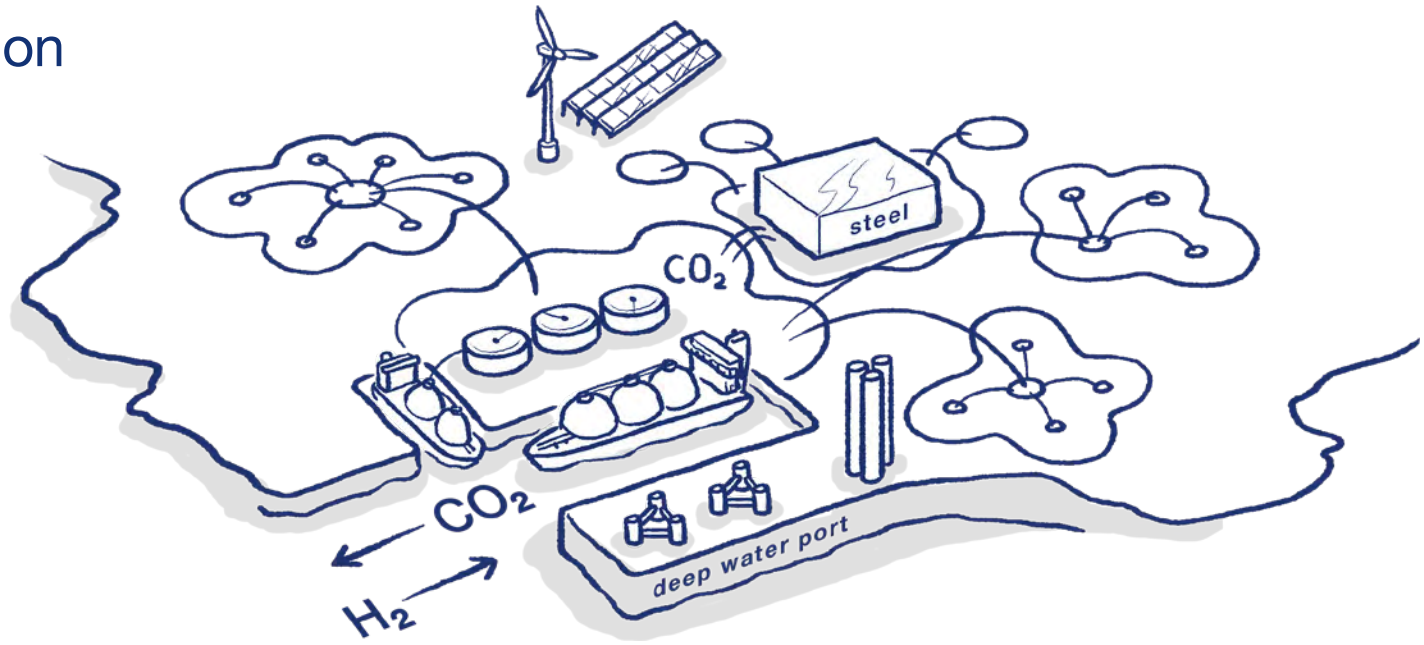
Future ports: Port Talbot

Transformational change for
the next industrial revolution



ASSOCIATED
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Foreword

We have been looking at how our five South Wales ports could play a key role in the economic transformation coming towards Wales - and it is clear that Port Talbot could play the biggest role of all, with huge significance for decarbonisation plans in Wales, the UK, and the rest of Europe.

We are at the point of transition from the old, carbon-based economy to a new, zero-carbon world. Port Talbot has a central role to play in helping Wales make that shift, and now is the time to be radical: Port Talbot is a strategic national asset with round-the-clock access for some of the largest dry cargo ships in the world, along with the large-scale development land, infrastructure connections, and skilled labour force needed to make an impact. As we will show, it is the sheer size and capability of the port that is going to be a key advantage as we move towards net zero by 2050, allowing us to shift the decarbonisation effort onto a new, altogether bigger, scale. This is about creating a new, zero carbon system that integrates energy and industrial elements into a single hub.

This we know this is big, ambitious goal. Decarbonisation is a societal challenge that goes beyond ABP. But, working with our partners, we can fundamentally transform Port Talbot's prospects, laying the foundations for a new cycle of prosperity in a decarbonising century.

These opportunities will not be open to us forever. The task is urgent. We need to focus our thinking, make some big decisions, and marshal serious investments.

We will need to forge new relationships to deliver success, and will need to create a joint strategy, ensuring that we work together to maximise our impacts.

We are at the very start of the conversation that could build this new approach. We hope you find this work a useful guide to our thought process, and that we can work together to the benefit of the Port, town, community and environment of Port Talbot.

Andrew Harston
Regional Director, ABP Wales & Short Sea Ports

The port today

1: Tidal Harbour
2: Jetty
3: Talbot Wharf
4: Phoenix Wharf
5: Harbourside
6: North Bank
7: Rio Tinto Wharf
8: Tata Steel site
9: Margam Wharf
10: Port Talbot Docks
11. Baglan Energy Park
12. Town Centre

Part 1: Opportunity Urgency

Vision
Objectives

Delivery
Timelines

We are in a time of change

Through its history, Port Talbot has seen a profound economic transformation. The nineteenth century saw the first big wave of change, as the villages of Baglan, Margam and Aberafan were reborn as an industrial powerhouse. After 1945, the port and steelworks saw nationalisation, modernisation and further expansion. And now, Port Talbot is seeing the arrival of the post-carbon economy, putting old industrial patterns into flux.

This is a big opportunity for Port Talbot. We can use this time to modernise, invest, and grow, just as those before us did. The alternative – allowing ourselves to be overwhelmed by change – would see us left behind. If we want to create a future we like, we need to take a step forward. This is what this plan aims to help us do.

Carbon based fuels have determined the shape of the world economy over the last 50 years. But we are at the start of a major disruption to these economic patterns, and are in the early stages of a historic shift to a zero carbon economy.

These changes create profound uncertainty. The changes that are needed will fundamentally affect millions of investment decisions right around the world. But for a short period – perhaps the next two to five years – this uncertainty creates a window of opportunity for Port Talbot, when we can create an intelligent, strategic approach that could secure Wales' prosperity for years to come.

Time is of the essence. Delay will mean that we lose first mover advantages, and others will make decisions which constrain our choices. And of course, we know that plans will not be delivered precisely as set out here: our commercial returns are uncertain, and a huge amount of collaborative work is needed. But we should not allow ourselves to be paralysed. Instead, we need to pick out the big themes, and ensure that Port Talbot is well positioned to take advantage of a range of future scenarios in the coming transformation.

These are societal challenges. They are much bigger than ABP. We are already part of work dealing with these issues, but we want to accelerate the process further and create the right environment for the industrial transformation needed in Port Talbot and across Wales.

What you are about to read is very ambitious for Port Talbot. We know that it requires a measure of vision and optimism, even faith. But we believe that we are at a unique point in Port Talbot's development, and are poised between the old and the new. Right now, the biggest risk comes from thinking small. If we make bold moves, we can work together to create the future we want for Port Talbot, and ensure that the town and Port makes the next industrial revolution as successful as the first.

"Decarbonisation is massive. It is unprecedented and people don't realise how big it is. But that doesn't actually mean it's grim."

Professor Cameron Hepburn
Director, Oxford University Smith School of Enterprise and the Environment

Opportunity
Urgency

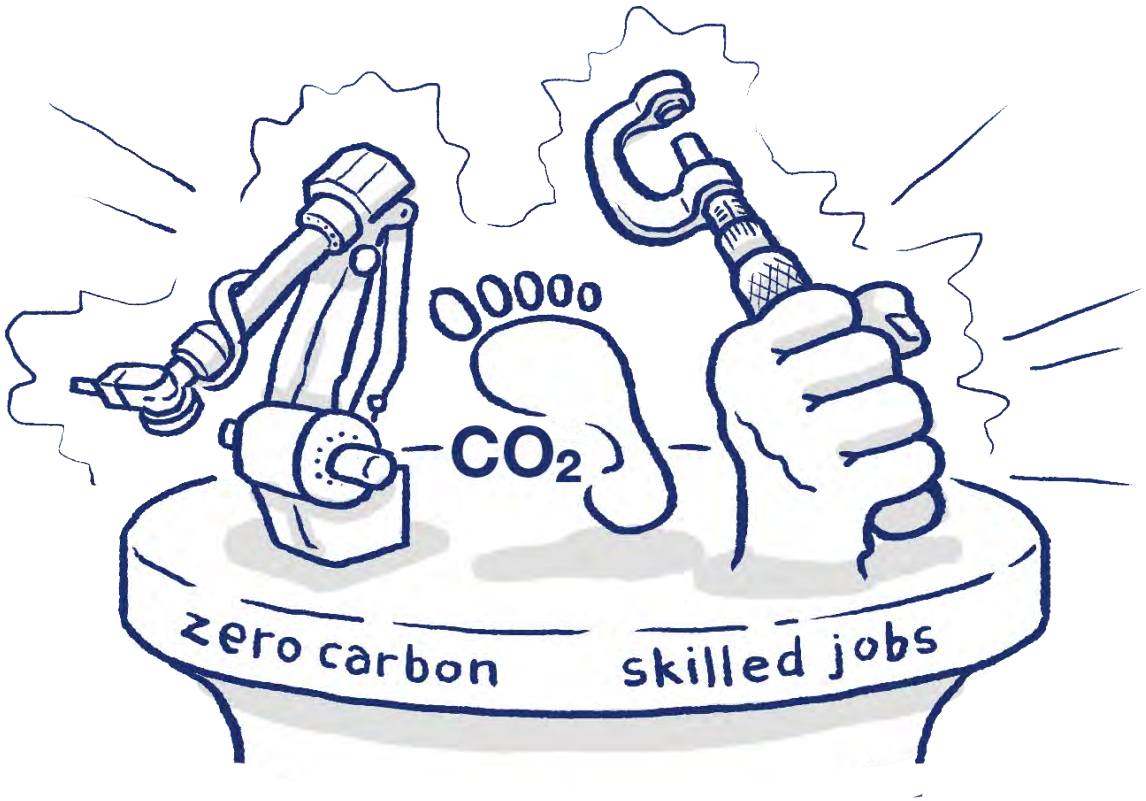
Part 2:
Vision
Objectives

Delivery
Timelines

This is what we want to help create in Port Talbot

At ABP, we want to see a port, town, community and environment transformed. We will work with partners to ensure that Port Talbot is a key driver in the next industrial revolution, translating the risks of decarbonisation into opportunities.

Success will see Port Talbot shift decisively onto a new economic pathway aligned to a zero carbon world, bringing new innovation and prosperity across Swansea Bay, a smaller carbon footprint, and new highly skilled jobs.



Port Talbot today

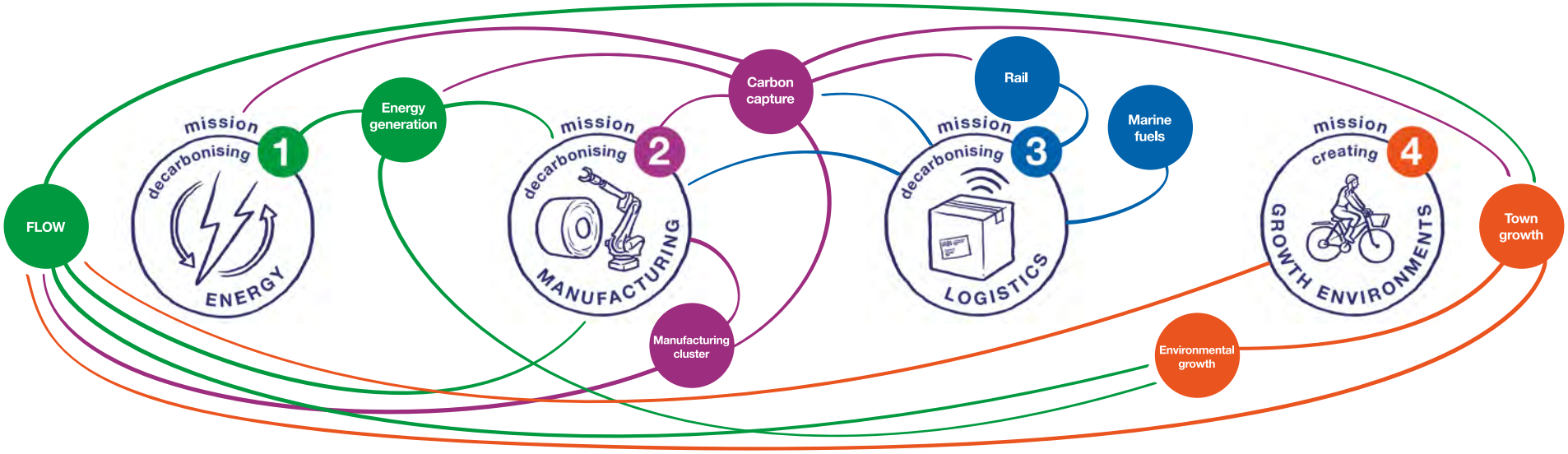
Future Port Talbot

We have set out four big, bold ‘missions’

Systemic challenges like the ones we face in Port Talbot can only be solved if we break through the organisational silos that separate the public from private sectors. Our four ‘missions’ aim to do that, orienting us towards fundamental change. These missions will develop – but must ultimately be driven by clear objectives and SMART targets, all delivered by coalition members within a disciplined, hard-nosed approach to project management.

Our proposed missions get delivered by programmes that work together

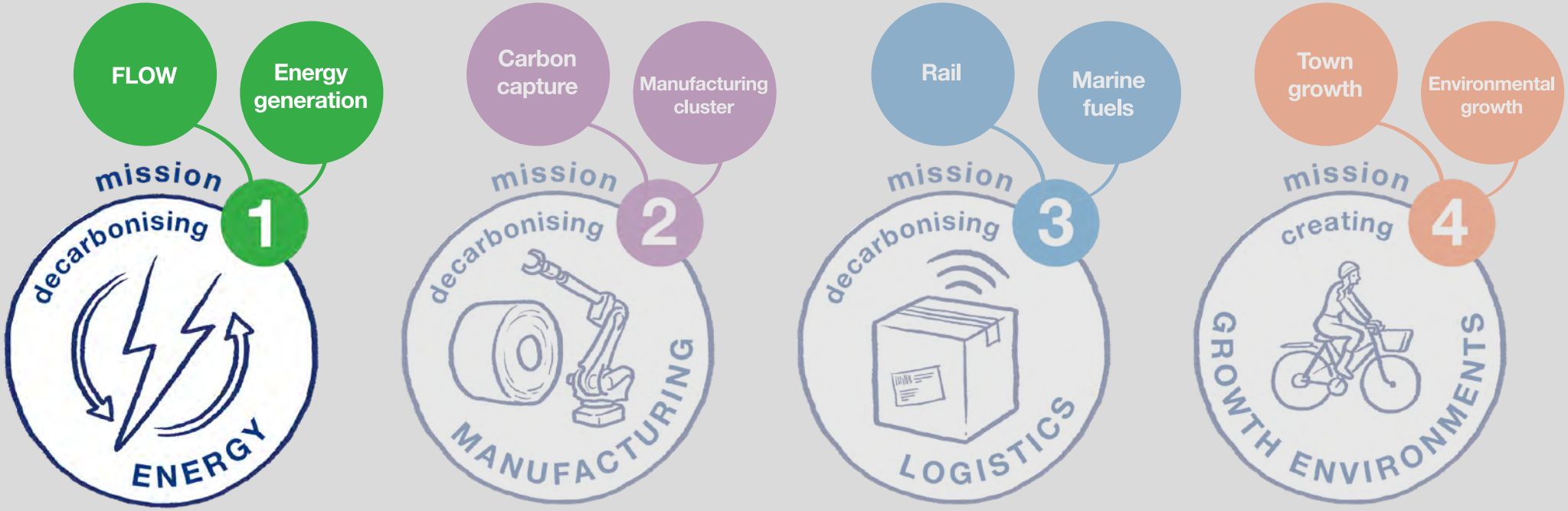
In the next section, we set out the programmes that will implement the missions: we break the task into its constituent parts, in order to explain it. But the really exciting change will come from ensuring that these constituent parts will combine to create a new ‘system’ for Port Talbot, working together to propel one another forward. We hope to create a compelling investment proposition that delivers system change for the port, the town, and our customers.



mission 1

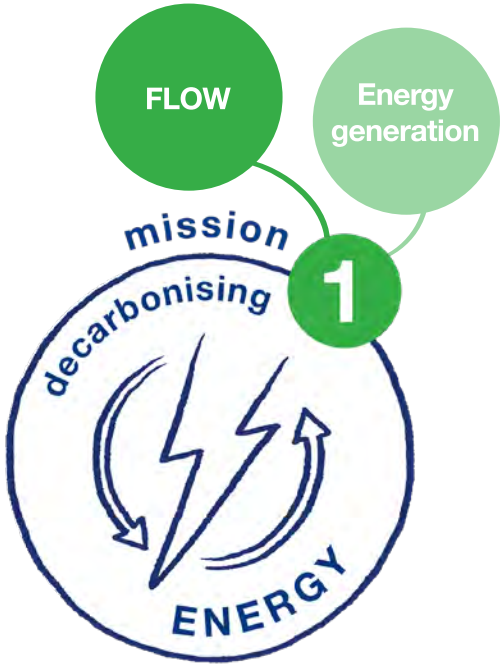
Decarbonising energy generation

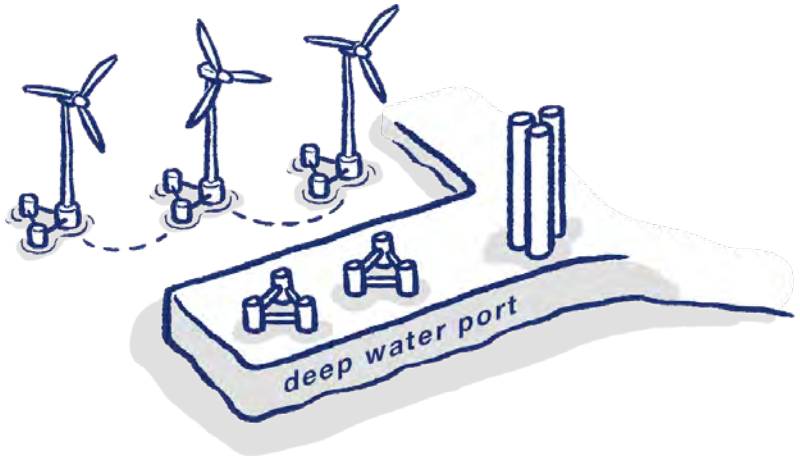
As we move to net zero, Wales is positioning itself for a technological revolution in the way that energy is created, distributed and used. This is a major strategic priority for both the Welsh Government and strategic business investors, and Port Talbot can make a big contribution in helping Wales deliver.



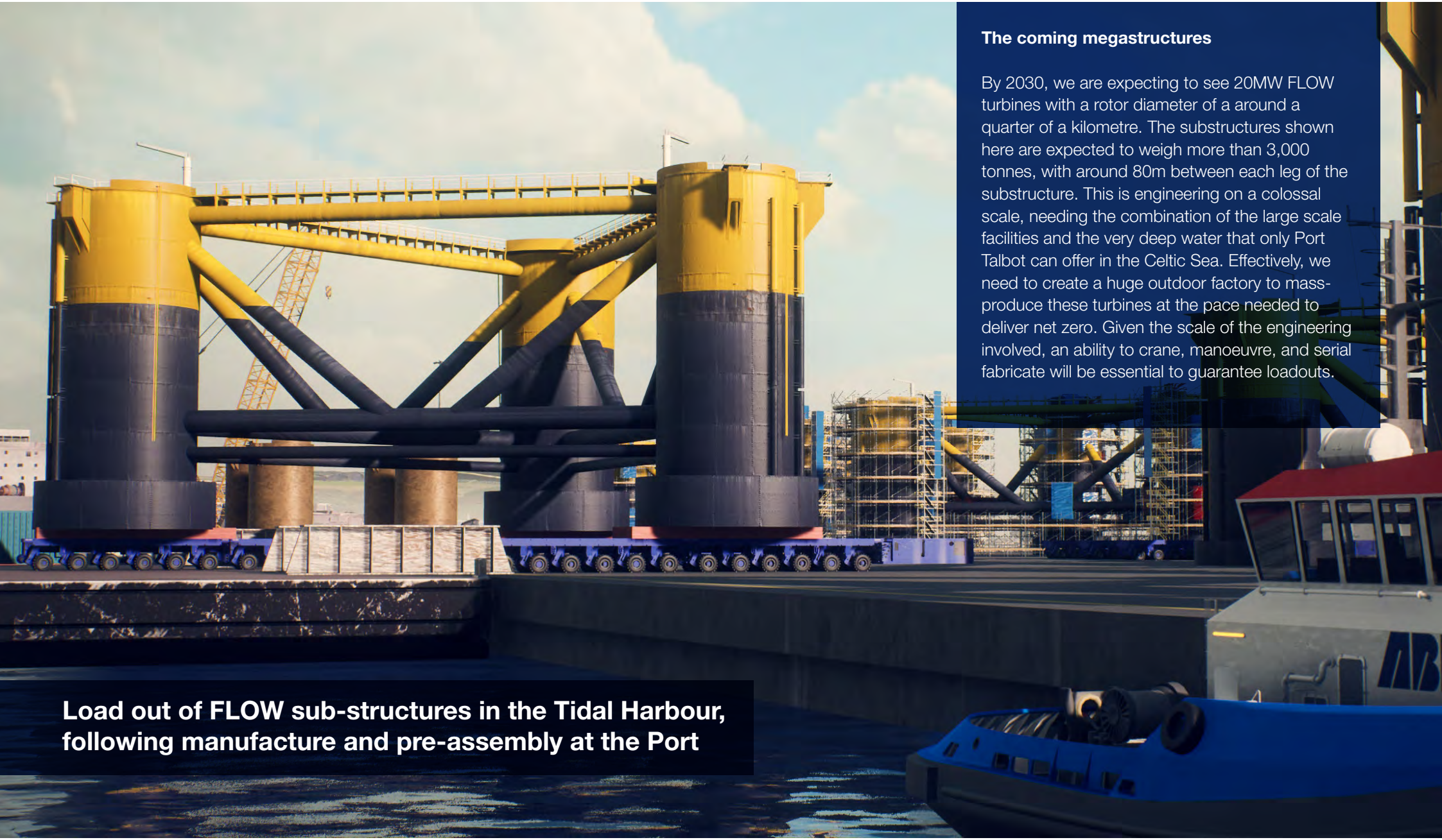
Our vision for Floating Offshore Wind (FLOW)

By 2030, FLOW (Floating Offshore Wind) turbines will be moving into the commercial mainstream. The turbines built will be megastructures, with blade tips as high as London's Shard building. Hundreds will be needed, and only Port Talbot has the scale and capacity to deliver, creating a transformational opportunity in a new, high-productivity strategic industry - spinning out skilled jobs, triggering the growth of a new supply chain, and creating new export opportunities. We must start work now.





New quays in the Tidal Harbour support the manufacture and assembly of FLOW substructures and turbine components



Load out of FLOW sub-structures in the Tidal Harbour, following manufacture and pre-assembly at the Port

The coming megastructures

By 2030, we are expecting to see 20MW FLOW turbines with a rotor diameter of a around a quarter of a kilometre. The substructures shown here are expected to weigh more than 3,000 tonnes, with around 80m between each leg of the substructure. This is engineering on a colossal scale, needing the combination of the large scale facilities and the very deep water that only Port Talbot can offer in the Celtic Sea. Effectively, we need to create a huge outdoor factory to mass-produce these turbines at the pace needed to deliver net zero. Given the scale of the engineering involved, an ability to crane, manoeuvre, and serial fabricate will be essential to guarantee loadouts.

The opportunity

Electrification is a key step on the road to net zero. The coming electrification of UK transport and heating will create a step change in demand for renewable energy, requiring the deployment of between 65-125 GW of UK offshore wind by 2050 (CCC, 2020). A significant proportion of the estimated 25 to 85 GW of offshore wind growth after 2030 is expected to be supplied by FLOW, with the Celtic Sea identified as a key development area. Five Celtic Sea demonstrator scale FLOW projects are already in the planning stage along with Blue Gem Wind's 300 MW Valorous project, due for construction in 2027. And beyond that, there are major long term opportunities in the North Atlantic.

This is a huge opportunity for Port Talbot and the wider Swansea Bay economy and can be a major driver of new industrial activity: to create 10GW of new capacity will require the production and assembly of 500 new 20MW turbines – suggesting that a market for hundreds, if not thousands, of turbines is possible.

The potential scale of this new industry requires an entirely new approach to turbine production and will attract significant international investment. As production methods are systematised, costs of FLOW are anticipated to fall significantly over the next decade. This will create a positive feedback loop of new demand, as costs become comparable with those associated with traditional bottom-fixed offshore wind farms. FLOW will therefore play a key role in delivering Net Zero and will in doing so, unlock around £120bn of UK capital investment by 2050 (Catapult, 2021).

Port Talbot has the capacity to deliver this scale of growth. It has the critical mass and heavy industrial 'backbone' needed to make a success of this future industry. Port Talbot has the deep water, brownfield development land, rail connections, proximity to steel, marine aggregates and – crucially – access to thousands of skilled workers. Scale matters, and the Swansea Bay economy has the ability both to absorb the additional demand and translate it into new economic activity, without new demand simply being burned off in the form of localised inflation in housing and labour costs.

No other port around the Celtic Sea can offer all of these attributes, and Port Talbot's manufacturing specialisms would work in partnership with south-west England and Milford Haven, which already has an important R&D role and is also perfectly located for the operations and maintenance business FLOW will create.

Wales will face significant competition for FLOW business from other European ports.

The EU is already funding FLOW projects in France and Ireland, whilst the Spanish Government has recently released a roadmap for the development of up to 3GW of floating offshore wind by 2030, representing a significant contribution to the objectives of the EU's Marine Energy Strategy.
Spanish plans have four 'grand objectives' which will establish Spain as a 'European point of reference' for a) the design and scale-up of new technologies, b) industrial collaboration between steel, shipbuilding and marine energy providers, c) sustainability and d) efficient project delivery. R&D funding of €200million has been allocated (2021-23) to reinforce existing test platforms, and the needs of the port infrastructure will be evaluated, where investment needs of €500m to €1billion are estimated.

The optimal scenario

This is an opportunity to create a new strategic industry for Wales, but we will need a team approach to deliver investment in new quayside facilities. The requirement for large scale investment in manufacturing infrastructure means that construction is generally centralised to established facilities in Europe, some of which are state-owned. This picture is unlikely to change without public intervention. We may need Government to be 'investor of first resort', creating momentum where the private sector cannot. Government could share the rewards of early investment, possibly through an innovative approach to blended finance and risk-sharing. ABP's experience of working with Government and investors at Green Port Hull shows us how this could happen.

The investment in quayside infrastructure will create other industrial spin-outs for Port Talbot, securing the future of manufacturing in Port Talbot into the 21st century. Extensive mooring systems are needed to secure substructures to the sea bed. These can be manufactured using synthetic ropes or steel coil, like that produced by Tata Steel at the adjacent site. Port Talbot could therefore be a particularly attractive location for anchor chain manufacturers who could serve not only the Celtic Sea but potentially a global market. And if concrete foundations become a preferred technology, the proximity of Port Talbot to the extensive marine aggregate reserves in the Bristol Channel could be a key factor in enabling the Port to become a manufacturing hub for foundations using this technology.

An approach which is too rigid creates risk, which is why we suggest a flexible phased approach.

The following images show a three staged approach, starting with a jack up vessel in Stage 1, and the progressing to the infill of the harbour arm in Stage 2, and then to land reclamation in Stage 3.

These stages represent our current view of the most likely development scenario, but we know that other configurations are possible. For example, an alternative use of the Stage 2 harbour arm infill area could be to store blades, rather than fabricating substructures, although this would reduce space for substructure fabrication. Alternatively, we could run the Stage 1 jack up vessel concurrently with the Stage 2 new quayside. Work is continuing on the detail of sequencing but the solution is likely to be in some combination of these 'big moves'.

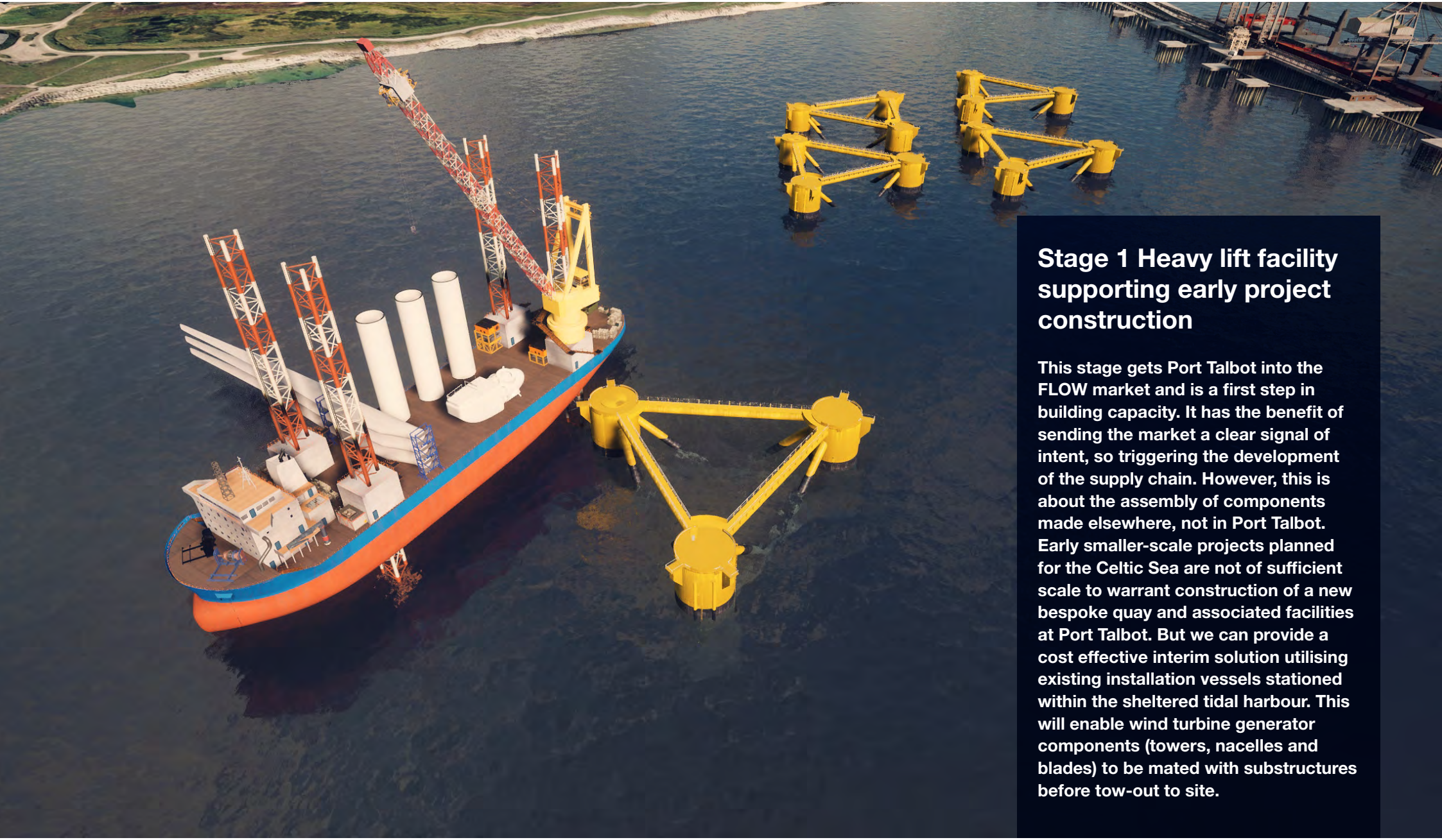
By 2030, the floating offshore wind industry in the Celtic Sea could support 3,200 new jobs with a combined spend in the regional supply chain of £682m. This spend could increase to £1.24 billion if there is further investment in manufacturing facilities for mooring chains and cables, and port infrastructure to enable turbine substructure fabrication locally, rather than final assembly only.

Source: ORE Catapult (2020)

"There is a first mover advantage with Floating Offshore Wind: success will go to those who can speculatively invest to establish a lead. State-owned European ports can do it, but UK ports struggle.That needs to change.The first mover will own the cluster, bringing a pre-eminent position in the industry."

Chris Willow
Head of Floating Wind Development, RWE

2021 2022 2023 2024 **2025 2026 2027 2028 2029 2030 2031-2050**



Stage 1 Heavy lift facility supporting early project construction

This stage gets Port Talbot into the FLOW market and is a first step in building capacity. It has the benefit of sending the market a clear signal of intent, so triggering the development of the supply chain. However, this is about the assembly of components made elsewhere, not in Port Talbot. Early smaller-scale projects planned for the Celtic Sea are not of sufficient scale to warrant construction of a new bespoke quay and associated facilities at Port Talbot. But we can provide a cost effective interim solution utilising existing installation vessels stationed within the sheltered tidal harbour. This will enable wind turbine generator components (towers, nacelles and blades) to be mated with substructures before tow-out to site.

Stage 2: Harbour arm new quay and laydown area to support substructure fabrication, assembly and export

This stage allows us to fabricate, paint and finish substructures at Port Talbot. Compared to stage 1, this creates a real uplift in economic activity captured in Port Talbot. Growth in the scale and number of projects will justify construction of a new heavy load out quay, along with fabrication and storage facilities on a circa 25 ha site. Options are evolving, but we envisage a new circa 300m quay offering 12m+ draught at all states of tide at the south of the tidal harbour (up to a maximum of 21m), with tug berthing. Additional component parts for substructures will be brought in via vessel and assembled/finished at the new facility, before tow out to site.

Stage 3: Developing the manufacturing cluster

This stage creates the space – and, potentially, quay facilities - to accommodate a growing supply chain for an FLOW industry working at scale.

We anticipate this area becoming a major hub for key supply chain manufacturing activities such as the manufacture of substructures, turbine blades, cables and catenary systems. In the example illustrated here, we see the reclamation of intertidal area for the supply chain manufacturing, the storage of turbine blades and the preassembly and preparation of turbine components. Preassembly would involve the imported nascelles being discharged to quayside, electrical pre-commissioning, preparation and testing, and then installation direct to a floating substructure.

We've done this before: Siemens Green Port Hull

Many of the challenges faced at Port Talbot with FLOW are similar to those faced by ABP and Siemens with the planning and development of Green Port Hull turbine blade manufacturing facility over a decade ago. The journey to implementation lasted 8 years, and was the culmination of years of strategic collaboration under the 'Green Port Hull' banner, a strategic concept created by range of partners in Hull, including the city, university, port and other private sector actors.

Planning work had shown that a major push would be required in order to land significant new manufacturing investment arising from the growth of offshore wind in the southern North Sea. In 2014, Siemens announced that it would be investing in the development of a major new turbine blade manufacturing facility at Hull's Alexandra Dock, involving dock infill, new quayside, and a new manufacturing facilities.

A key milestone in the process occurred in 2010: this was the decision made by the UK government to provide a clear signal of its intention to support OWF investment needs by pledging to make £60m available for the development of ports, to help manufacturers of offshore wind turbines looking to locate new facilities in the UK. As a result of this, Siemens was then in a position to sign an MoU committing to an investment in excess of £80m to develop an offshore wind turbine production facility in the UK. The eventual investment package saw Siemens invest £160m in the development of an offshore wind facility; Associated British Ports (ABP) invest a further £150m; and £25.7m was also provided by the Regional Growth Fund for the Green Port Growth Programme which helped to deliver employment and skills development, R&D and secure investment.

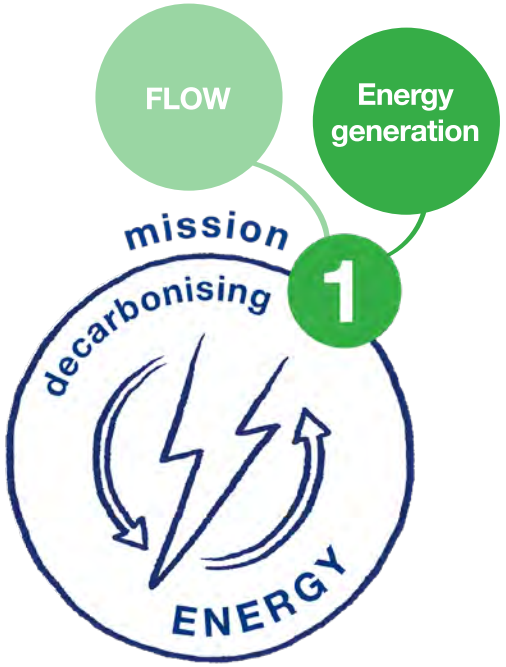
The development has taken real care to protect the sensitive estuarine environment. Working in partnership with environmental regulators, ABP has led on an extensive Environmental Management and Monitoring Plan.

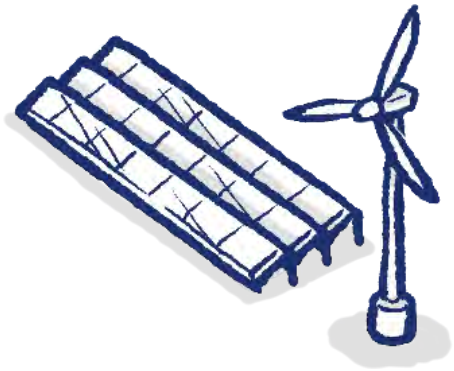
Approximately 1,000 staff have been recruited by Siemens, and the development has proven to be the springboard for new cycles of investment in the port and city. In August 2021, the extension of the factory was announced, readying it for the next generation of offshore wind turbines which will use blades longer than 100 metres. Siemens Gamesa will invest a total of £186 million, creating 200 new jobs.

Sources: University of Hull Logistics Institute (2017); FT Aug 2021; ABP

Our vision for on-port energy generation & supply

Projects here are intended to create two big ‘wins’: firstly, reducing our carbon footprint, and secondly, creating a new form of competitive advantage for investors in Port Talbot. To do that, sensitively placed turbines can harvest Swansea Bay’s plentiful wind resources, whilst ground mounted and roof top solar can also help meet Port users’ energy needs.





Onshore wind turbines situated around the Tidal Harbour, generating green energy for Port users

A 3-5 MW ground mounted solar installation at Talbot Wharf to help enable low carbon port operations

The opportunity

As the Port grows to accommodate FLOW and manufacturing interests, we envisage a significant increase in energy demand, both from ABP and our customers. This will be needed for a wide range of activities including customer manufacturing processes, cranage operations, heating, lighting and on-port transportation. Ensuring all these take place in a low carbon way will be a major challenge, but we have an opportunity to at least partly meet this demand through the generation of renewable energy on the port.

The optimal scenario

Solar power will be an increasingly important part of Wales' energy mix. We have identified a 13-acre site on Talbot Wharf which is suitable for ground mounted solar. We expect that this will be 3-5 MW in scale, and will make a direct contribution to decarbonisation for port customers. ABP is one of the UK's biggest industrial producers of roof-mounted solar energy, and we will look to install roof-top solar whenever we develop new buildings at the port.

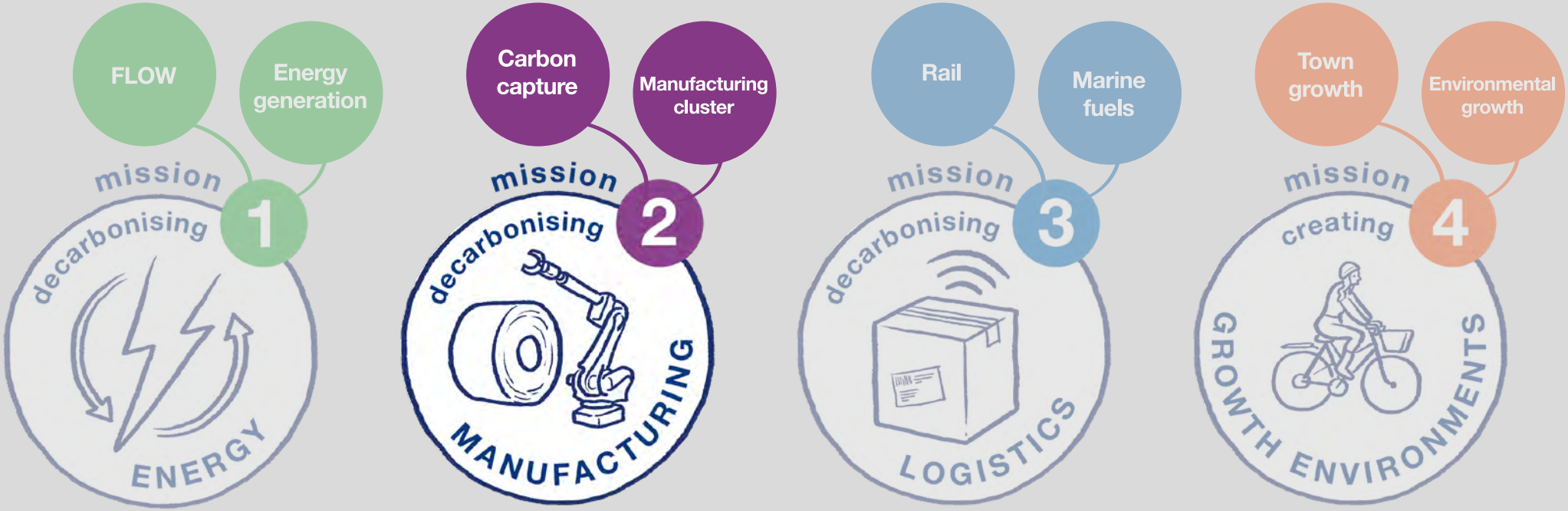
The installation of wind turbines would complement the solar energy by providing, in an average year, a higher proportion of its generation over winter months with the potential to generate at all hours of the day. ABP would carefully consider aspects such as bird flight paths along with landscape and visual impacts during the development phase. We will seek to incorporate ecological features to maintain important connectivity across the landscape.

We envisage installation of a small number of turbines in the southern part of the Port, with a generating capacity of around 4-5 MW each. Over time, we will seek to maximise the opportunity to generate renewable energy from onshore wind at the site, and the number of turbines that could be appropriately sited will be assessed in due course.

Storage of renewable energy is likely to become an increasingly important asset class in order to retain excess renewable energy for use in peak demand periods. Storage can also play a part in providing balancing services for the wider network in order to provide grid stability. ABP will explore the potential to deploy storage assets, whether quick-response battery units or larger capacity, slower discharge units using other technologies. The specifics of which technology type and whether it would be beneficial depends in part on the customer load profile and hence will be assessed in due course.

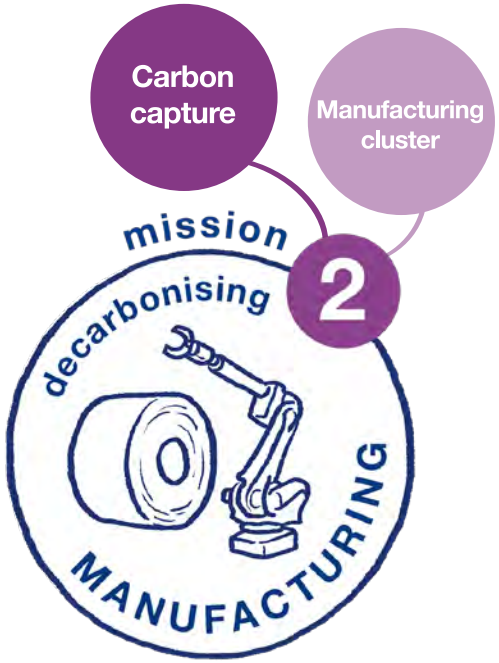
Decarbonising manufacturing industries

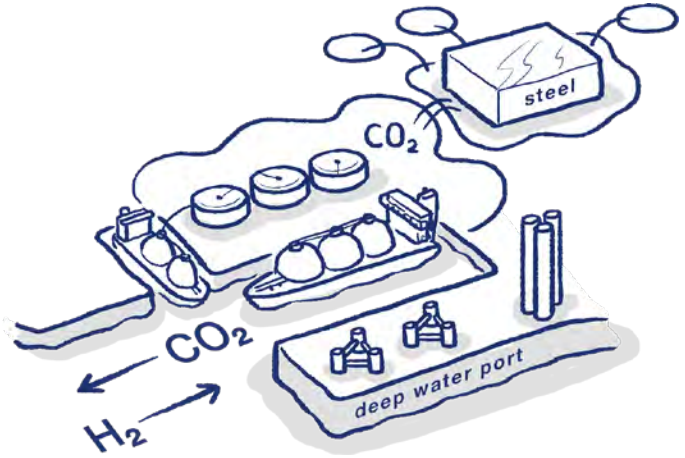
Decarbonisation will demand fundamental changes in Port Talbot's manufacturing industries, and have big implications for the port. But we do not see this in terms of cost and risk. Instead, we see this as a huge opportunity - stimulating a jump to a new cycle of investment, modernisation and growth. ABP will work with businesses and stakeholders to meet this generational challenge.



Our vision for Carbon Capture, Utilisation & Storage and hydrogen

Getting to net zero by 2050 means decarbonising the Port Talbot industrial cluster. There are different ways of delivering that objective, but the port will be indispensable under all change scenarios - whether led by hydrogen, Carbon Capture, Utilisation & Storage (CCUS), or a blend of the two.





A potential pipeline would carry liquefied CO_2 from carbon capture facilities on nearby land to the Tidal Harbour jetty. Jetty and pipeline facilities could be also used to import hydrogen for onsite storage and use

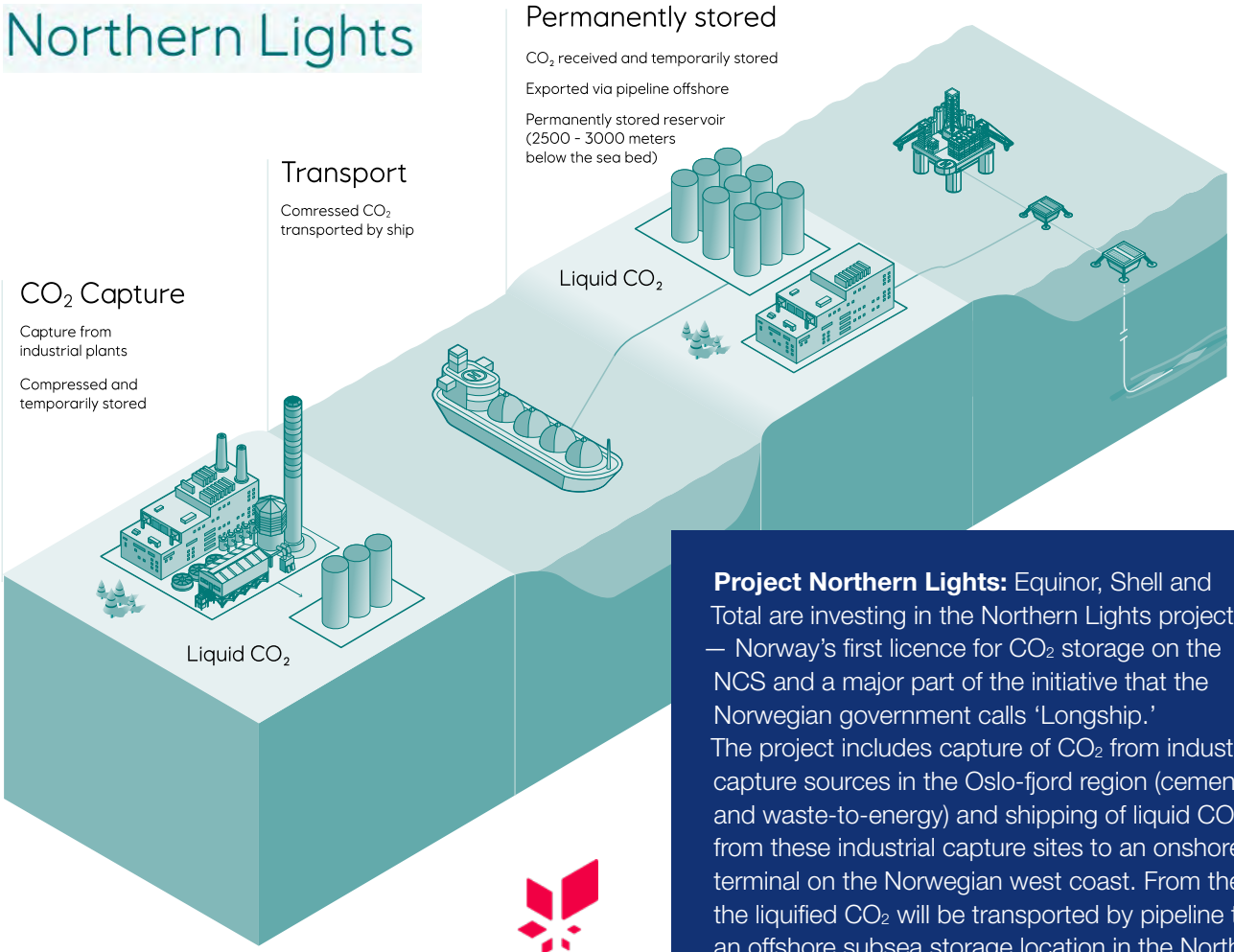
Liquefied CO_2 being loaded to gas carrier vessel, prior to onward transportation and sequestration in redundant gas fields. This infrastructure could also be used to import hydrogen

The opportunity

Change is coming to ABP's Port Talbot facilities. They are hard-wired into steel production at Tata Steel site, bringing in the basic feedstocks of iron ore, coke and coal.

South Wales' industrial cluster is the UK's second largest industrial emitter of carbon dioxide – and Port Talbot Steelworks is the biggest single emitter within that cluster. Strategy work by the Committee on Climate Change (Sixth Budget Methodology Report) has shown that achievement of the legally binding Net Zero target requires steel production in South Wales to be decarbonised in the 'early 2030s' (135).

There is no magic bullet technology that will decarbonise the steel industry. Tata Steel is working through the options now. Irrespective of investment decisions made by Tata Steel, there are good reasons to think that a CCUS or hydrogen system would be an important part of Port Talbot's future, and allow the creation of a wider zero-carbon manufacturing cluster. Port Talbot already has many of the key attributes needed to handle this role. Port Talbot has the land is available for liquefaction, tank storage and pipework; the Tidal Harbour jetty is already in place, and can be used to pipe CO2 to vessels, or hydrogen from vessels; the deep water access needed by the gas carrier vessels is available; and the Port has a marine operations team skilled in handling the type of vessels involved.



Graphic by Equinor

Project Northern Lights: Equinor, Shell and Total are investing in the Northern Lights project — Norway's first licence for CO_2 storage on the NCS and a major part of the initiative that the Norwegian government calls 'Longship.'
The project includes capture of CO_2 from industrial capture sources in the Oslo-fjord region (cement and waste-to-energy) and shipping of liquid CO_2 from these industrial capture sites to an onshore terminal on the Norwegian west coast. From there, the liquified CO_2 will be transported by pipeline to an offshore subsea storage location in the North Sea, for permanent storage.

Source: Equinor (2021)

The optimal scenario

ABP's port facilities could be a big part of the carbon solution at Port Talbot. Shipping via ports will be critical: we are looking at a new role for ports taking CO_2 out for sequestration in redundant gas fields, creating the opportunity to jump to new decarbonised technologies that will create a modern, globally competitive and zero-carbon steel-making facility.

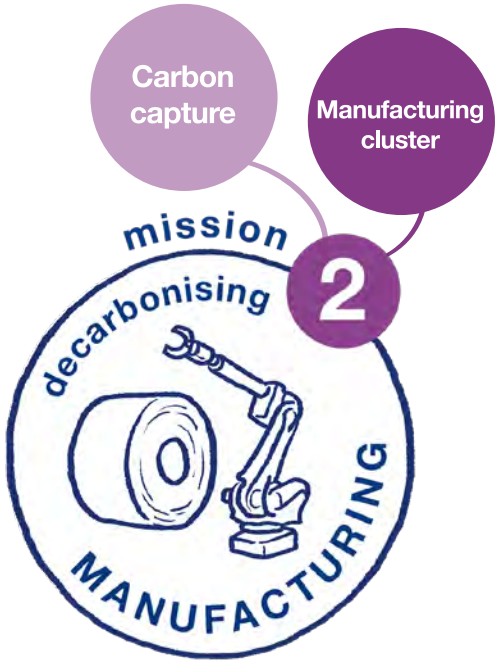
The CCUS option emerging through the South Wales Industrial Cluster (SWIC) envisages CO_2 capture at point of combustion, gas compression and storage onsite, with a pipeline running to the Tidal Harbour jetty. From the jetty, CO_2 would be loaded to vessels for transport to sequestration facilities in the East Irish Sea, or North Sea. Alternatives are also being investigated.

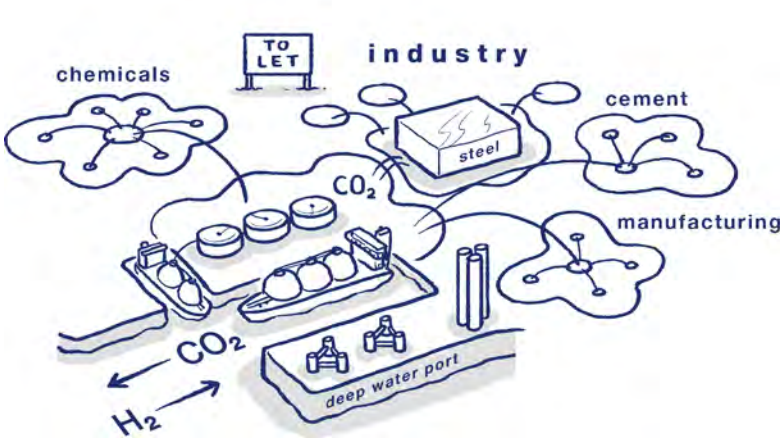
The attributes which make Port Talbot suited to CO_2 transfers also make the Port suited to the import of hydrogen. As with CO_2 transport, gas carrier vessels are likely to feature heavily in the transport of hydrogen: we expect to see a global marketplace for hydrogen emerge which will in many ways look similar to the today's market for LNG. Existing facilities such as Milford Haven will have an important role to play in this market, but there may be a role for importing hydrogen directly. That business case becomes more attractive if Tata Steel establish hydrogen and DRI steelmaking technologies over the longer term, and would support work to use hydrogen with processes at port-centric manufacturers, or even for blending into gas networks.

Fundamentally, Port Talbot's deep water and existing facilities provide an excellent basis for long-term low-carbon steelmaking at Port Talbot in a range of futures, and connect the site to key feedstocks and sequestration opportunities which will be critical in future. Alongside Tata Steel and the South Wales Industrial Cluster (SWIC), we are keen to work alongside all stakeholders to get the right package for South Wales.

Our vision for a new low-carbon manufacturing cluster

Ports have always been great manufacturing sites, because they offer excellent transport connections alongside proximity to markets and labour. These advantages will be amplified as carbon pricing is implemented, but we will turbocharge growth when we allow other businesses to plug into new hydrogen supplies and a possible future Port Talbot CCUS system. Direct connections to offshore energy generation via dedicated cable could be a further boost, kick-starting a new, low carbon manufacturing cluster.





On port manufacturing supporting marine renewable energy developments in the Celtic Sea and beyond

Potential new carbon capture capabilities on nearby land could attract a cluster of carbon intensive industries

The opportunity

Carbon capture and hydrogen availability are set to become crucial technologies in a decarbonising world, and ports' abilities to connect hinterlands to these new infrastructures means that port locations will have a new economic gravity. The coming shifts mean that competitive advantage will move away from global locations offering cheap labour, towards those places which are able to combine raw materials, manufacturing expertise, and market access in a carbon efficient way. We see four key opportunities for Port Talbot.

1. Possible future CCUS facilities and hydrogen supplies will be attractive to industrial sectors that generate high levels of CO_2 emissions – such as chemicals, ceramics, glass, and cement manufacture. Clustering of these industries in a single location enables the sharing of facilities and thus a reduction of costs compared with each facility attempting to individually reduce emissions;

2. CCUS facilities could attract the manufacture of blue hydrogen cracked from imported methane – with the hydrogen produced then attracting other business locations, in a virtuous cycle;

3. CCUS will attract industries that use CO_2 as a feedstock for other processes, such as synthetic fuel manufacturers; and

4. 'Power-to-X' facilities could see incoming cabling from FLOW generation facilities directed via Port Talbot, creating behind-the-wire opportunities for surplus low carbon energy supplies to direct to the steelworks, other manufacturers, or green hydrogen production. These projects are being implemented in Denmark.

Over coming years, the scale of incoming business is likely to create a new demand for space, both on the Port, and across Port Talbot at sites such as the Baglan Bay Energy Park, the Baglan Industrial Estate, and other sites in the sub-region. We will need to connect on-port facilities efficiently to neighbouring sites in order to ensure that bottlenecks do not get created.

Billions of pounds of funding are already in place to support industrial decarbonisation in the UK, and ABP is already working with SWIC in this area to help develop a world leading truly sustainable industries befitting the societal needs of 2030, 2040, 2050 and beyond.

CCUS is one of a combination of options that could be used to decarbonise industrial clusters

'Facilities able to 'plug in' their facilities to a CCUS hub and cluster arrangement could effectively protect themselves and their investments against potential high future carbon prices, while regions which use CCUS to establish themselves as 'low carbon industrial zones' could see significant advantages in the race to attract and maintain investment.'

Source: Global Carbon Capture and Storage Institute Ltd 2016

The optimal scenario

The drive towards net zero sees Port Talbot become a major hub for low-carbon manufacturing, with demand focused on both the Port and wider Energy Park land. The anchor project for this transformation would be the installation of CCUS facilities by 2030. These new facilities would attract carbon intensive industries which can 'plug in' to the system and export their CO_2. We anticipate this also being of great interest to existing Port customers, as well as new inward investors.

The CO_2 capture system could also be used by a future 'blue' hydrogen manufacturing process. If the blue hydrogen option was adopted, the vessel berthing facilities that are likely to be required for incoming methane could be used for hydrogen produced offsite, meaning that Port Talbot would also evolves into a hydrogen import and distribution hub for the UK.

Whilst the combustion of fossil fuels leads to the unwanted release of CO_2, it may, under certain circumstances, be re-used in the production of sustainable carbon-neutral fuels. The steel works are a major emitter of CO_2 and therefore the Port can become an attractive location for such an operation, with export via rail and/or sea to domestic and international markets. Given the importance of rail connectivity and proximity of Tata Steel, our early thinking suggests that the optimal location for sustainable fuel production could be adjacent to Rio Tinto Wharf, to the south of Hanson's facility.

'Power-to-X' cabling direct from offshore generation assets could see the creation of further competitive advantages for both the steelworks and the new low-carbon manufacturing cluster, along with the manufacture of green hydrogen.

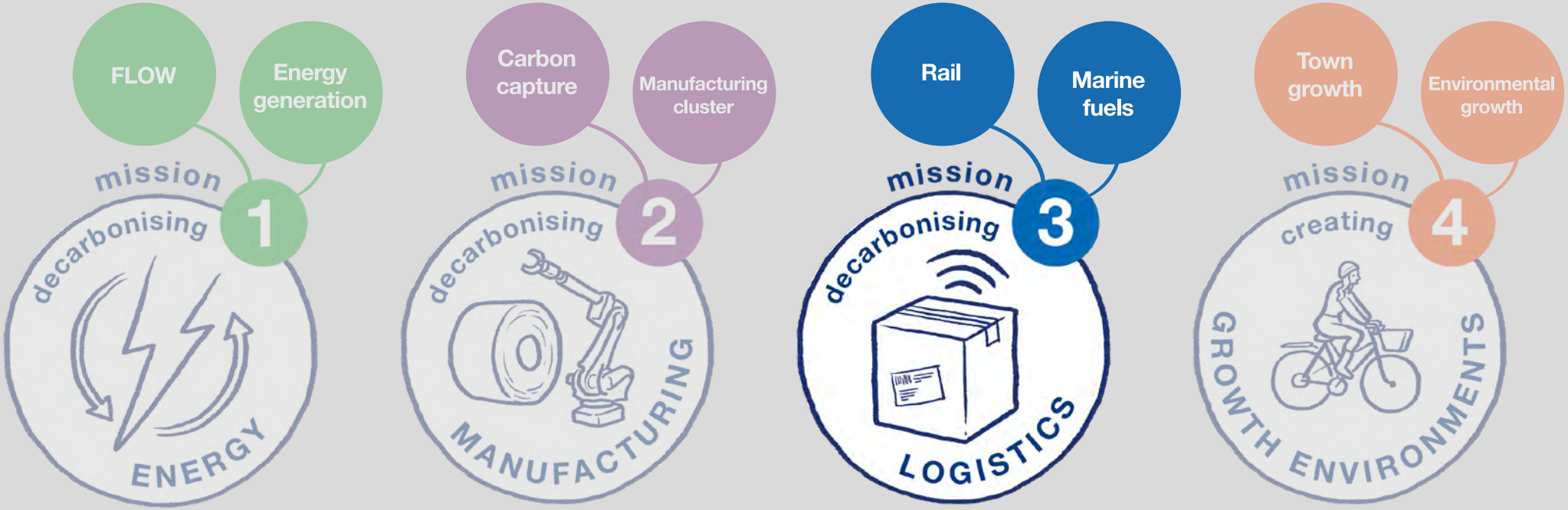
The increasing need for generation and transmission of offshore renewable energy to meet net zero targets will provide opportunities for on-port manufacturing to support these developments. We see significant demand emerging for a range of products such as mooring line and anchor manufacturing, along with sub-sea electrical cables. We have identified a 50 acre site, located between Phoenix Wharf and the Tidal Harbour, which is optimally located to support manufacturing activities. Here, materials can be brought in via rail and/or sea, with finished products exported to offshore sites via vessel. The deep water available at the Port enables access to large vessels, allowing for export opportunities to both domestic and international markets.

We are accelerating our work around port-centric manufacturing, and will be keen to work with partners – including universities - to build the sector further. We want to foster an environment in which research groups are able to work with ABP and our customers at the Port to explore ways in which innovative new technologies may be used to reduce industrial carbon emissions. We are already seeing this type of work beginning to emerge with the collaboration between the Energy Safety Research Institute at Swansea University and cement producer Hanson UK, based at Rio Tinto Wharf. This has seen the installation of a new green hydrogen demonstration unit at the company's Regen Ground Granulated Blast furnace Slag (GGBS) plant, which aims to replace some of the natural gas used at the plant with green hydrogen. This is considered a clean source of energy as it only emits water when burned. We intend to develop our role in these types of projects in future.

mission 3

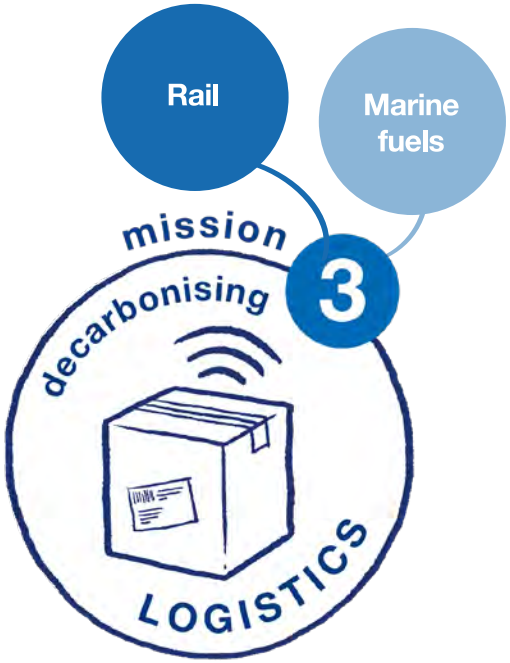
Decarbonising logistics

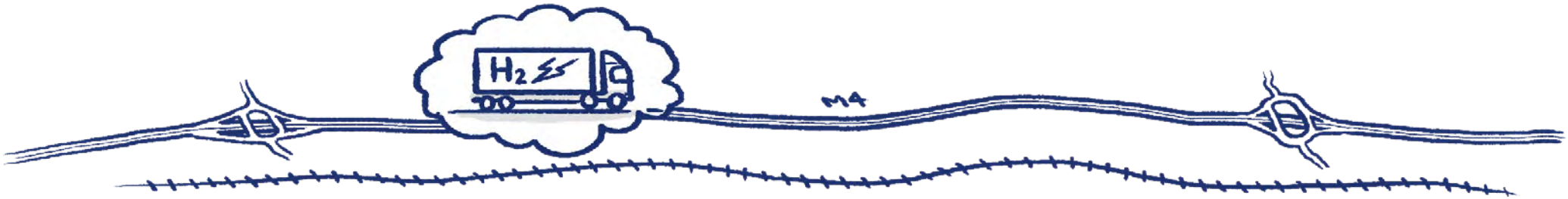
Logistics are at the heart of the modern, digitised economy. We need to revitalise the Port's low-carbon rail connections and create a new approach to zero-carbon marine fuelling. The result will be a cleaner and more efficient Welsh economy.



Our vision for rail

Port Talbot's rail connections were an essential part of its historic industrial offer – and there are signs that rail may be just as important to Port Talbot's future. There is an opportunity to create efficient, low-carbon business-to-business supply chain relationships for port customers. The regenerated rail network is also likely to have a big role in the development of the port itself – bringing construction materials needed for quayside construction and development, where water access is not an option.





A regenerated rail line at the port will create new transport capacity for low carbon freight and business-to-business connections

A new rail connection will assist the transfer of sustainable fuels

The opportunity

Whilst road connectivity to the Port site is strong – improved in recent years by the completion of the local Port Talbot Distributor Road – there are issues with the strategic road connections through South Wales, particularly east of Cardiff. In this context - where new emphasis is being placed on rail to both increase network-wide transport capacity and cut carbon emissions - Port Talbot's historic rail connections create a real opportunity, building new transport capacity for freight and business-to-business connections.

There are opportunities to use rail connections at Port Talbot to

- bring liquified carbon dioxide from offsite points of production to the Port for onward transport by sea to sequestration locations;
- transport imported or port-produced hydrogen from the Port to points of consumption across Wales and southern England;
- create new business-to-business connections from new industrial users in Port Talbot to product markets across the UK, along with incoming supply chain access to recycled feedstocks such as scrap metal, which will increase circularity and incentivise resource efficiency;
- transfer incoming land quarried aggregates, (particularly from facilities in Scotland) from sea to rail, in order to access wider markets in South Wales and southern England. Note that the existing non-electrified network can undertake this role, but haulage weight limits caused by Severn Tunnel gradients limit diesel trains to 18 wagons. Running electric trains to Port Talbot would allow full-length freight trains to run between Wales and England, creating an additional element to the wider argument for electrification from Cardiff to Swansea; and
- use rail facilities in the construction process of the new quayside and land infill required for FLOW and port-centric manufacturing.

The latter role of rail in the construction process at Port Talbot is potentially very important. Large amounts of fill material would need to be brought to site if major quayside construction and land reclamation projects were brought forward. Seaborne transport might not be possible for that material, meaning that rail connectivity could be an important part of the chosen construction solution. For this reason, rail re-engineering is considered to be on the critical path, and an early positive decision on this project would be required in order to unlock the wider project.

The optimal scenario

The optimal scenario would see rail facilities re-engineered where necessary, in order to create long term connectivity to the mainline. Facilities would be co-located with carbon sequestration, aggregates handling and PCM manufacturing facilities, allowing users both on and off the Port access to a strategic facilities.

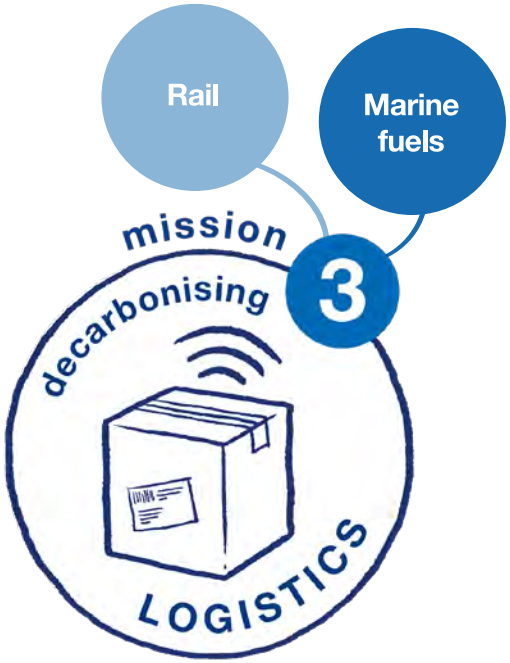
Before these opportunities can be realised, investment will be required. The port of Port Talbot is connected to the mainline via the Docks Branch line.

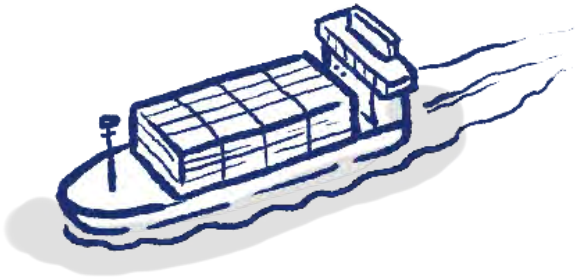
- Within the ABP demise, the rail line runs south of Rio Tinto and Phoenix Wharves in the Harbour. Upgrade and reengineering will be required to rail lines within the ABP site.
- Within the Tata Steel demise and DB Cargo lease land, stretches of the rail have been taken up over the years. These lines would need to be replaced.

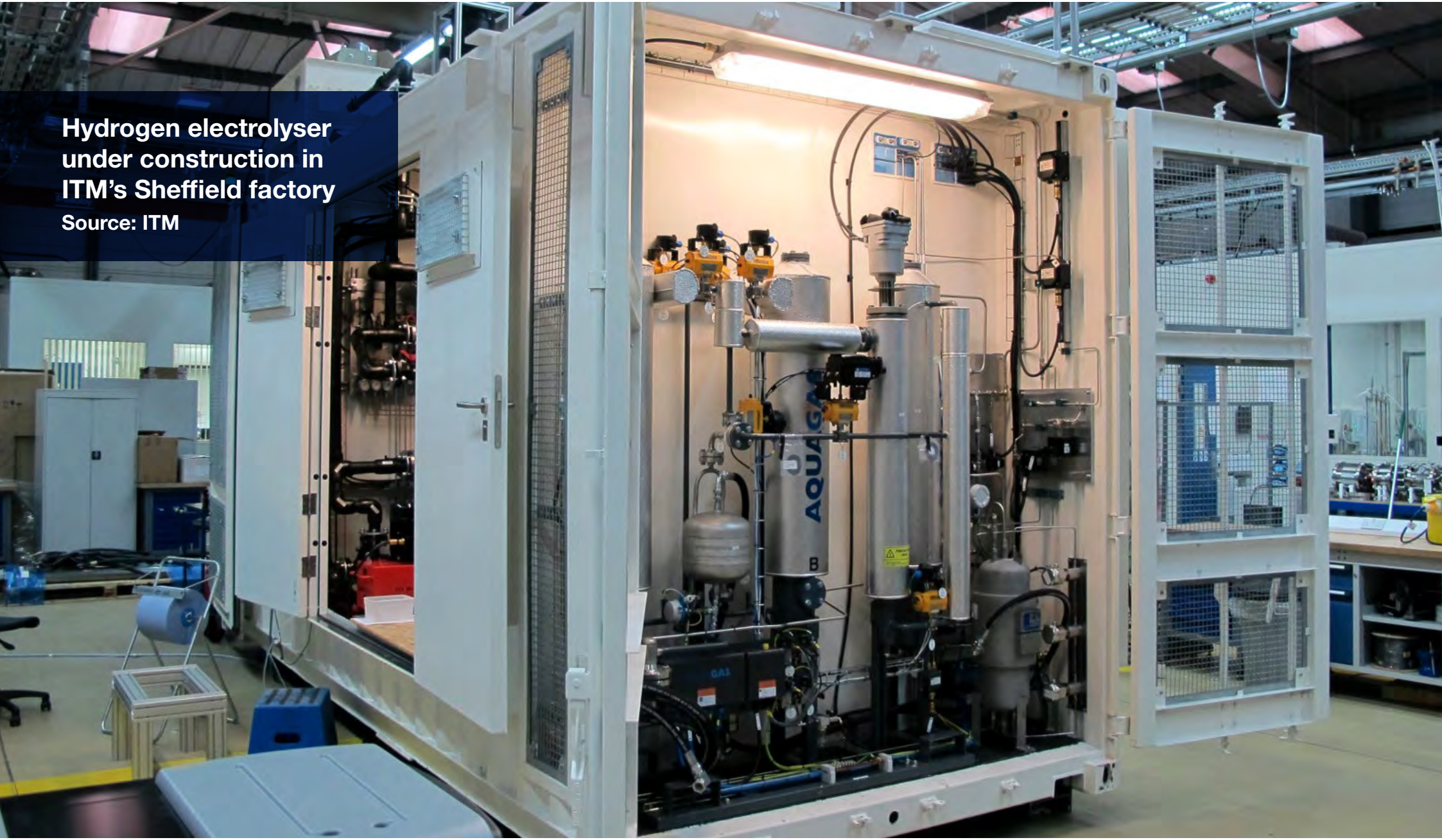
Detailed costings have not been created for this work, but could be of the order of £5m to £10m. The Docks Branch forms part of the consultation regarding the South Wales metro, and we will be working with Welsh Govt, Tata Steel, and DB to ensure that there is broader understanding of the economic opportunity that Branch Line re-engineering creates.

Our vision for a decarbonised marine sector

The global shift to the use of lower-carbon energy is going to occur across all industries, and the maritime sector is going to be no exception. Right now, the technology pathway is still unclear – marine fuels used could be methanol, hydrogen, ammonia, biofuels, battery storage, or a combination. Whatever the future holds, we want to be able to help our customers make these important sustainability improvements.







Hydrogen electrolyser under construction in ITM's Sheffield factory

Source: ITM

The opportunity

It is clear that the marine sector will need to decarbonise: the development of alternative maritime fuels (methanol, hydrogen, ammonia, or biofuel) is a central part of the Government's Maritime 2050 strategy. Working with partners and customers, we aim to explore ways in which new vessel fuels could be offered to port users, cutting our carbon footprint whilst building the attractiveness of the port to long-term, forward-thinking investors.

We recognise that presently, the technology pathway is still unclear: this will be a long term process that is likely to begin with smaller vessels (such as pilot launches) before progressing onto the larger bulk carriers and FLOW construction craft which will use the port in the longer term. On-port hydrogen facilities would also enable us to switch incoming haulage vehicles and our port vehicles and plant to zero carbon technology.

This is a longer term vision. As this workstream evolves, we will look at fuel storage locations and methods with our partners; work with partners looking at supplying the port with 'blue' hydrogen; review findings from ABP Southampton on shore power for hybrid or battery vessels; and look at piloting the manufacture of hydrogen on the port with a new electrolyser units.

These concepts need development. But we can plan for change in the meantime: we will build multipurpose manifolds and ductwork into new infrastructure at the port in advance of new fuelling systems being available, particularly at areas of the Port where we expect smaller vessels (such as pilot vessels) to berth. This will allow us to make the switch to new fuels with the minimum of disruption.

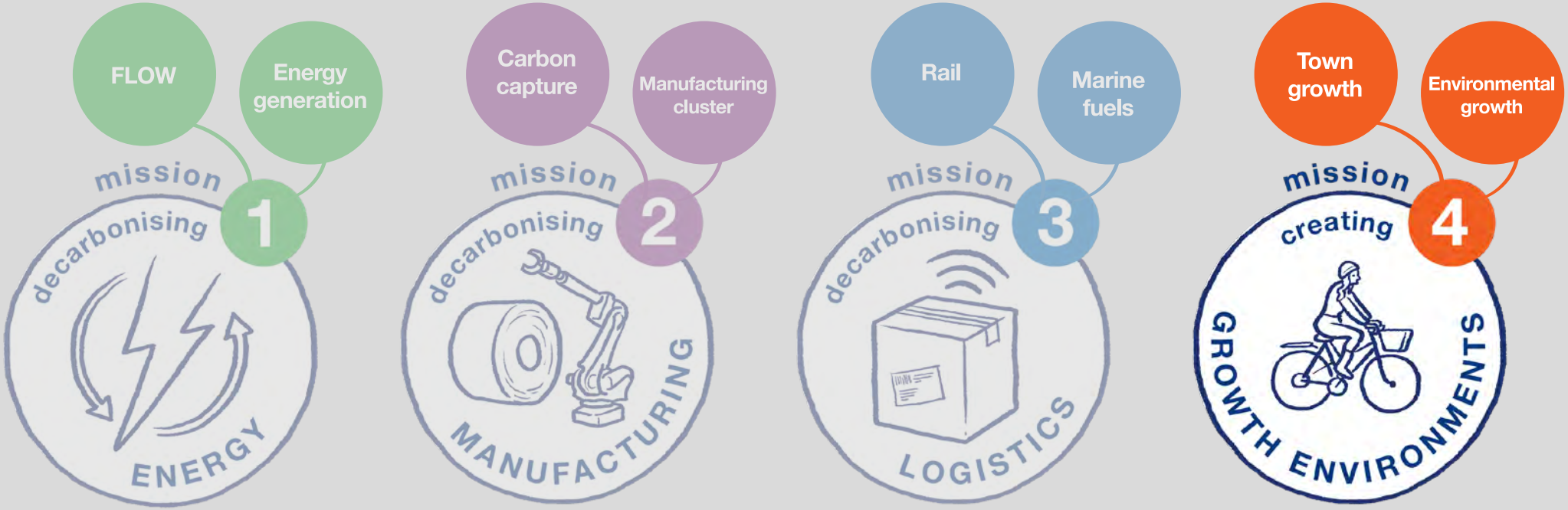
The optimal scenario

The optimal scenario would see all vessels using the port powered by zero carbon (or carbon neutral) fuels by 2050. Ideally, these fuels will be derived from on-port energy sources such as locally generated solar and wind energy, possibly in conjunction with a hydrogen electrolyser located at the port. Whilst on-port energy production is likely to be sufficient to cover requirements for smaller vessels (such as pilot craft), powering large vessels will require very large volumes of fuel – which is likely to need either fuel imports or at-scale hydrogen manufacturing using imported energy sources.

mission 4

Creating new growth environments

Our ambition is to help ensure that Port Talbot builds a reputation as fertile location where communities, businesses and natural ecosystems can grow and succeed in a sustainable way. The port can play a key role.



Our vision for an integrated town and port growth strategy

We see the port as part of a wider social and economic growth system in South Wales. We will be looking outside the port boundaries to make sure that the port's plans spin out benefits to the wider community.

Port and industrial cluster growth will support the development of the new R&D village in the Harbourside area of Port Talbot

The Harbourside fronts on to the Talbot Wharf area of the Port

The opportunity

Port Talbot's challenge is to attract investment, retain it, and then win more reinvestment, creating a new cycle of growth. That means we must create a compelling proposition across the board, which includes excellent local supply chains, high quality skills, easy access to cutting edge technology, and good quality housing. We want to help – which is likely to mean working alongside the strategic employment site owners to help create new investment locations; with the College to help develop the skilled workers needed; with the Council to help upgrade the broader investment environment at Harbourside, at town centres and within communities; and with local Universities, who are already working on innovative projects at the Hydrogen Centre and FLEXIS.

Neath Port Talbot Council already has a series of ambitious development objectives for the town's former docks quarter. This vision aims to build on those plans, and could have particular benefits for the emerging plans for Neath College's new facilities and the R&D Village at the Harbourside area of Port Talbot.

As well as impacts at the Harbourside, other spin out investments catalysed by Port redevelopment can be expected, and could be accommodated at other strategic employment sites in the sub-region, including Baglan Energy Park.

The optimal scenario

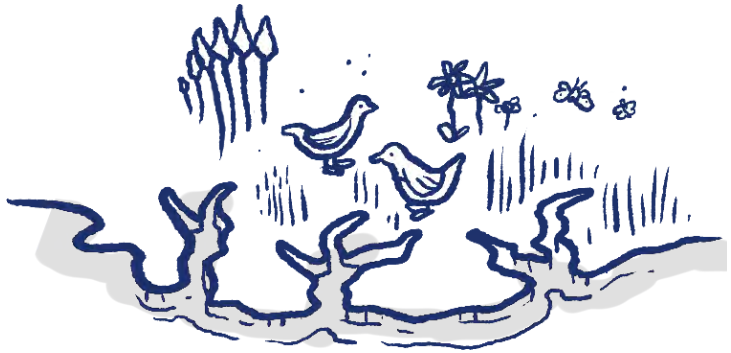
Port Talbot has the opportunity to create a new centre of gravity in the energy and manufacturing sectors. To do that, we need to make the right investments, create strong skills and R&D links to academia, and create the right policy environment – all with the objective of reinforcing the concentration of competing, collaborating and inter-trading companies in Port Talbot. The resulting cluster will create a virtuous cycle of rising prosperity, creating a new growth pathway for the Port with important implications for the wider town.

We are at the start of process now – but over time we see a number of possibilities, as follows:

- Skills development. Whilst thousands of jobs across Wales are dependent on port activity, ABP itself is not a major employer at Port Talbot now, and is unlikely to be in future. However, we can expect that the tenant businesses attracted to the Port and surrounding area by the Port's coming redevelopment will have a high demand for skills and workforce development. Both Swansea University and HE Colleges in Neath, Bridgend and Swansea are likely to be important partners for training and workforce development activities, and as activity builds, ABP will work to develop linkages between the College and tenant Port businesses.
- Supply chains: ABP's investments in Port Talbot over the next decade will be very substantial. We want to take an 'impact investing' approach to our contracting, ensuring we create a positive social and environmental impact alongside a financial return. This benefits local businesses and local communities, but also creates real benefits for ABP and our customers by helping to build the diverse, resilient local supply chains that both the town and Port rely on for long-term prosperity. In its future capital expenditure plans, ABP will investigate integrating a social value approach to procurement, including requiring successful ABP construction contractors to build skills development, environmental excellence and local sourcing opportunities into their bids. ABP will also look at developing links with local networks on 'meet the buyer' events which create opportunities for local businesses.
- Site development and promotion at Harbourside and Baglan Energy Park Enterprise Zone sites: land at Harbourside and Baglan is outside of ABP's control, but its proximity to the port means that the port will have a key role in reinforcing the competitiveness of both these sites. We will liaise with landowners via the Council in order to provide early intelligence of forthcoming port developments, so that landowners can prepare sites for incoming investors; and, where relevant, integrate our port promotional work to highlight the off-port opportunities available in Port Talbot.
- Links with academia: Port Talbot's competitive position would be significantly improved by creating a reputation as a marine technology and low-carbon manufacturing cluster, building long-term resilience in the face of likely ongoing technological change. There are a number of initiatives that could be explored alongside the University of Swansea, University of Cardiff, and other academic partners, many of which would attract public sector funding. ABP will seek to develop linkages with local academic bodies.

Our vision for environmental improvements

We believe that local environmental improvements can exist side-by-side with economic development wins – and that done well, one helps the other. Rethinking the port gives us an opportunity to work with partners to create habitats with greater biodiversity value, both within the port estate and across the wider area.
We are planning for genuine sustainable development – creating the new industrial infrastructure needed for carbon reduction, whilst working towards local biodiversity and amenity benefits.



Plans retain the listed Sea Cadet building at Talbot Wharf

Plans aim to enhance biodiversity and improve public amenity on the North Bank

The opportunity

There are a series of important environmental opportunities arising from the redevelopment of the port, and at ABP, we are keen to ensure that we exceed our legal obligations to maintain and enhance biodiversity. Whilst there are no formal environmental designations on the port estate, we know that there are areas on the port which are home to important species, creating opportunities to develop and protect those environments whilst we upgrade the port.

We aim to deliver these opportunities in a planned and co-ordinated way. The foundation of change will be a port-wide Environmental Enhancement Strategy, which we would like to develop in partnership with stakeholders and prospective investors. The strategy will explicitly seek to deliver innovative and effective ways to deliver simultaneous wins – showing how we will work towards environmental net gain whilst securing the economic benefits and local amenity we need.

The optimal scenario

Our optimal scenario is one in which the economic potential of the port is unconstrained, whilst creating new, thriving natural environments. We also aim to ensure that we translate those benefits to the natural environment into benefits for local people, and we will be looking to create new ecological zones to create a great environment for the local community and those working at the port's new industries.

To develop a strategy for success we will be working closely with stakeholders, seeking not just to comply with environmental legislation but find those win-win opportunities. Collaboration will be an important part of developing an innovative and well-funded package that fully realises the biodiversity and wellbeing potential of the port.

The Environmental Enhancement Strategy will:

- explore the possibility of taking North Bank/ Fisherman's Wharf out of the port boundary - and into community use or even community ownership. Our work with stakeholders would seek to secure the right balance between enhancing biodiversity and improving public amenity. If public amenity was prioritised by stakeholders, we would seek to work together to create amenity enhancements such as fishing access within a rewilded setting aimed at local communities and workers employed in the Harbourside area.

  Either way, change would include work to improve biodiversity and secure the existing harbour walls and revetments to reduce long term liabilities.
- Explore the possibility of creating reserved 'zones' within the active port that will allow particular environmental assets to co-exist with updated industrial uses, and look at the establishment of wildlife corridors that allow for the continued connectivity of important habitats and species across the Port Talbot landscape.
- Develop a habitat mitigation package, possibly including a strategic offset land acquisition strategy, that will ensure that the right environmental growth package is developed. This is likely to use land both onsite and offsite.
- Upgrade public amenity. The Dock is already used by the local community for fishing, sailing and jet skiing. With innovative design and a collaborative approach, we hope to create areas which can be enjoyed safely by the local and Port community, contributing to wider health and wellbeing and making the Port an enjoyable place to be.
- Investigate other benefits from an integrated, strategic approach – such as the possibility of using marine dredge arisings to alter ground levels within the port estate where necessary to deliver the other objectives covered in this Vision paper.

Early work which will contribute to this Environmental Enhancement Strategy has started. We have:

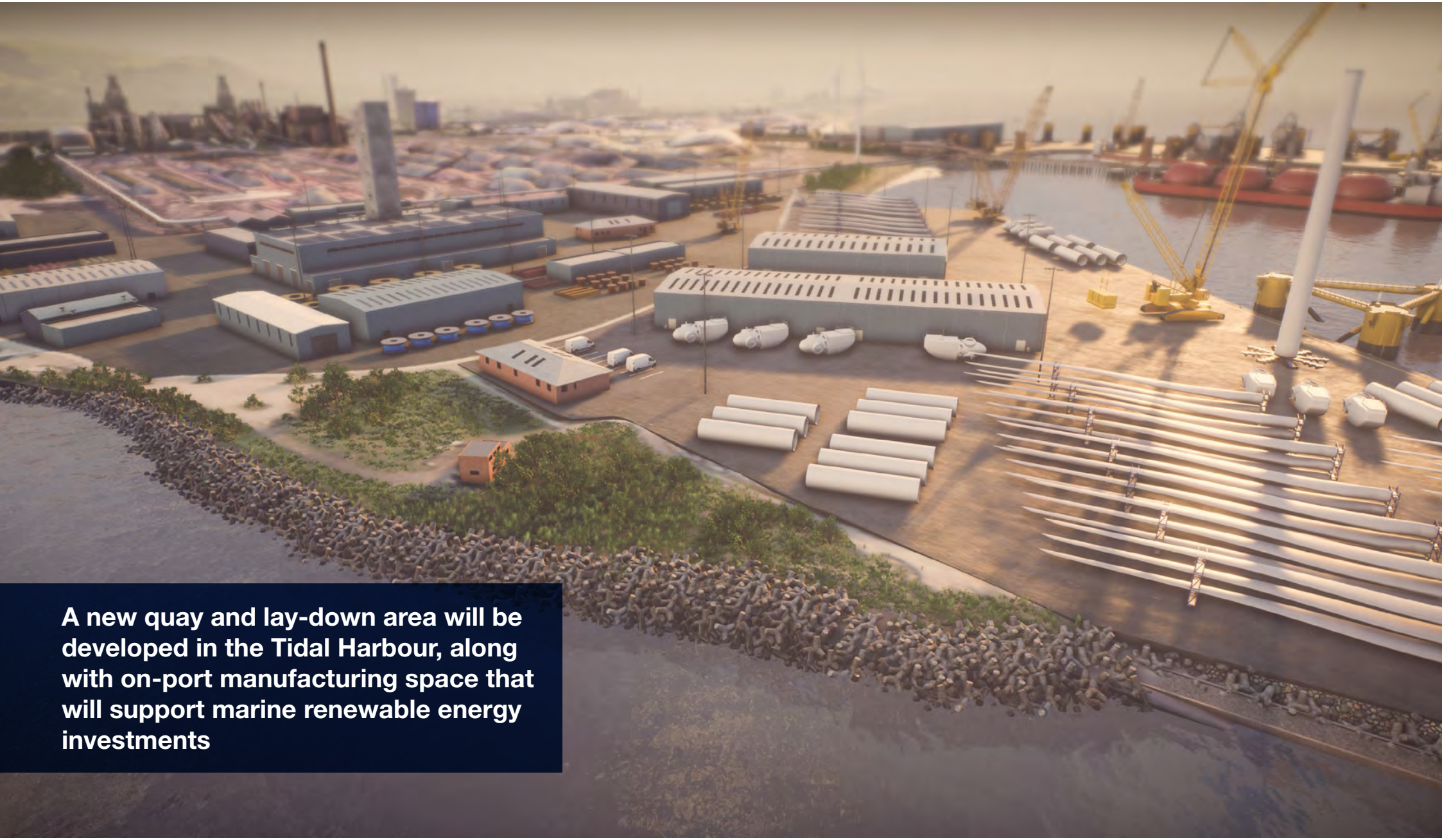
- completed initial biodiversity surveys of the habitats which could be affected as the basis for the Strategy;
- identified opportunities for delivering protection and betterment;
- identified where we need to eradicate invasive species; and
- identified areas within the Port which we could secure for biodiversity improvement.

We are looking at opportunities to work towards environmental net gain - an approach which aims to leave the natural environment in a measurably better state than beforehand. Once implemented, the completed development will have a positive ecological impact, delivering improvements through habitat creation or enhancement after avoiding or mitigating harm.

Opportunity
Urgency

Vision
Objectives

Part 3: Delivery Timelines



A new quay and lay-down area will be developed in the Tidal Harbour, along with on-port manufacturing space that will support marine renewable energy investments

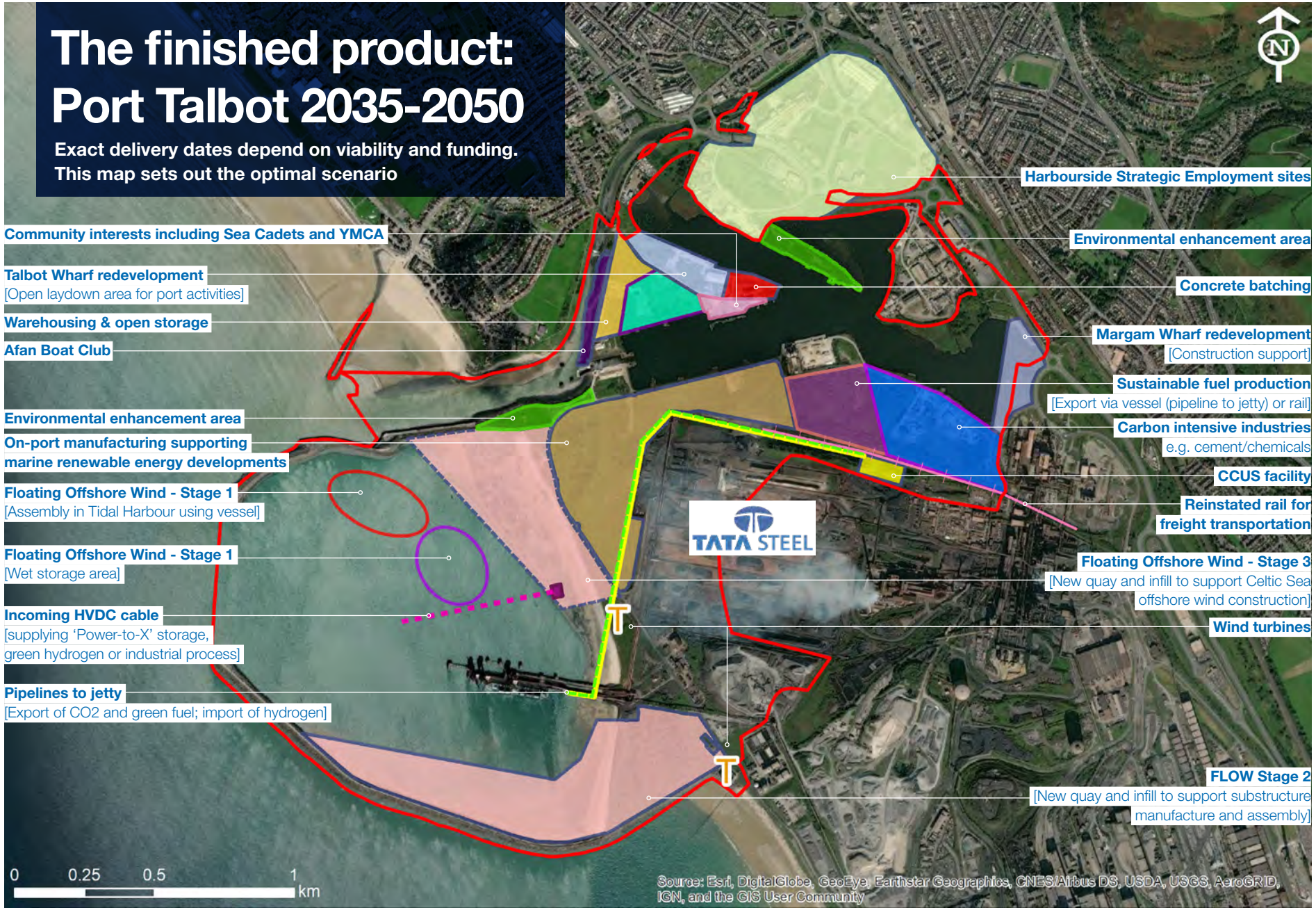
Delivery

Port Talbot is covered by various existing strategies and plans. Understandably, these documents describe making incremental improvements to Business As Usual.

By contrast, we are suggesting that we need a paradigm shift – a major disruption that makes a radically different future possible for Port Talbot. If transformation is the objective, then we need to take an entirely new approach. Here, we describe the processes we think are needed to make the vision become reality.

The finished product: Port Talbot 2035-2050

Exact delivery dates depend on viability and funding. This map sets out the optimal scenario



The Port Talbot vision set out in this paper is a very early, preliminary step on the wider journey towards change at Port Talbot. It will only succeed if delivered consistently over a number of years, accompanied by new partnership arrangements, funding and appropriate policy support. We think that the following big moves are necessary.

Building a team of the willing

Teamwork is going to be critical in future in Port Talbot. A new, highly collaborative relationship between public and private sector, requiring us to rethink how government, the private sector, community and academia work together.

There are two key reasons why. Firstly, remit. Single actor organisations do not have sufficient breadth of responsibility to be effective. We know that the changes we have described here go far beyond the control of ABP: a wide range of actors will need to collaborate, across a number of industries and sites.

Secondly, innovation. Single actor organisations cannot know enough to be effective. NESTA has pointed out that we are 'In an age of "combinatorial" innovation – where major breakthroughs are likely to involve knowledge from different fields, and joint working between thinkers, doers and communicators - being good at collective intelligence will be a crucial determinant of success for businesses, for governments, and for countries.' We need to build a new coalition, create the structures that will hold it together, and learn from experience.

Creating a shared vision and strategy

Because innovation is going to be so important to the future of Port Talbot, we need to be thinking in profoundly different ways, within both the private and public sector.

We are suggesting a process of policy co-design, which builds in the ideas of a broad base of consultees from the very beginning of the vision. Network members could include Welsh Govt, local authorities, city region, the universities, ORE Catapult, the Crown Estate, ABP, Tata Steel, Hanson, Tarmac, other private sector companies. The process of strategy co-design would need to be run with a great deal of thought and preparation if it is to be a success. Various models (some originating in software design) could be used, including 'hackdays', online wikis, and more traditional stakeholder days and consultation.

Port Talbot needs to be open and ambitious, asking questions such as:

- Could Port Talbot develop a 'Place Commission' – perhaps with four or five industry, academic and delivery 'big thinkers' to lead the discussion?
- Could a new strategy attract an 'impresario' who would be able to propel the conversation, and act as ambassador for the town?

The resulting vision and accompanying strategy will need to be clear minded. The strategy does not need to keep everyone happy. Instead, it must stimulate change, and avoid an ineffectual middle ground. It will need to:

- Disrupt: shake up existing patterns and resource distributions;
- Focus: say which things are more important than others; and
- Innovate: actively seek out new perspectives, and erode groupthink

There needs to be space for experimentation. Some ideas that come through an innovative process will fail. That is to be expected, and can be tolerated as long as failed projects get quickly shut down, or fixed.

Getting the right policy framework in place

We need to focus on the key projects that will make a long term structural difference. For example, Government must be willing to make clear decisions on which sites should get preparatory investment: it will be important not to confuse the market by fracturing strategic focus across too many sites. The regulatory environment around FLOW is also important. We must balance creating markets with sufficient critical mass to begin unlocking transformative investment, but also provide time for the UK supply chain to respond. In particular, this involves setting out an ambitious but credible medium-term target for FLOW - suggested to be between 15-20 GW by ORE Catapult.

Creating a delivery plan and project management structure

Together, stakeholders in Port Talbot must work together on a delivery plan, setting out what needs to happen, answering questions such as:

- What has got to change? How?
- Which changes do we prioritise?
- What is on the critical path, and so what do we do next? When?
- Who is responsible?

The best actions will be consciously designed to build on each other cumulatively, so reinforcing one another, and will co-ordinated in time and place to get maximum impact. A disciplined project management approach should be adopted, with each project having:

- A project sponsor. This needs to be a senior individual who has the experience and line management authority to break through silos.
- A clearly defined project manager. This individual would be held responsible for project progress and delivery.
- A clearly defined project team and project management structures.
- Excellent links between the project team and developers/investors and regulators including the planning authority and NRW

> *"improving competitiveness is a collaborative process involving multiple levels of government, companies [and] educational institutions…a large number of factors impact on competitiveness and hence only a broad coalition can hope to improve [it]."*
>
> Prof Michael Porter

Timeline

Here, our objective is to get a rough sequence for the tasks needed to implement this vision. Timelines are driven by the necessity of hitting net zero by 2050. Working back from that date, we need to see Tata Steel decarbonised in the early 2030s, and 1GW of UK Floating Offshore Wind generation by 2030. Timings are uncertain, and much more detail will develop as we iterate and collaborate with partners. But it is already clear that port development needs to begin now.

Timeline for Growth to 2050

2021

FLOW (Stage 1) preparation: marine permitting and preparation of the stone bed for jack up vessel

2022

FLOW (Stage 2) planning and consenting: developing operational requirements, terrestrial and marine permissions. Likely needed at risk in advance of identified investor

Environmental growth: programme of biodiversity and amenity improvements commences, working towards long term environmental net gain alongside port development

2023

Energy generation: installation of ground mounted solar at Talbot Wharf

Energy generation: installation of onshore wind turbines adjacent to the Tidal Harbour

2024

FLOW (Stage 1) implementation: heavy lift OWF installation vessels stationed in the Tidal Harbour enabling mating between topsides and substructures

On-Port manufacturing in support of renewables energy. Overtime a cluster emerges, attracted by the possible proximity of carbon capture facilities

2025

Integrated town & port growth: port investment alongside Harbourside redevelopment catalyses further inward investment to the Town

2026

Rail: upgraded and re-engineered infrastructure in order to create long term connectivity to the mainline

2027

Carbon capture: the port starts to play a major role in the decarbonisation of industry, bringing in hydrogen, or taking out CO_2 for sequestration

2028

FLOW (Stage 3): new quay and laydown area in the north of the Tidal Harbour to support the continued emergence of a FLOW manufacturing cluster

2029

Marine fuels: port service craft begin using by zero carbon (or carbon neutral) fuel, with larger craft using the port switching to alternative fuels later in the decade

2030

FLOW (Stage 2) implementation: new quay and laydown area in the south of the Tidal Harbour to support substructure import, assembly and export

2031-2050

What do you think?

The best visions evolve and adapt: we present this paper as a work in progress which is intended to start an ongoing conversation. We welcome your comments, ideas and improvements.

Please get in touch via email at
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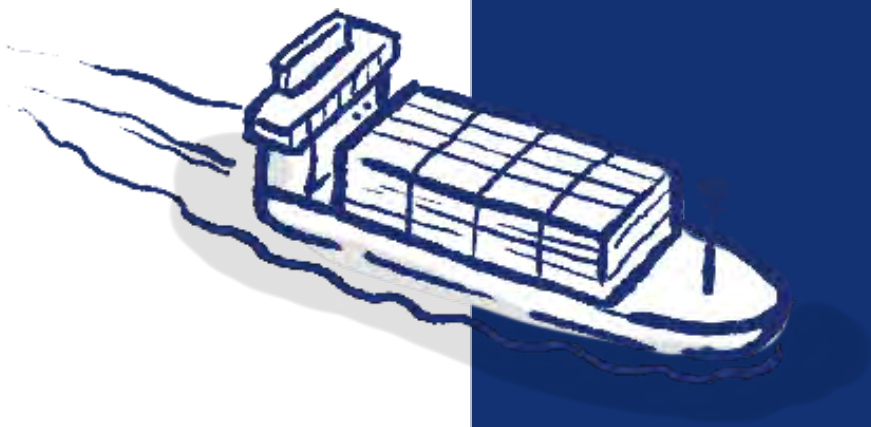

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