

## Tidal Range **Power for the people**



METRO MAYOR LIVERPOOL CITY REGION



#### Foreword



**Steve Rotheram** Mayor of the Liverpool City Region

For as long as I can remember there has been talk of building a tidal barrage on the River Mersey and, thanks to devolution, we're working to make it a reality. I want to harness the potential of our great river, which has been the lifeblood of our region's fortunes throughout its past – to power our future.

Mersey Tidal Power has the potential to position our region as a worldwide centre of excellence in a key industry of the future – and establish ourselves as the UK's Renewable Energy Coast. It's power for the people, by the people.



#### Cllr David Baines

Deputy Mayor of Liverpool City Region and Portfolio Holder for Net Zero & Air Quality

We have set out a strong ambition for attaining Net Zero, reducing our demand for fossil fuels and using electrification to lower emissions and improve air quality. A tidal range project is just one of the solutions in the Liverpool City Region jigsaw, close to our urban need.

### National Energy Security Means it's time for Tidal Range

'As an island nation surrounded by water, we will also aggressively explore renewable opportunities afforded by our geography and geology, including tidal and geothermal.' UK Energy Security Strategy (7 April 2022).

#### The UK faces the triple challenge of reducing carbon emissions and improving energy security, while also addressing affordability.

Tidal range is a globally proven technology, used for over 60 years, that can provide domestic green electricity, alongside offshore wind, solar and other renewables.

Mersey Tidal will predictably contribute on a daily basis to improve UK energy security vulnerability to reduce the reliance on imported energy and geopolitical forces.

As a reliable and local solution, Mersey Tidal can reduce price volatility and provide generation close to the urban demand of Liverpool City Region, without the need for new long-distance transmission, providing the electricity to charge our Electric Vehicles and heat our homes, without the risk of curtailment.

### Mersey Tidal proposition North West – UK's Renewable Energy Coast

The North West has established itself as the UK's Renewable Energy Coast and already has 13 offshore wind farms from the Solway Firth in Cumbria to Anglesey.

Four more offshore wind project sites are now in Consenting for deployment in Liverpool Bay before 2030.

The proposition to develop and deploy Mersey Tidal Range will add to the security of electricity generation in the North West and provide predictable generation close to the urban, port city region.

A tidal range project, that will operate for over 120 years, will provide more clean and secure energy, provide protection against sea level rise and be deployed to help create and enhance natural habitats.



IT'S TIME FOR TIDAL



#### Mersey Tidal proposition Growing the Liverpool City Region

The River Mersey is the marine artery of Liverpool City Region, with the historic city waterfront central to the fast-paced development of the region.

Our progress in riverfront development at Liverpool Waters, Wirral Waters and North Liverpool (including new Everton stadium) demonstrates the ongoing regeneration of Liverpool City Region. Our critical port infrastructure, shipbuilding facilities and road connectivity to the rest of UK ensure Liverpool City Region has a prosperous future.

Mersey Tidal is an essential project for our Net Zero ambition and a central cog in providing clean, marine energy to our residents as we look to decarbonise our region through electrification.

- LCR Freeport supports the development of 310ha of land with 675,000sqm of commercial development creating over 10,000 new jobs.
- The LCR Life Science Investment Zone will attract c£500m of investment into key life science cluster locations across the City Region from 2024 -2029.







- Liverpool is a strategically important port facing west and handling half of the UK trade with North America. Our Freeport status provides a platform for further investment and growth.
- 2. The new stadium for Everton Football Club, on the banks of the Mersey in North Liverpool is due, for completion for 2024-25 season.
  - Our historic waterfront area at the Pier Head, with the Three Graces, of the Royal Liver Building, The Cunard Building and the Port of Liverpool Building define the Liverpool skyline and are internationally recognised.
  - The 500 acres Wirral Waters development on the left bank of the Mersey, is transforming the area around the old floats (docks) to create new neighbourhoods.
- Cammell Laird is a strategic UK shipbuilding and repair facility on the Mersey, at the heart of our maritime industry with capacity for constructing and maintaining passenger, research and defence vessels.
- 6. The Mersey Gateway Bridge opened in 2017 as an essential infrastructure upgrade, between Runcorn and Widnes in Halton, providing much needed additional transport capacity with a six-lane highway improving connectivity and journey times.

## Mersey Tidal Scheme A barrage solution?

A Mersey Tidal scheme based on a barrage solution would be a first of a kind (FOAK) project in the UK, and involve constructing a barrage with turbines, sluices and marine navigation locks in the Mersey.

The engineering, manufacturing and construction would be the largest project in the North West and be a bold statement of our ambition to address the climate change challenges of decarbonising our electricity system by using clean renewable energy and responding to the flood risks posed by sea level rise.

We need more electricity to enable heating and transport to decarbonise and move away from fossil fuels, and we need it local to our demand.





- 1. The tidal range turbines are based on mature technology and at 25 MW each are already bigger than the largest offshore wind turbines.
- 2. To aid water management, close to the natural tidal cycle, we will also have an array of sluice gates to let water pass quickly through the barrage when needed.
- 3. Our building retrofit programme has commenced, and adding heat pumps will mean we can use tidal electricity to heat our homes and provide domestic hot water.
- 4. Our plans for decarbonising transport will need more electricity to charge our electric vehicles (EVs) and provide green hydrogen for heavy transport.

## Mersey Tidal proposition Tidal Range operation

Tidal Range schemes generate electricity using the energy available from the difference in height of the tides which can be up to 10 metres (33 feet) in Liverpool.

A massive un-tapped resource close to our urban port city region.

Electricity can be produced as two-way generation using the incoming or rising tide (Flood) and then again using the outgoing tide (Ebb).

One-way generation is also possible, when the tide is allowed to 'flood' in quickly with electricity then produced with the outgoing or falling tide (ebb) only. Alternatively, electricity can be generated on the rising tide only.

Tidal range is different from tidal stream. Tidal stream uses submerged turbines, in tidal flow channels, generally with much smaller units in remote locations.



A cross section of a tidal range scheme showing difference in water levels for ebb generation

#### A century of operating Lifetime operation comparison



A typical comparison of operating life of low carbon new-build projects showing the additional long life value of tidal range

### Technology Operating Life

We need a mature assessment of how Tidal Range can be part of the UK energy mix, not just for today, but for over a century.

Investing in Tidal Range today is rewarded with clean generation for both 2050 and onwards to 2150. This creates long-term value for money without the need for further investment in replacement projects.

There is no other emerging renewable technology that can offer electricity for a century or more.

The operating life of tidal range projects is similar to hydropower, which exceeds 120 years (over four times that of wind farms and twice that of a nuclear plant).

Tidal range schemes also bring significant co-benefits that other schemes do not bring (such as flood defence, coastal protection, active transport connectivity, and tourism).

# Mersey Tidal proposition **Tried and Tested**

#### La Rance, France



The EDF tidal range plant at La Rance, near St Malo, France has been operating since 1966, and has 24 turbines each of 10 MW capacity. It has now been operating for over 50 years and is the second largest tidal range station in the world.

The scheme is 750m long , generates over 500GWh of electricity each year and provides power for over 200,000 people. A new ecological balance has developed itself in the estuary since the station was built. Fauna and flora are plentiful and varied.

#### Sihwa, South Korea



The K-Water tidal range plant at Sihwa, South Korea has been operating since 2014, and has 10 turbines each of 24.5 MW capacity. It has now been operating for a decade and has a dual purpose to generate electricity but also to flush water into the Sihwa lake to improve water quality.

The scheme is part of a 12 km sea wall road near Ansan City, with visitor centre and exhibition space that attracts over 1 million visitors each year. The station generates over 550GWh annually, on the rising tide.



Dunlin are prolific on the Mersey



Marine Mammals are often seen in and around Mersey

The Mersey Tidal power project is regarded as a Nationally Significant Infrastructure Project (NSIP) and will progress under the Development Consent Order (DCO) process and in line with National Policy Statement (NPS ENI) which sees the potential of a place for Tidal Range in the UK energy mix.

A tidal project on the Mersey will create a major new piece of infrastructure – linking the left and right bank (Wirral and Liverpool) – with the potential to provide more clean energy, provide protection against inevitable sea level rise and can be deployed to help create and enhance natural habitats. This will require assessment and agreed mitigation plans.



Natural habitats are under pressure from forecast sea level rises

## What we need **Summary**

Mersey Tidal is the largest publicly-led renewable project in the UK, looking to deploy giga-watt scale Tidal Range, close to the demand of our urban, port city region.

For tidal range to progress, in line with our national need for net zero electricity, and for the creation of a new sector of renewable energy, with up to 10 GW of capacity, the following enablers are required:

- Explicit Government Policy support for Tidal Range Tidal range must be an explicit technology in UK Energy Strategy and the National Planning Statements (NPS) to show the commitment to the sector and to benefit from the review of the planning system timeline for major energy infrastructure.
- Decision to support Development activity and funding as a new sector within clean energy, we want to see;
- The creation of tidal range task force to look at barrage and lagoon schemes.
- More collaboration from across Government to promote tidal range.
- Recognition of international experience and tried and tested technology.

This funding and support would be similar to that seen recently to kick start Hydrogen and provided for Hydrogen and CCuS FEED studies. All new large renewable technology in the UK have received funding support to get going - tidal range needs that same support now.

- Development of a Tidal Range Financing Bill recognising that a Regulated Asset Base (RAB) model, as proposed for Sizewell C, is more appropriate than Contract for Difference (CFD) as the right mechanism for 120-year tidal range operating asset.
- Site development lease approach we need a common approach with The Crown Estate and Duchy of Lancaster to sea-bed leases for a barrage or lagoon, without the prohibitive, high-entry costs seen by Offshore Wind in recent sea-bed leasing.

For Mersey Tidal to progress, in line with our national need for net zero electricity, then the enablers we need to be able to progress Mersey Tidal, in line with original devolution commitments are;

- Decision to support Mersey Tidal development activity as the leading project in tidal range in the UK, and as an extension to the LCRCA devolution agreement we want to;
- Use devolution to develop not just explore tidal range.
- Secure development grant funding support for Mersey Tidal.
- Build a UK supply chain and manufacturing base in the North-West.
- Creation of an international tidal range centre of excellence in Liverpool City Region that builds on our international oceanographic, maritime and advanced manufacturing experience to;
- Stand-up a digital engineering and marine manufacturing centre.
- Create physical test facilities for turbines and other marine equipment.
- Provides an expert centre for Power to X research and studies.







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