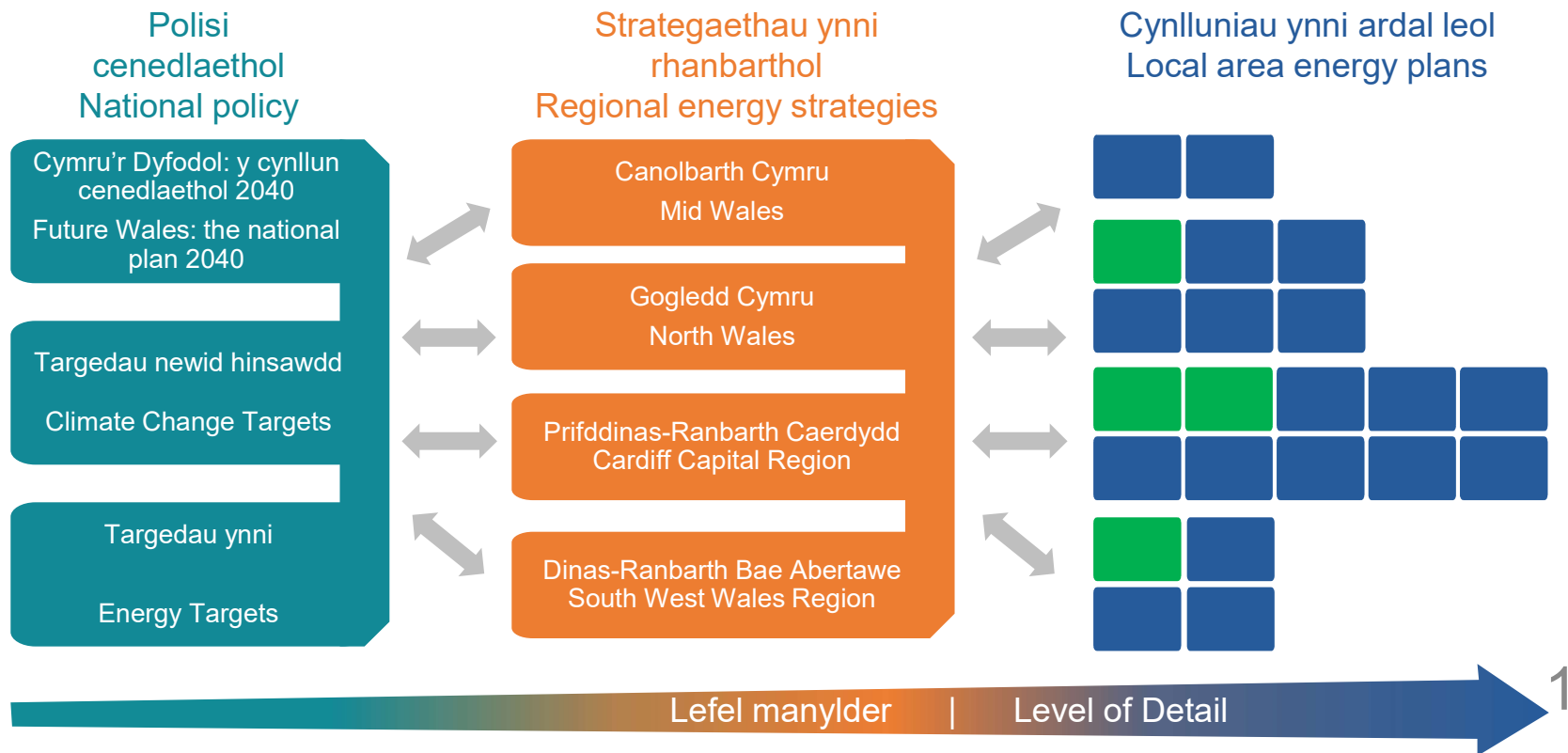
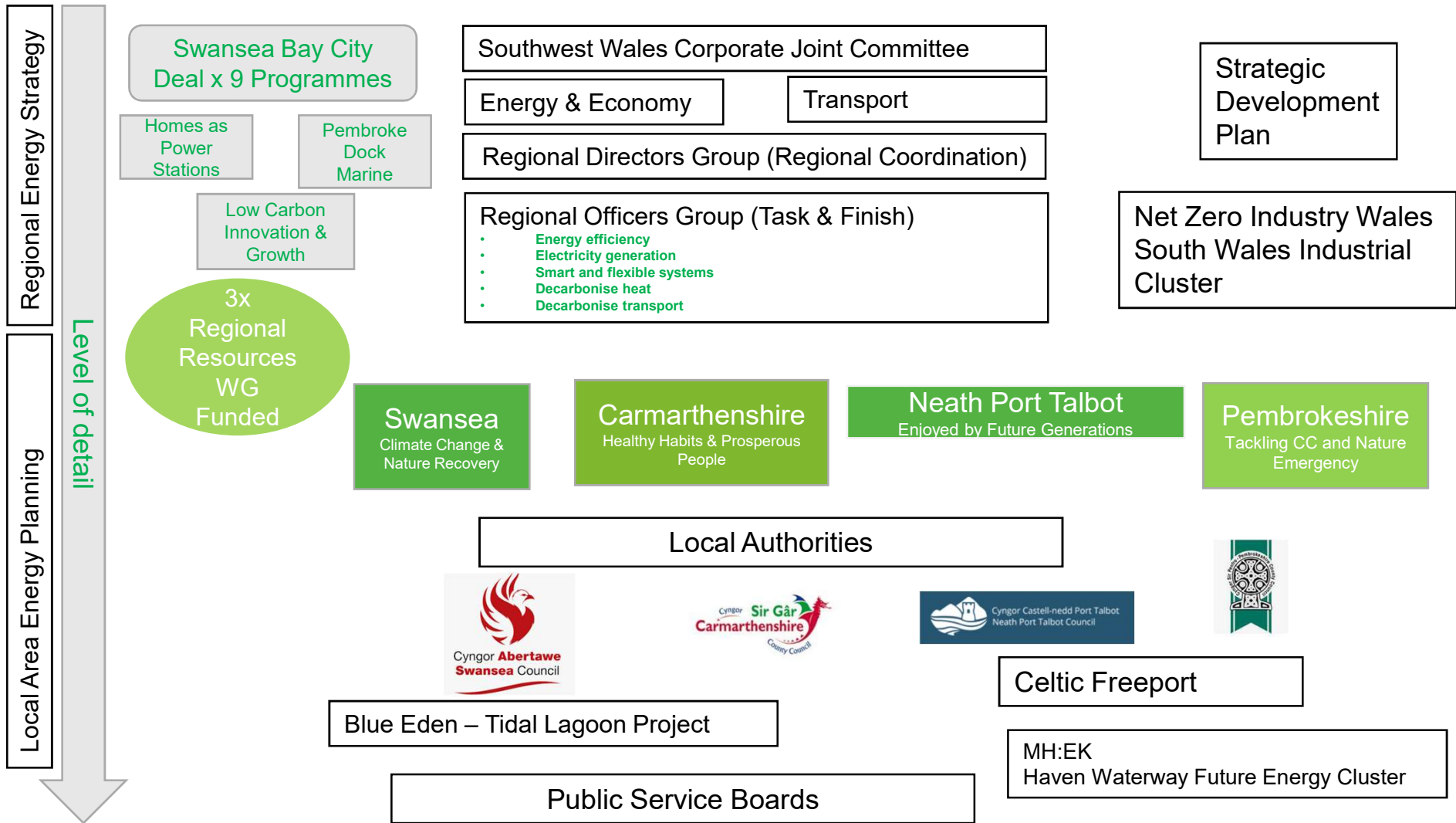
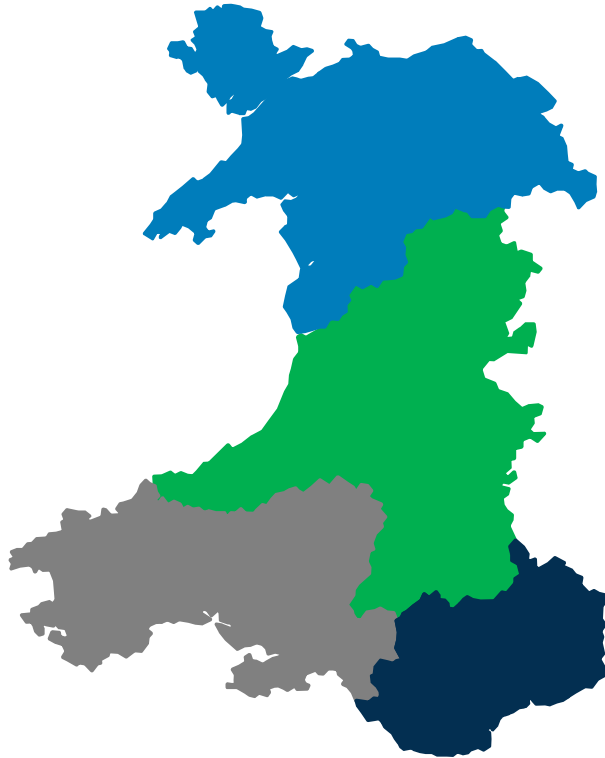


# Cynllunio ar gyfer system ynni carbon isel sy'n fwy integredig Planning for a more integrated low carbon energy system





## Wales Wide View



Regional Level

- Growth Deals (CCR, NWAB, GMW)

Regional/Local Level

- Public Services Board
- Regional Energy Strategy

Local Level

- Local Authority Cabinets
  - Local Area Energy Plans
-

## SWWCJC Corporate Plan - approved action plan for the regional energy strategy

Appendix 2 – Regional Energy Strategy, Well-being objective 1 - action/steps, timescale and impact measures. To deliver the RES, we will take the following steps 2023-2028:

Priority	Actions	Impact Measures
<b>Map available resources and identify resource gaps.</b>	<ul style="list-style-type: none"> <li>Undertake an evaluation exercise to determine that the correct level of resource and expertise is embedded within each Council for the effective delivery of activity and programmes within each specific thematic theme of the strategy:</li> </ul> <ol style="list-style-type: none"> <li>Domestic energy</li> <li>Renewable energy generation</li> <li>Transport and active travel</li> </ol>	Establish regional delivery team.  Alignment to existing programmes.
	<ol style="list-style-type: none"> <li>Commercial and industrial</li> </ol> <ul style="list-style-type: none"> <li>Complete Local Area Energy Plans</li> </ul>	
<b>Formulate implementation programmes alongside our partners, including private industry.</b>	<ul style="list-style-type: none"> <li>Develop prioritised action plans for the four programme themes</li> <li>Enable and facilitate programme and project implementation</li> <li>Align projects (and benefits) with Regional Economic Delivery Plan low carbon objectives</li> <li>Ensure Well-being objective informs Regional Transport Plan.</li> </ul>	Local Authority Energy Plans aligned with Regional Energy Strategy benefits realised.

- Some items in progress:
- CJC Regional Energy Sub Committee
  - Recruitment for LAEP co-ordination/delivery
  - Workshop(s) to hone SWW Regional Energy Strategy and align to LAEPs

## Challenges

- Pace & Scale at the regional strategic level
  - Uncertainty around the cost of delivery/net zero (Audit Wales)
  - Funding capital and revenue funding for identified projects
  - Skills now and future to design, deliver, implement, maintain and monitor
  - Policy Reforms & Influence
  - Governance – alignment with other regional projects
  - Infrastructure
-

## Regional economy and energy landscape - understanding the landscape, the scale of opportunity and gaps

### Why South West Wales?

South Wales has the UK's 2<sup>nd</sup> largest Industrial Cluster. Milford Haven is the UK's largest Energy Port - Circa 20% of the UK's energy imports.



RWE Pembroke  
Power Station  
2200MW Combined  
Cycle Gas Turbine

Valero Pembroke Refinery  
270,000 bpd, 10.5m  
barrels storage

Valero Pembrokeshire  
Oil Terminal  
8.7mb petroleum products  
storage facility

Dragon LNG  
Liquefied Natural  
Gas terminal

South Hook LNG  
Liquefied Natural  
Gas Terminal

Puma  
1.4m m3  
storage facility

4,000 jobs (40% of total local employment around the Port)

- Tata Steel in Port Talbot - UK's biggest single point emitter
- RWE's Pembroke Power Station - UK's third biggest single point emitter
- Valero's Pembroke refinery – in the UK's top ten single point emitters

A once in a generation opportunity to support the transition to a renewable energy based economy by utilising the abundant renewable energy resources (FLOW, tidal, wave, green hydrogen) off the SW Wales coast, Swansea Bay and the Severn Estuary.



# The South Wales Industrial Cluster (SWIC) collaboration

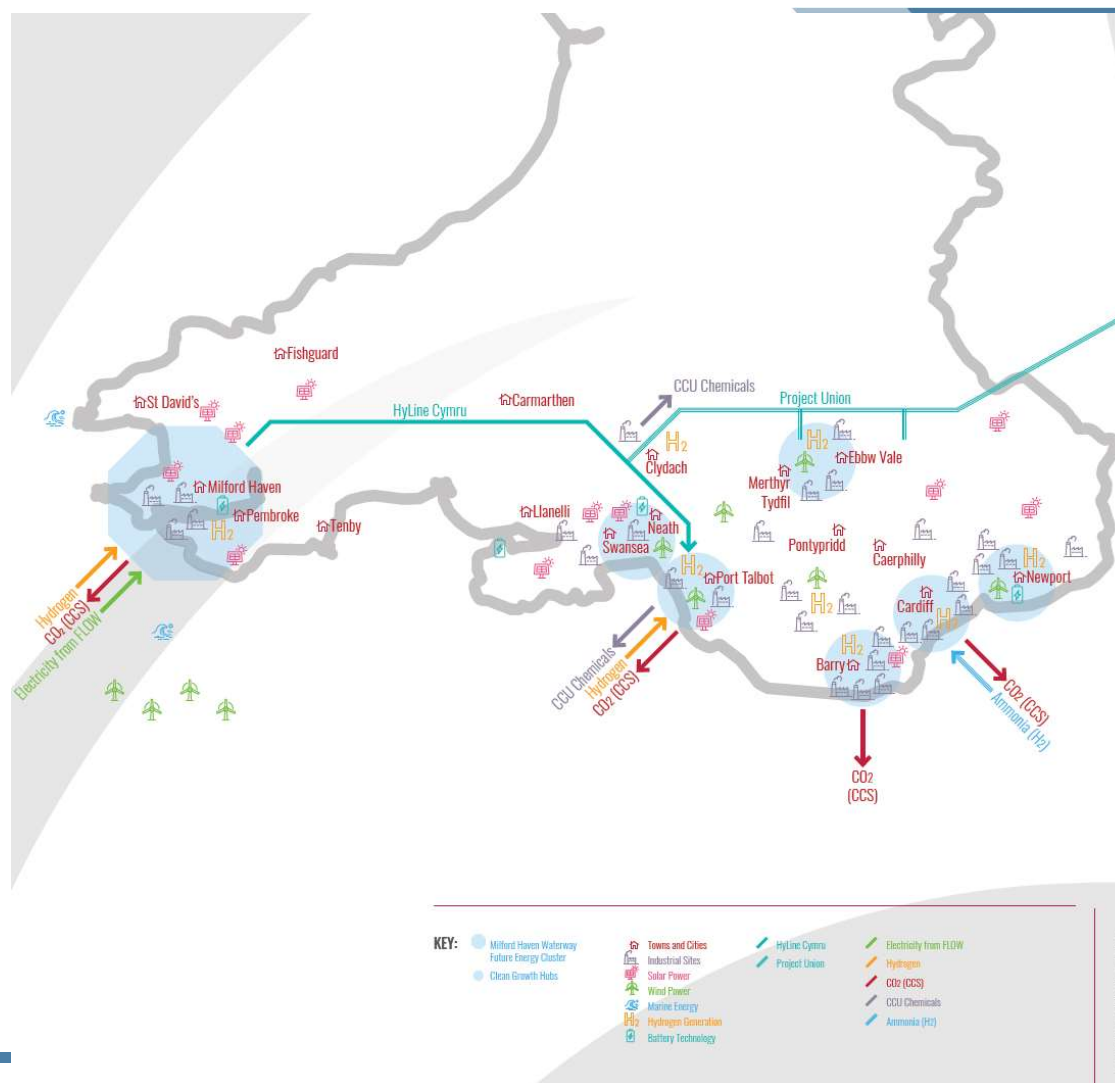
South Wales is home to a significant industrial base, including the UK's largest integrated steelworks, one of the UK's seven oil refineries and one of only four nickel refineries in Europe.

## The SWIC Vision

“Develop a world leading, truly sustainable industrial cluster, befitting the societal needs of 2030, 2040, 2050 and beyond”.

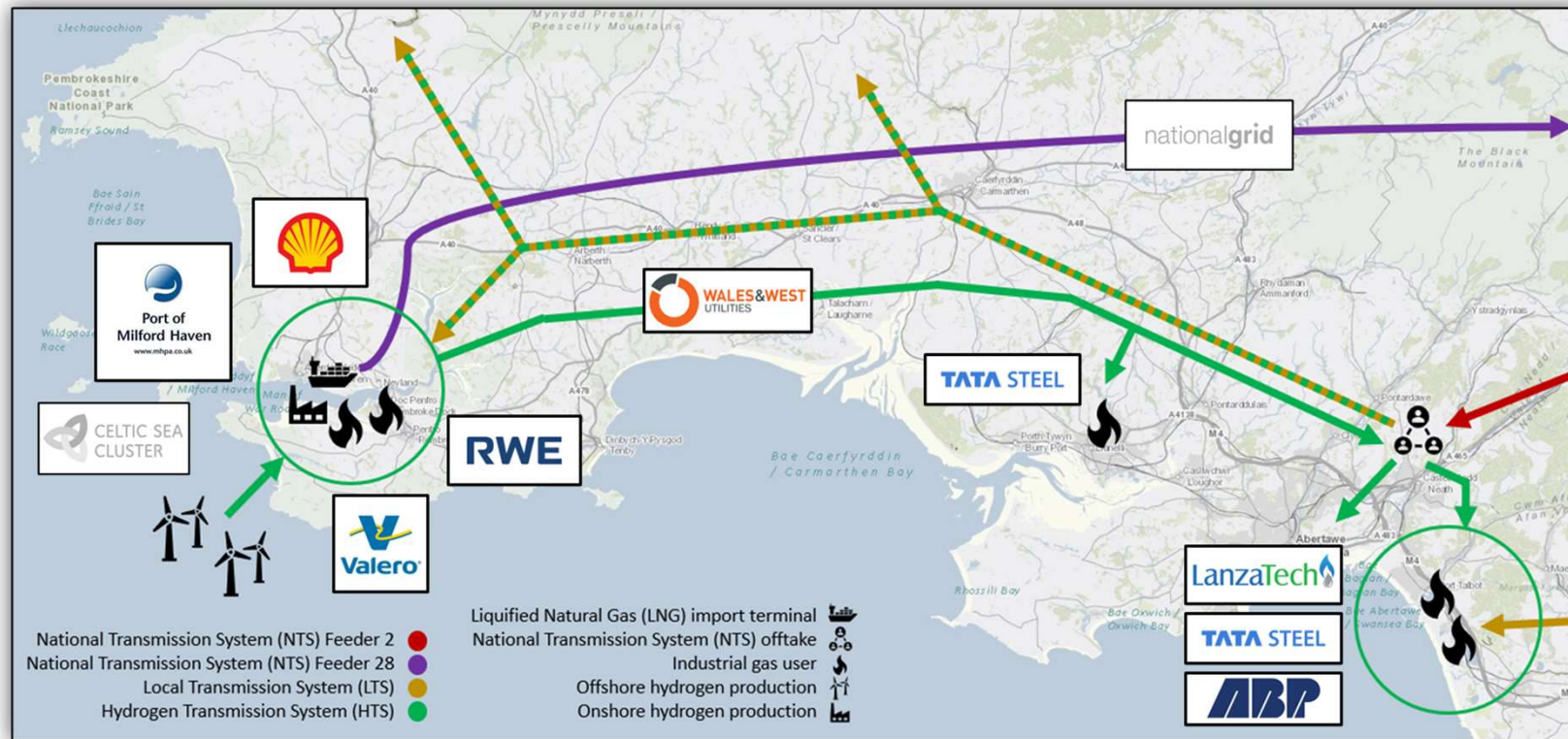
The SWIC Vision showcases ambitious plans to achieve:

- Net zero industries in South Wales by 2040, equating to **40% reduction of current Welsh CO<sub>2</sub> emissions**
- **Retention of 113,000 jobs** and a net positive increase in jobs overall
- **Unlocking £30bn investment opportunities** in the region
- **Growing the £6bn Gross Value Added** from South Wales industry.





# WWU Hydrogen LTS Feasibility – Phase 1 – ‘HyLine Cymru’





## Vision: – SW Wales is home to a vibrant clean energy cluster, the bedrock for the UK’s hydrogen economy

### FLOATING OFFSHORE WIND (FLOW)

- The Crown Estate’s (TCE’s) ambition is to unlock up to 4GW of new floating offshore wind capacity by 2035.
- TCE state regional potential to utilise a further 20GW of floating offshore wind capacity by 2045.
- Studies show more is potentially attainable 49.9GW (low) to 120GW (high).
- **3,000 jobs and £682m in supply chain opportunities for Wales and Cornwall by 2030.**
- The Celtic Sea is home to the **first ever floating offshore CfD award** (Hexicon’s 32MW Twinhub project to be built 2025-27)

Project Name	Capacity	Developer	Expected Completion
TwinHub	32MW	Hexicon	2025 (contracted)
Erebus	96MW	Blue Gem Wind (a joint venture between Total and Simply Blue Energy)	2026/2027
Valorous	300MW	Blue Gem Wind	2029
Llyr 1	100MW	Floventis (a joint venture between SBM Offshore and Cierco)	Unknown
Llyr 2	100MW	Floventis	Unknown
Whitecross	100MW	Offshore Wind Ltd. (a joint venture between Cobra and Flotation Energy)	Unknown
Pembrokeshire Demonstration Zone	180MW	Wave Hub	Unknown
Llywelyn	300MW	Falck Renewables & BlueFloat Energy	Unknown
Petroc	300MW	Falck Renewables & BlueFloat Energy	Unknown
Gwynt Glas	300MW – 1,000 MW	EDF Renewables UK & DP Energy	Unknown
Celtic Deep 1	98MW	AWC Technology Ltd.	Unknown
Celtic Deep 2	300MW	AWC Technology Ltd.	Unknown

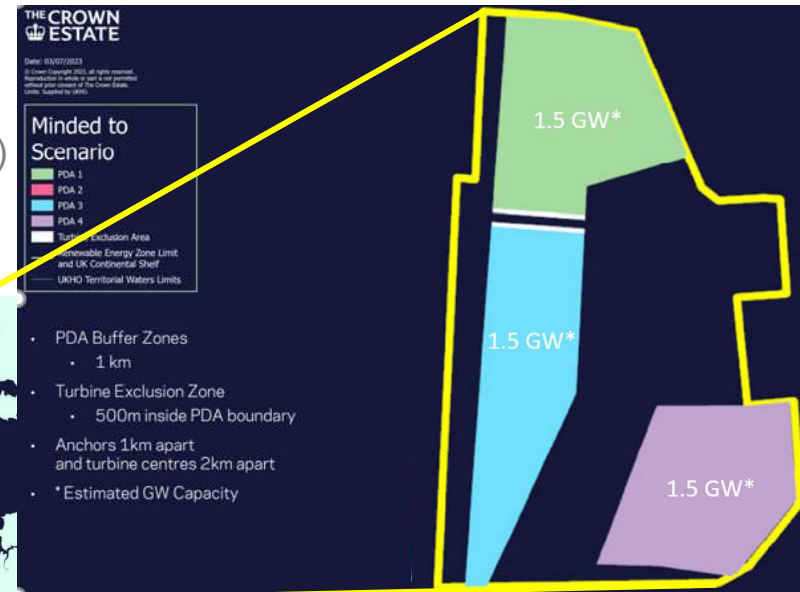


Table 1 Floating wind projects in planning in the Celtic Sea.

## FLOW IN WALES - THE OPPORTUNITY

For perspective UK baseload power consumption 32 GW, peak is 47 GW

- 4.5GW of new FLOW capacity by 2035 (3 x 1.5 GW zones)
- 20GW of FLOW capacity by 2045.



The Bristol Channel and Severn Estuary is home to the second largest tidal range in the world after the Bay of Fundy in Canada

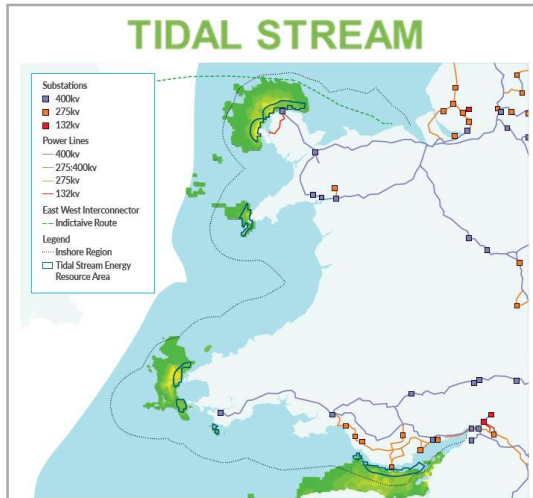


Figure 11 Tidal stream resource area around Wales. Source: Sector locational guidance: tidal stream energy (January 2022) (Welsh Government).

Ramsay Sound - Cambrian Offshore  
- capacity of up to 1 MW connected to South Wales grid.

Larger area West of Ramsey Island - modelling shows 1.3TWh annual potential.

Anglesey - [Magallanes Renovables](#) - deploying 5.62 MW [Morlais](#) Project - power to grid in 2025.

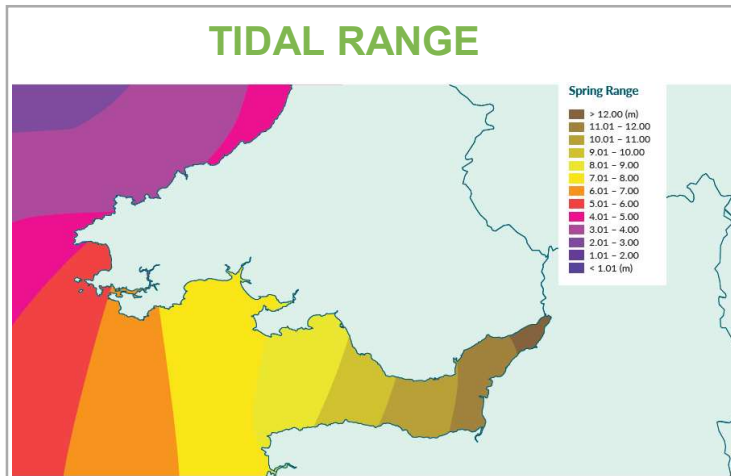


Figure 12 Spring tidal range off the coast of South Wales. Source: renewables-atlas.info (July 2021).

Proposed but yet to be built (Swansea likely first mover):

- 320 MW Swansea Bay Tidal Lagoon (SBTL)
- 1.4 GW Newport Tidal Lagoon
- 3 GW Cardiff Tidal Lagoon
- 12 GW Severn Barrage (up to 10% UK power)

Tidal impoundments can continue to **generate predictable power for around 120 years** and this has not been reflected in most economic assessments which look at 20/30 year terms.

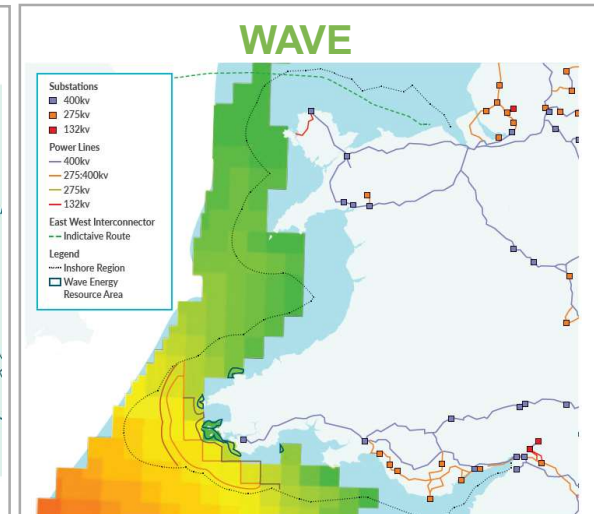


Figure 13 Annual mean wave power. Source: BERR Atlas of UK Renewable Energy Resource (April 2010) & RPS.

Higher resource areas further offshore pose survivability challenges.

Bombora's 1.5 MW mWave device testing at the Marine Energy Test Area (META) in 2023 - largest WEC trial to date globally.

Pembrokeshire Demonstration Zone (PDZ) will be a 180 MW grid connected test area in open sea off Pembrokeshire for the purpose of testing and validating.

## Swansea Port Development Project (formerly Blue Eden)

**A £4bn project, estimated to be worth £114m a year to the Swansea economy, creating up to 2,500 full-time jobs.**

- Expanding the Fabian Way park and ride site to create a green energy transport hub to potentially include a hydrogen manufacturing station for hydrogen-powered transport, an abundance of electric vehicle charging points, and restaurants and flexible working areas for visitors to enjoy.
- Expanding on approved solar farm plans at the former Tir John landfill site to create one of the UK's largest solar energy generating facilities.
- A new manufacturing facility on the former Morrissey Site in SA1 to make high-tech batteries that would store the renewable energy generated by the project and for worldwide distribution.
- A tidal lagoon
- A floating solar facility
- A hyper-scale data centre powered by renewable energy
- An oceanic and climate change research centre
- Energy-efficient eco-homes anchored in the water
- A new district heating system using renewable energy.



## **CURTAILMENT – i.e. the grid can't currently transmit renewable electricity to where it is needed**

- In 2022 the UK generated c.30% of its energy from renewables, of which wind power at c.23% total generation was by far the biggest contributor
- When we're generating more wind power than we can transmit, the National Grid pays the windfarms to turn off ('curtailment'), and pays a (typically gas powered) alternative generator, closer to the demand, to turn on
- In 2022 the UK spent £215m on turning windfarms off, and then another £717m turning on gas power plants to replace the lost wind power

### **Potential solutions:**

- Build more electricity cables to take the power to demand centres (communities will feel this impact - pylons)
- Add energy storage at cable bottlenecks – e.g. lithium batteries, pumped hydro, blue/green hydrogen

Source: [The UK is wasting a lot of wind power | Archy de Berker](#)



## FLOATING OFFSHORE WIND AND GREEN HYDROGEN PRODUCTION

**Huge renewable electricity potential. Electricity grid and ports infrastructure upgrades needed. Industrial processes, Heat & Transport emissions hardest to action.**

There is potential for green hydrogen to service industry (Haven Waterway/SWIC), regional transport, power generation and heat.

**Increasing volumes of floating offshore wind is well suited to production of green hydrogen – produce H2 when curtailed or low UK power demand.**

Co-location of hydrogen with offshore wind will enable an increase in usable energy from individual projects as well as providing long-term storage and an alternative fuel source for increased UK electrification.

ORE Catapult estimates that the cost of supplying **blue hydrogen** is tied to gas prices, which is likely to remain around **£145/MWh (£5.70/kg)**

OREC forecast the cost of producing **green hydrogen** from UK floating offshore wind to reduce from around £145/MWh for early commercial projects around 2025-2027 to around **£75/MWh by 2030** to **£50/MWh by 2040** reducing to **£40/MWh (£1.60/kg) by 2050** (cost parity with the cheapest global cost for green hydrogen). *(Perspective: A Toyota Mirai can drive 60 miles on 1 kg of hydrogen at a cost of £1.60 by 2050 – before duty etc).*

There is huge potential to **export UK green hydrogen** to Europe and beyond. This opportunity was valued at **£48bn per year** in ORE Catapult's Solving the Integration Challenge (StIC) study with **hydrogen forming 25% of Europe's energy needs by 2050**.

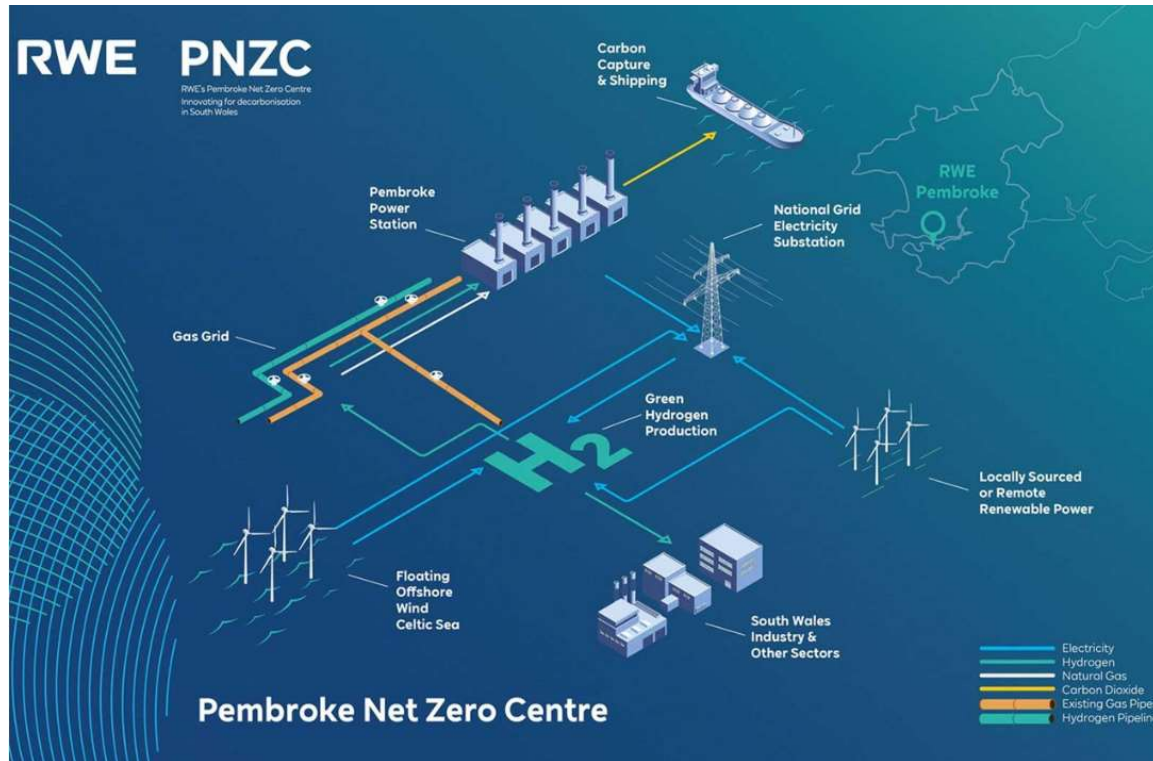
Project Name	Capacity	Developer	Expected Completion
Project Dylan	300MW 1GW	ERM and Source Engie	Commercial windfarm by 2028 Expansion by 2030
Pembroke Net Zero Centre	100-250MW	RWE	2028

**Table 2 Welsh offshore renewable projects with hydrogen production.**





## Industry 'early mover' example



### RWE Pembroke Net Zero Centre

£3bn investment in:

- Green hydrogen production, including the development of an electrolyser on the Pembroke site, the development of floating offshore wind (FLOW) in the Celtic Sea. 110 MW green H<sub>2</sub> electrolysis (by 2026) and up to 1GW (by 2030). (UK target for 10 GW by 2030)
- H<sub>2</sub> for fleet, transport, industry, grid.
- Decarbonisation of Pembroke Power Station, including carbon capture.
- The feasibility of hydrogen as a power generation fuel
- RWE £15bn investment in UK



Trafigura (Puma) and Statkraft also planning significant hydrogen production projects in the region

## Swansea Bay City Deal programme

Includes a number of projects that are aligned with the regional energy agenda:

- Pembroke Dock Marine project – MEECE, PDZ, META, Port Development
- Homes as Power Stations
- Supporting Innovation and Low Carbon Growth project.

‘Portfolio Carbon Reduction Assessment’ report (February 2023) provided by the SBCD Portfolio Office, identified a range of contributions:

- Estimated 80,000 sq m of BREEAM excellent floor space
  - 5,000 jobs across renewable and energy sectors
  - Estimated 6,000 skills and talent opportunities for the energy and decarbonisation sectors
  - A regional centre of excellence in the renewable energy sector
  - Growing the supply chains in the installation, marketing and operations of blue and green technologies.
-

# The Future of Rail Innovation

## The UK's first net zero railway

The Global Centre of Rail Excellence will be a purpose built site for world class research, testing and certification of rolling stock, infrastructure and innovative new rail technologies that will fill a gap, not just in UK rail, but across Europe.

The Welsh Government's new 'Global Centre of Rail Excellence' – the first of its kind in the UK – is expected to be fully operational by 2025, bringing up to 300 jobs to the area.

Under the plans, a 6.9 kilometre high-speed testing track and 4.5km low-speed high-tonnage testing track will be built at the Nant Helen site along with a dual platform station.

The facility will be connected to the main Brecon to Neath line, with signalling upgrades also planned as part of the project.





## Green light for transformational Celtic Freeport bid



The Celtic Freeport private-public bid consortium has reacted to today's announcement it has been shortlisted by the UK and Welsh Governments for freeport status.

£160m port infrastructure funding scheme, with a particular emphasis on the “substantial pipeline of potential projects in the Celtic Sea”



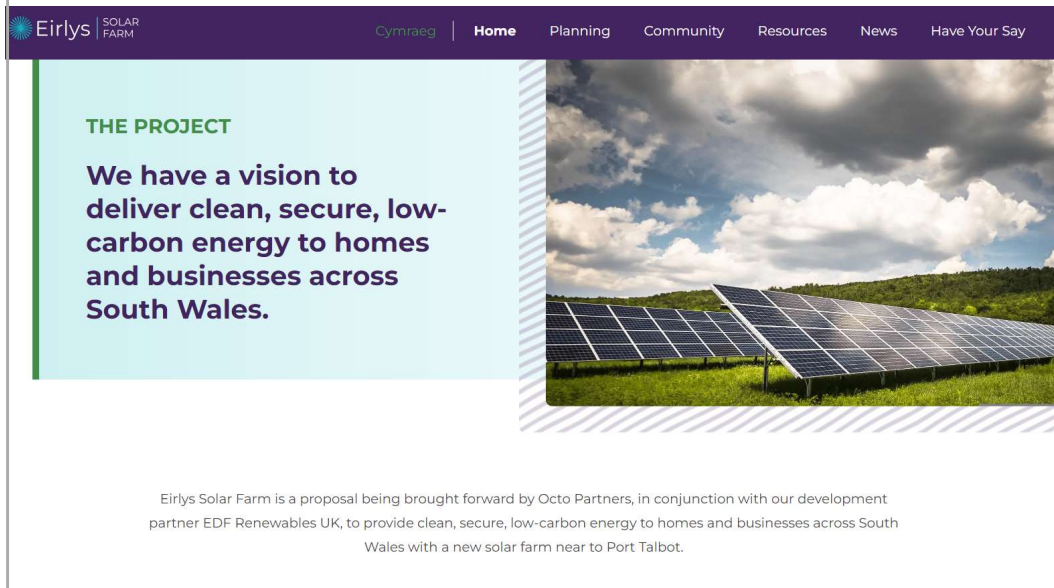
Support 16,000  
new green jobs

Generate £5.5bn  
of new investment

Accelerate the  
roll-out of floating  
offshore wind

## Other regional energy/economy projects:

Proposal for the **29 MW Eirlys Solar Farm** west of Mynydd Morgan in Port Talbot - capable of generating enough renewable electricity for over 7,000 homes



The screenshot shows the Eirlys Solar Farm website. The header includes the Eirlys Solar Farm logo and navigation links: Cymraeg, Home, Planning, Community, Resources, News, and Have Your Say. The main content area features the heading "THE PROJECT" and the text: "We have a vision to deliver clean, secure, low-carbon energy to homes and businesses across South Wales." Below this text is a photograph of a solar farm with rows of panels in a field under a cloudy sky. At the bottom of the page, there is a small paragraph of text.

Eirlys Solar Farm is a proposal being brought forward by Octo Partners, in conjunction with our development partner EDF Renewables UK, to provide clean, secure, low-carbon energy to homes and businesses across South Wales with a new solar farm near to Port Talbot.

### Canolfan Eto new 're-use village'

- A circular economy hub at Nant y Caws, Carmarthenshire connecting customers looking to purchase a wide range of recycled items including furniture, bicycles, paint, gardening items and much more
- An education centre for school pupils covering a range of environmental topics.

