buys from France.

In 2018 I, once again, returned home to advise the government on the feasibility of tidal-range energy, which uses the changing height of water to generate electricity. A commercial developer had proposed building a large dam wall from Noirmont to St Helier to create a tidal lagoon in St Aubin's Bay which would operate in a very similar manner to the tidal barrage scheme in La Rance, and similar to the scheme proposed for Swansea Bay.

This type of lagoon is the only practical way for Jersey to extract tidal range energy, but the technology is still largely unproven and is cost prohibitive. The scale and complexity would be a major challenge, let alone understanding and mitigating the environmental impact of walling off St Aubin's Bay.

Setting aside the issues of affordability, environmental impacts and technology risk, although Jersey has one of the world's largest tidal ranges, a lagoon could only generate 70% of the Island's annual electricity demand.

Logically, I concluded that neither tidal stream nor tidal range are realistic options right now, but could be reconsidered in the future as they are proven elsewhere. Recognising the positive progress of the nearby Saint Brieuc offshore wind farm in French waters, I encouraged the government to investigate offshore wind resources.

In 2018, I led the feasibility study which now underpins the government's initiative on offshore wind. The study's main conclusion was that Jersey has an excellent offshore wind resource with the potential to provide many economic benefits.

> **Jersey has all the fundamental elements needed for an offshore wind farm. Delivering the Island's largest ever infrastructure project will not be simple, but it has the potential to provide huge benefits to all residents and become another reason to be proud of Jersey**

The study identified a 220-square-kilometre area in the south-west of the Island's waters as the most suitable for a offshore wind farm, by avoiding sensitive biodiversity, important fishing areas and shipping traffic routes. This site could host at least 1,000MW (or 1GW) of offshore wind, which would provide better economies of scale than a smaller project, and could generate around 3,770GWh per year, which is six times the Island's current electricity demand, and at least double the Island's total annual energy demand.

Offshore wind could fulfil all of Jersey's energy needs and have the same amount leftover, thereby providing enough energy for the Island to become energy independent. In addition to energy security, offshore wind would allow Jersey to become an exporter of energy to France, Guernsey or even the UK, providing a new source of revenue.

Unlike tidal technologies, offshore wind is well-established and commercially viable, with over 10,000 turbines operating around the globe, and a combined capacity of 64GW. Since the first pilot project was installed in Denmark in 1991, offshore-wind technology has matured, with a massive increase in scale helping to dramatically reduce its costs.

Extensive research has informed environmental and social mitigation measures and careful project planning, meaning there has been no evidence of significant negative impacts from offshore wind. As a result, over the past decade, the industry has boomed because of the benefits it provides.

The offshore wind industry has not been immune to the impacts of recent world events on global supply chains, inflation and interest rates; now that the pain is known and the industry is adjusting, costs are expected to reduce again in the near future.

Given that it typically takes at least seven years to plan, develop and construct a project, the timing is right for Jersey to start developing its offshore-wind resources.

Jersey will not be alone in its quest to develop offshore wind; 19 countries have already installed wind turbines in their waters and at least 30 more are planning to follow. Offshore wind is expected to make a vital contribution to global decarbonisation alongside other renewable energy technologies such as solar, onshore wind and hydro.

If the targets set by government policies around the world are met, the industry must quadruple in size by 2030 and, for the world to achieve net zero by 2050, it is expected that at least 2,000GW of offshore wind will be needed.

Given the urgency to decarbonise and accelerate the roll-out of offshore wind globally, four years ago the World Bank asked me to move to Washington DC to be their global lead for offshore wind. Clearly a humbling but formidable challenge, I lead a programme to advise and fund governments around the world to establish new offshore wind markets, supporting them through early project development and setting the conditions to attract the vast amount of private-investor capital that will be needed.

During this time, I have been fortunate to have worked with the energy ministries of 24 nations – from large countries such as India and Vietnam to the small islands of Barbados and Saint Lucia, which have many similarities to Jersey.

Generating renewable electricity is not the only reason these countries are developing offshore wind and each has its own priorities. Decarbonisation, diversification, energy security and economic benefits are often the main drivers, and Jersey's motives are no different.

The past few years have been dramatic for European energy markets, with the significant impacts of Brexit, the Covid-19 pandemic and increased global insecurity with the tragic wars in Ukraine and the Middle East, all leading to painful increases in inflation and interest rates globally.

They have shown us that, in this vast, turbulent world, we should not assume that we will indefinitely have access to imported, cheap, low-carbon electricity.

Our vulnerable island must proactively secure its future energy security and affordability while achieving its transition to net-zero carbon and its aspirations for economic growth and diversification. To do this, the Island's future energy system will inevitably feature different forms of power generation, energy storage, interconnection and demand management – an energy system which is far evolved from today's.

On occasion, we can see French offshore wind turbines from the Island, but we receive no direct benefits from them. The area of Jersey's waters identified in the feasibility study is just to the north of

Turbine platforms destined for Saint Brieuc's offshore wind farm are transported past Jersey's south-west coast earlier this year Picture: DAVID FERGUSON

Dr Mark Leybourne at the Kincardine offshore wind farm, which is off the coast of Aberdeen. It is the UK's first floating offshore wind farm

– the huge benefits of offshore wind

the existing Saint Brieuc wind farm, so it would be our own wind turbines we would see while they provide us with huge energy and economic benefits. But, to maximise these benefits, I encourage our local communities to engage in the ongoing public consultations and take the opportunity to voice their priorities.

Offshore wind must be developed with strong local roots and with an understanding of the Island to ensure that value is passed on to Islanders.

Beyond the long-term certainty of the price of power, there are many other benefits that an offshore wind farm could provide. The most straightforward is an annual lease fee for the wind farm's seabed area and this would pay at least £4 million per year to Jersey's economy. Community benefit funds are also commonly used by other jurisdictions and could provide grants for local projects and initiatives – from infrastructure upgrades to education programmes.

More complex, innovative benefits include local investment opportunities and community ownership shares. There will also, inherently, be high-value and skilled local jobs created and sustained throughout the development and operation of the wind farm.

Through my experience, working globally, it is abundantly clear that the clarity and commitment demonstrated by a government are fundamental factors for investor confidence and success. To attract the large amount of investor and bank funding needed, uncertainty must be reduced to a minimum.

Having supported the Island's government for over a decade, I am deeply encouraged to observe that the Government of Jersey's approach is well considered, sensible and pragmatic. The current plans are based on the lessons learned from the UK experience and they set out a series of steps that incrementally help to reduce uncertainty.

Ultimately, the wind farm will be a private, commercial venture and not financed by the government, meaning there will be no additional financial burden on the Island.

There are still many unanswered questions about the wind farm, but these will only be addressed through the work of a commercial project developer (often a consortium of multiple parties) in close co-operation with the Island and its communities. Providing a framework to enable the selection of a credible developer is a no-regrets action and has no downside or risk to Islanders. Years of studies and investigations will then be required before a request for planning permission.

The ongoing public consultation will allow people to voice their support or concerns. I intend to be present at each of the three public meetings and look forward to discussing this issue which I am so passionate about. I hope the public will also see the tremendous upside and opportunity for the Island and give a mandate for the government to take the next step in the process.

Jersey has all the fundamental elements needed for an offshore wind farm. Delivering the Island's largest ever infrastructure project will not be simple, but it has the potential to provide huge benefits to all residents and become another reason to be proud of Jersey, the place we all call home.

For my part, I am an Islander committed to Jersey and its success. As I have for the past decade, I will continue to work with the government, the communities and other stakeholders and contribute my global experience to help make offshore wind a reality for the Island's exciting and windy future.

● These are the personal views of Mark Leybourne. The World Bank is not providing official assistance to the Government of Jersey.

Dr Mark Leybourne is the global lead for offshore wind at the World Bank and has worked in the offshore-wind industry for the past 16 years. He has supported governments and project developers in over 30 countries, including advising the Government of Jersey on the Island's tidal and offshore wind prospects. Growing up in Jersey, Mark attended Victoria College before studying at the University of Southampton for a degree in aerospace engineering and a PhD in offshore renewable energy.