World Petroleum Council Netherlands National Committee

THE NETHERLANDS

Summary of workshops
May 2020

This contribution to the 23rd World Petroleum Congress is about the energy future of the North Sea region. North West Europe counts ten countries with some 250 Million inhabitants. The North Sea itself is in this 'ring' of prosperous societies. Large oil and gas fields have been in production since the early 1970's, mainly in Norwegian, British, Dutch and Danish waters. Today decommissioning projects have started at depleted oil and gas fields, such as the UK Brent fields. But reuse and repurpose of offshore assets for CCS, H2 production and transport offers new opportunities for the offshore sector.

Most of the oil and gas fields are approaching end of life, starting in the UK, followed by the Netherlands and later Norway. In the 2020's and 2030's majority of the structures need to be removed in the Southern section of the North Sea. In the late 1990's the first wind farms were developed offshore in Denmark and in 2006 the first large scale near shore wind farm was opened on the Dutch coast. Oil and gas and wind power seemed to be two very independent developments until some 5 years ago. As offshore wind is moving to deeper waters, and floating wind still under development.

There are challenges to introduce large volumes of intermittent power into the onshore grids, the option of power-to-gas, i.e. offshore conversion of wind power to hydrogen by electrolysis of sea water, has emerged as a new option for energy transportation to shore. The experience of the oil and gas sector to operate in harsh offshore environment and transport molecules is becoming a valuable capability for the renewable sector. At the same time, the offshore operators are looking for a clean source of power to run their offshore facilities and store CO2 in depleted fields. As a result, the energy transition from oil and gas to wind and hydrogen may benefit from system integration between these sectors also enabling re-use of existing oil and gas infrastructure.

The EU has set ambitious climate goals to reduce the carbon emissions by 55% in 2030. The North Sea area is expected to contribute significantly to this goal by not only large scale wind - renewable power and green hydrogen projects – but also provide for carbon storage facility to enable the industrial use of carbon neutral blue hydrogen. The existing depleted reservoirs in the North Sea can be made available for carbon storage, by using the existing pipelines running to the shore.

Beyond 2030 there is the EU ambition to become climate-neutral by 2050. The extensive North Sea oil and gas infrastructure can be integrated in the new energy seascape. This window of opportunity would pave way for the two decades to come. To fully utilize the potential of the North Seas for clean energy purposes public and political support is needed. Obtaining the social license to operate requires a balanced view on technology, economics, environmental and social demands and conditions.

The discussions at the 23rd World Petroleum Congress without doubt adds important value to the dialogues that the industry and society will have on the future of energy from the North Sea.

Click here for more information.

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1 Introduction

(Conversation with Marjan van Loon and Jacqueline Vaessen*)

1.0 Setting the business scene

At the beginning of 2020 the Brexit negotiations between the EU and the UK were still hitting the headlines regarding expectations on the economic and business impacts for both the UK and the EU member states and companies – but not for long.

The business environment changed overnight from March 2020 onwards. COVID-19 turned into a pandemic rapidly, resulting in many thousands of casualties, overloaded health care systems, societal lockdowns, border closures and a complete standstill of the aviation industry.

In many European countries the economy has shrunk in 1st HY 2020 by 10% or more.

On top of that the oil and gas prices dropped, partly due to less demand but also due to the volume push by producing countries. For the IOC's the stock value plummeted to 50% or less compared to 2019. Some IOC's reduced their dividends significantly and took write-offs up to 20 billion USD and lowered investment budgets.

EPC companies are even hit more as a result of low CAPEX investment budgets as shown in figure 2.

EPC companies

Share prices of leading EPC companies between Q1 2014-Q1 2020

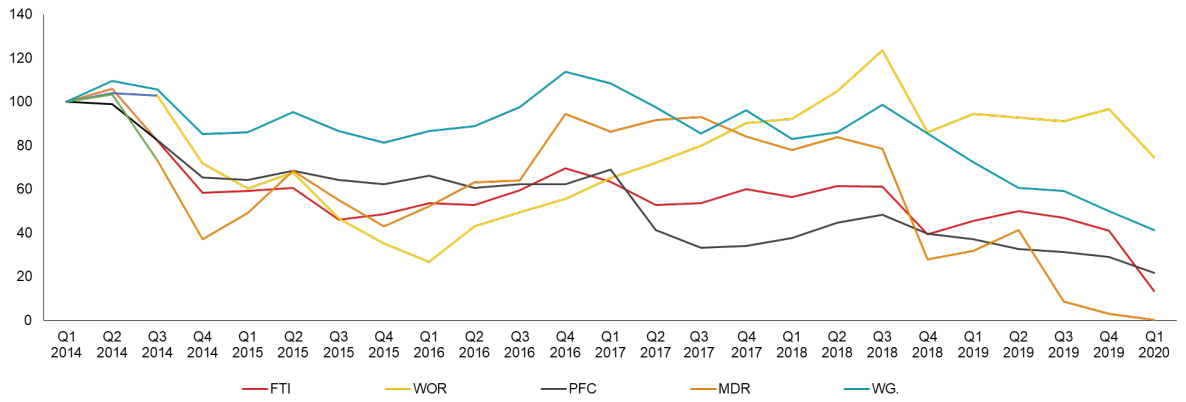

Figure 1: Pitchbook data for a sample of EPC players (source: TechnipFMC, Worley Parsons, Petrofac, McDermott International and Wood Group).

Writing this paper in Q42 2020, the economic outlook and the business environment seem highly uncertain. For instance, airline companies are anticipating a period up to 2025 to restore from the crisis due to a lack of consumer confidence in travelling. It may come faster, however new outbreaks of Corona may even further slowdown economic restoration.

The EU and many EU member states have announced large restoration funds, noticeably EU's 750 billion euro Recovery and Resilience Fund (RRF). The EU priorities are split up with 30% of the focus on initiatives related to climate, strengthening growth potential, job creation, economic and social resilience, contribution to the green and digital transition and 70% focused on the economic reform related recommendations that the EU Commission has formulated for that member state.

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It is expected that the energy transition will benefit from this fund, i.e. renewable and climate neutral energies.

A well-known expression is 'never waste a good crisis'. Both for the Governments and Companies the reforming and restructuring activities are leading to new economies and business models being realised and implemented. IOC's need to reinvent themselves faster than what was anticipated before COVID-19, in order to adapt to a post-corona 'New Normal' whatever that's going to look like – as for many there seems no way back to the old normal.

As indicated from the outcome of a small poll during one of the workshops: when probed if the energy transition would be accelerated or slowed down by the Corona crisis, 45% answered 'accelerated', 40% 'slowed down' and for 15% there's no difference or answered no opinion.

The postponement of the 23rd World Petroleum Congress due to held in 2020 was announced during the execution of the WPC workshops in the Netherlands. The Dutch team decided to finalise the workshops and the whitepaper. An update is anticipated before the planned Congress in December 2021.

1.1 Oil and gas operations in decline

The North Sea area is a mature basin for oil and gas production. Production is in steep decline, particularly in the Southern North Sea (NL and UK) and the decommissioning of infrastructure has already started. Investments in new oil and gas exploration and production projects have dropped significantly, not only because of lack of exploration potential or prospects, but also because of an increasing societal resistance to fossil fuels and the scarcity of governmental support. For example, investments in E&P in The Netherlands have dropped by 80% over the last years (EBN 2019), and the Dutch state participation organization EBN has warned that a further reduction is expected.

As a result of depleting reservoirs, the decommissioning of oil and gas assets has started. It is expected that the cost of decommissioning and abandonment of platforms, wells and potentially also pipelines will cost over 100 billion euros, of which 7 billion euro will be in the Netherlands and 50 billion euro in the UK (WEC 2017, OGA 2020, NexStep 2018).

The offshore service industry is developing innovative ships such as the 'Pioneering Spirit' by Allseas, to be able to remove a jacket in a single lift operation (p.e Brent) or by using floating crane ships to lift topside from smaller platforms and satellites. A cost reduction of up to 30% is expected from organizing the supply chain, innovation and collaboration in decommissioning (NexStep 2018, OGA 2020).

In parallel to the cessation of oil and gas production and start of the decommissioning activities, which are driven by the ambitions for reduction in greenhouse gasses as per the Paris agreement, a completely new industry is developing in the North Sea area, which started in Denmark and is now expanding to the UK, Germany, The Netherlands and Belgium. The offshore wind sector is exponentially growing as the North Sea provides excellent conditions for cost-efficient development, given the shallow water, intensive wind conditions and governmental support.

The growth of this sector provides a new market to the offshore industry for installation, operation and maintenance activities. Some oil and gas operators have decided to transfer to an offshore wind operator, such as DONG (which is now the world's largest offshore wind operator and renamed to Orsted), after selling all the oil and gas assets. Others such as Shell have decided to develop offshore wind under a new energy's division, while Equinor is developing a leading position in floating offshore wind. They are entering a competitive market where energy players such as RWE, Eneco, Vattenfall have also set their eyes on.

International overview of decommissioning status

In total it is expected that decommissioning costs in the North Sea countries will amount to 100 billion euro. (WEC 2017). Please note that Germany and Belgium are not analysed. Germany only has two platforms, Belgium has no oil and gas production.

	United Kingdom	Norway	The Netherlands	Denmark
Assets to be de-commissioned	323 platforms, 370 sub-sea structures and 20,000 km pipelines to be decommissioned	119 platforms (12 concrete, 19 floating steel, 88 steel) and c. 350 sub-sea systems to be decommissioned	150 platforms and 200 km pipelines to be decommissioned	62 platforms (61 fixed steel and 1 gravity based structure) and 5 sub-sea installations to be decommissioned
Regulation	Operator is responsible for decommissioning installations. Infrastructure is made safe and abandoned	Licensee is responsible for decommissioning installations. Infrastructure is cleaned and disposed or abandoned.	Operator is responsible for decommissioning installations. Infrastructure is cleaned and abandoned.	Licensee is responsible for decommissioning platforms, infrastructure and for post-decommissioning monitoring.
Status	Active. The OGA has dedicated working groups. 95 platforms and 7,500 km pipeline will be removed in the period 2016-2025.	Decommissioning is not yet a high priority. Current focus on recovery and growth. 14 projects foreseen in the period 2016-2025.	Decommissioning masterplan in place since November 2016. 23 platforms have been decommissioned.	Subsoil Act regulates decommissioning and financial security requirements. Guidelines for decommissioning to be released in 2017.
Expected peak	Maximum activity is expedited in the period 2020-2030.	Increased activity is expected after 2030.	A peak is expected around 2025.	Estimated between 2025-2035.
Cost target used	Cost reduction target of 40% in place.	No cost reduction target in place.	No cost reduction target in place.	The Danish Energy Agency has not set a target but expects cost reductions by industry over time.
Societal costs	Shareholder: none. Estimated % of cost borne by society: 50-80%.	Shareholder: Petoro Estimated % of cost borne by society: 80-90%.	Shareholder: EBN Estimated % of cost borne by society: 70%.	Not yet estimated.

Source: EBN (2016), UK Oil & Gas (2016).

1.2 The North Sea as a new opportunity

Main oil and gas operators in Europe are increasingly setting targets for decarbonization, either by reducing the footprint of their own operations, such as reduction of flaring and venting, electrification of assets and CO2 capture and storage, or by investing in low or zero carbon energy such as solar, wind or geothermal. Strong targets have been set by Shell, Total, Equinor, Repsol and recently also BP on decarbonization of its operations.

All operators are currently looking at options to enter the new energies business, with a focus on offshore wind (Shell, Equinor), solar (BP, Total), geothermal (Shell, Total), CCS (Equinor, Shell, Total) and hydrogen (Shell, Total, Equinor).

Figure 2: Port of Rotterdam (https://www.porthosco2.nl/project/)

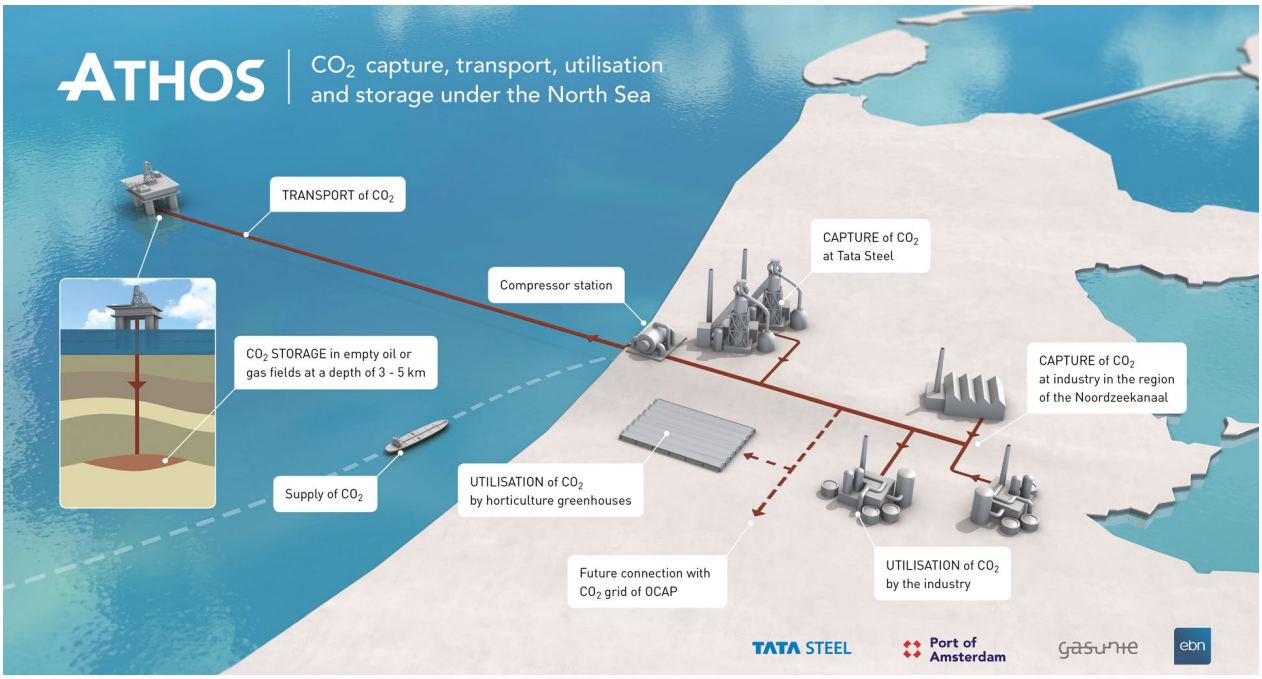


Figure 3: Athos example (source: https://athosccus.nl/).

Many of the new energy activities again have a strong relationship to the North Sea, obviously offshore wind, where it is expected that a significant amount of the marine space will become available for offshore wind towards 2050, the ambition is to place up to 250 GW capacity by that year. Current plans are to install up to 11.5 GW in the Netherlands, 20 GW in Germany and 30 GW in the UK by 2030,with further growth thereafter. For carbon capture and storage, offshore aquifers (Norway) or depleted gas fields (The Netherlands and UK) are considered to be attractive. Large scale projects such as Northern Lights (Norway), Porthos (Netherlands) and Acorn (UK) all have offshore storage licenses and will be in operation after FID in the coming 5 years. Even solar energy is developing towards floating applications, with the first set of developments announced by Shell and Eneco in the recently announced CrossWind project.

1.3 Low carbon hydrogen in the North Sea

With the current announcements of the hydrogen strategy by several European and North Sea countries such as The Netherlands and Germany, it becomes clear that hydrogen will play a major role in decarbonization of the energy intensive industries, mobility and potentially even heating in Northwest Europe in the next decades.

Hvision blue hydrogen production for Rotterdam

The industrial cluster in Rotterdam is developing the Hvision project, initiated by TNO and Deltalinqs together with 12 industrial partners. Hvision will produce blue hydrogen from refinery fuel gas and natural gas on a central location at the Maasvlakte site with CO2 capture and storage in depleted gas fields off the coast of Rotterdam.

The low carbon hydrogen will be sent to the refineries of Shell, BP and ExxonMobil to decarbonize their processes. In the first phase of the project 2.2 Mton/yr of CO2 will be captured and stored in depleted gasfields in the North Sea via the Porthos CCS project. In the second expansion phase this can be increased to 4.3 Mton/yr.

At maximum, 700 kton of blue hydrogen will be produced on the central location and transported to the refineries by means of a new hydrogen pipeline in the industrial cluster of Rotterdam. This pipeline will be connected to the future hydrogen backbone of TSO Gasunie at a later stage. Final Investment Decision is expected to be taken in 2023 with an expected start of the operations in 2025. The total investment of the Hvision project is currently estimated 2 billion euro.

System integration options for North Sea offshore energy transition

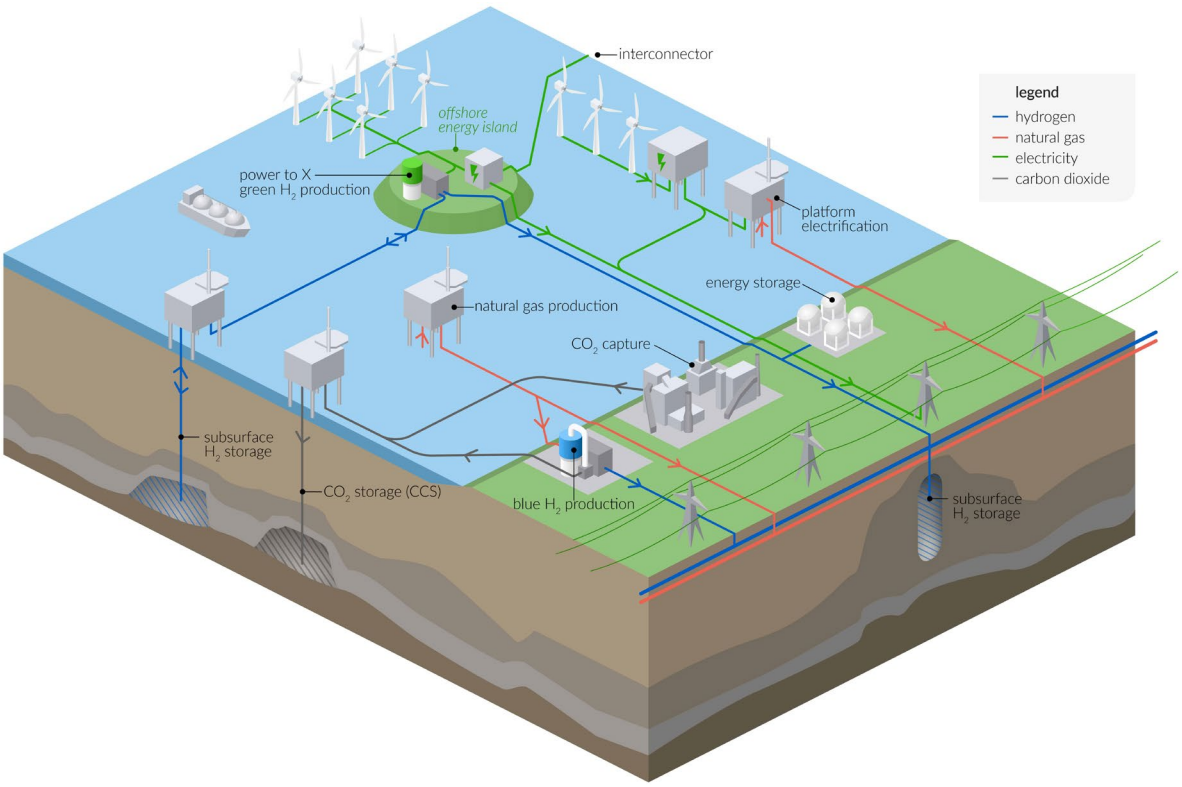


Figure 4: System integration options for North Sea offshore energy transition, source: TNO 2020.

While hydrogen is traditionally produced by steam reforming (SMR) of natural gas, low carbon hydrogen can be produced by capturing the CO2 from the SMR process and storing it offshore in depleted gas fields.

Alternatively, zero emission hydrogen can be produced from electrolysis of water by means of green electricity from solar or wind, thereby producing pure hydrogen and oxygen at a quality that can be used for fuel cells or as a feedstock for the chemical industry (e.g. ammonia production or hydrotreatment).

An increasing interest emerges to combine offshore wind with water electrolysis, thereby directly producing hydrogen offshore which can then be transported to shore via (existing) offshore pipelines. The first pilot for offshore hydrogen production called PosHYdon is under development in the Netherlands by Neptune Energy, NexStep and TNO.

These developments have triggered the question whether the assets from the oil and gas industry like pipelines, platforms, reservoirs and wells can be reused for the new energy applications, such as CO2 storage, H2 production and transport, Power to Gas conversion etc. (figure 4, North Sea Energy Program (2020), NexStep (2019)). This will extend asset life and delay some of the immediate spend while potentially offering continued positive cash flow.

The Hywind Tampen project

The offshore platforms of Gullfaks and Snorre of Equinor in the Norwegian North Sea will be electrified by means of offshore floating wind power. In total 11 floating wind turbines will be installed with a total power of 88 MW. These wind turbines are the largest floating units that have been developed over the past decades and demonstrated in projects such as Hywind Scotland in 2017. About 35% of the power demand of the offshore oil and gas operations will be supplied by the floating wind turbines. The final investment decision for this 450 million euro investment was taken in October 2019. In total 200 kton of CO2 emissions and 1000 ton of NOx emissions will be mitigated by this project. When operational, it will be the largest offshore floating wind farm in the world and a testbed for future developments of floating wind.

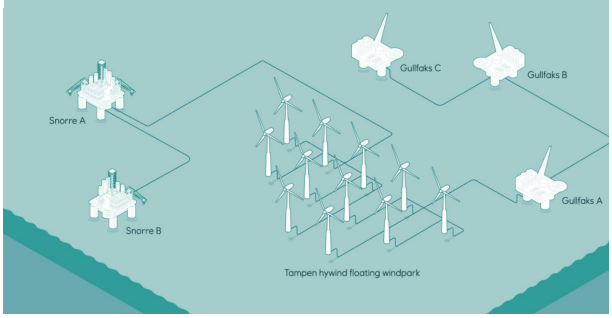


Figure 5: Tampen Hywind system (source: https://www.equinor.com/en/what-we-do/hywind-tampen.html).

In a large innovation program called the North Sea Energy program, operators are analyzing the options for cost-effective synergies between oil and gas operations, existing assets and new energy options.

First pilot projects that implement these innovations are under development, such as Porthos (CO2 storage by TAQA), PosHYdon (offshore hydrogen production by Neptune), platform electrification of the offshore AWG platform by NAM.

Also, in the UK and Norway projects have been announced to combine oil and gas production with new energies, such as the Acorn project in Scotland to produce blue hydrogen onshore with CO2 storage in an offshore gas field and the HyWind Tampen project in the Norwegian region where Snorre and Gullfaks platforms are powered by offshore wind.

The Northern Lights project for CO2 storage in Norway

In 2020, Norwegian operator Equinor, together with partners Shell and Total have taken the final investment decision for the first phase of the Northern Lights CCS project, offshore of Norway. In total 1.5 Mton/yr CO2 will be stored in a reservoir offshore of Norway in phase 1, with a potential extension towards 5 Mton/yr in phase 2. The CO2 will be captured from an onshore waste to energy plant and a cement factory in Norway, but the capacity allows for import of CO2 from countries around the North Sea by means of shipping in phase 2. These include Denmark, UK, The Netherlands and Belgium. CO2 is transported offshore via a subsea pipeline in a liquid phase 110 km towards the Oseberg platform, where it will be injected in the Aurora reservoir at 3 km depth and at a maximum pressure of 300 bar. The operations will start in 2024.

Figure 6: CO2 Storage reservoir (Source: Equinor)

2 Critical success factors
for venture investing in transition technologies

As highlighted before a North Sea energy system can play a key role in meeting the Paris Agreement climate goals on time. This system is unprecedented and while most of the technology is there, a lot of work is required to scale and integrate it.

Ventures can form a part of the solution to scale the technologies necessary to integrate (into) the system: both hardware and software elements. Also, the current regulatory frameworks and market designs may not yet be ready to support a well-functioning system.

When the North Sea energy system and the innovation required are considered from an operator's point of view, some key factors stand out both for and against a transition towards newer technologies in terms of financial rationale, legacy sourcing & contracting procedures and decision-making structures. These are generally applicable across the energy landscape, as well as having specific elements due to the North Sea.

Private organizations – especially IOCs and NOCs – see the benefits of transitioning to the new energies, given their sustainability ambition and targets and the opportunity to extract more value from current assets. The key role for energy companies would be to provide expertise as a system integrator in the new energy space. Innovation is likely to be often driven by external ventures, which are fueled by corporates through capital infusion.

The many elements of the hydrogen value chain need to work together to realize value for society at large. Ventures help realize the technical integration by developing initial solutions for the major technical challenges. However, new hardware and software solutions (developed by ventures red.) need to evolve towards integration and production at scale. For a venture this final step (in NASA terms from TRL 7 to TRL 8) has posed the greatest challenge and this is also where the real value lies.

Technical innovation in the hydrogen space to enable scale deployment will be driven by new ventures across the value chain

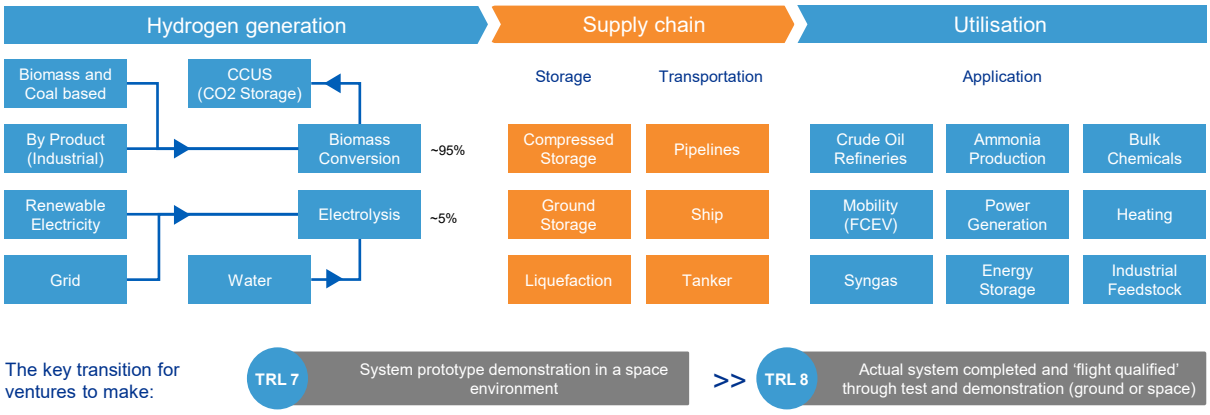


Figure 7: Hydrogen energy value chain and key focus of ventures to aid transition (source: KPMG).

In order to realize the success of these complex systems, government and private initiatives must work in tandem, with government supporting more from the point of view of guarantee side, permit /regulations side and creating long term policy to stimulate the required investments in innovation. While the private institutions are likely to support through funding the right ventures and participating in various forms of public-private partnerships (e.g. pilot projects) to accelerate development. The largest opportunity lies when the elements work as one system.

For the North Sea project to succeed all the factors require attention, as these are interdependent. All the actors of the system play a key role, be it ventures for innovation, corporates for providing integration possibilities and the governments to create policy framework to support both innovation and deployment.

When it comes to corporate venturing, there are key themes that ventures can concentrate on to ensure successful funding. These include a system- oriented approach with the right team in place, involving itself at the earliest moment keeping assets in mind and ensuring financial protection. Key success factors are technology innovation, functioning ecosystem, scalable operation and a viable business.

Figure 8: Key success factors for the North Sea vision (source: KPMG).

3 Future
of new offshore energy developments

The North Sea region is just embarking on its energy transition journey but it is clear that it plays a crucial role in the further transition to green energy, especially by building more wind farms the transition to green energy can be made.

The IABR project 2050: An Energetic Odyssey visualizes what the North Sea would look like if we were to build enough offshore wind farms to supply all of Northwest Europe with renewable energy by 2050. It is stated that this would require 25,000 offshore turbines of 10MW each. Together they would cover an area of some 57,000 km2.

The Dutch national government is aiming for a minimum of 27% in 2030. The Netherlands also wants to achieve zero carbon dioxide (CO2) emissions from the energy supply by 2050.

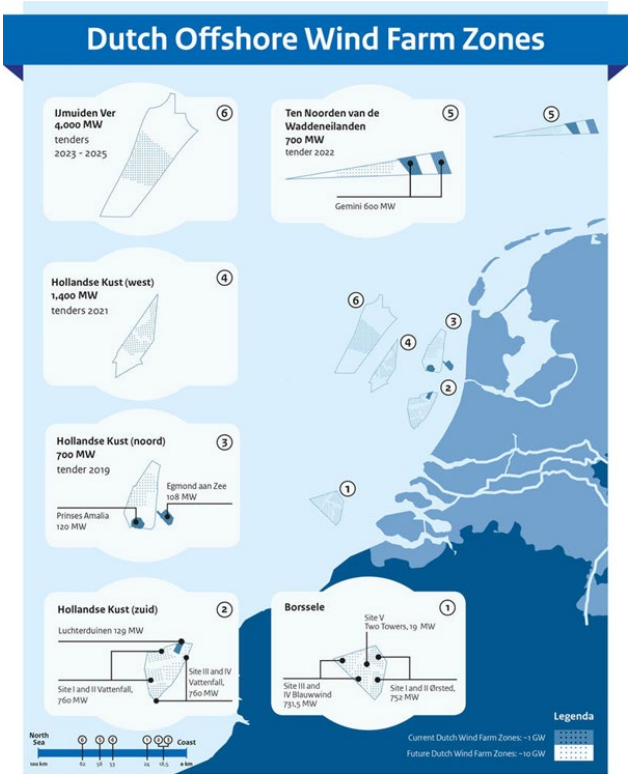


Figure 9: Offshore Wind Energy Roadmap reported by the Dutch government (source: Dutch Government).

Offshore wind is an important form of renewable energy for meeting these goals. The Coalition Agreement and the Climate Agreement (2019) include a commitment to continue the successful offshore wind energy policy. This will result in offshore wind farms generating approximately 11 GW by 2030, which is enough to supply 8.5% of all the energy in the Netherlands and 40% of the current Dutch electricity consumption (see Figure 9).

Creating an integrated energy system in the North Sea requires significant investment and over the next 15 years the investment profile remains dominated by oil and gas and offshore wind. A recently published article by the oil and gas Technology Centre reports that the economic impact for the UK could lead to over 200,000 new jobs being created across the region backed by the growth in offshore renewables, hydrogen and CCUS. Over £430 billion of capex is required between 2020 and 2050 to meet the CCC and OGUK targets, the UK content of this is expected to be around £270 billion and an integrated UKCS energy system could generate £36 billion per year in revenue by 2050 through the domestic sale of products and services.

In addition, this transition can only be made through unprecedented and considerable changes to our energy production and transport infrastructure, as well as to the ways we consume energy.

As for the hydrogen economy, an economic impact assessment carried out by the Hydrogen Taskforce, states that there will be a positive impact on the UK economy leading to creation of ~75,000 jobs and a revenue contribution to the tune of £18 billion by 2035. Similarly in a report by JIN Climate and Sustainability and New Energy

Coalition, the Dutch hydrogen economy is also likely to push the employment in the energy sector, increasing from about 60,000 jobs in 2015 to over 200,000 jobs by 2050 (in a base case), with 50,000 of these jobs expected due to the role of hydrogen in the energy landscape.

Similarly, for the offshore wind a study by the Belgian Offshore Platform group concluded that offshore wind industry is likely to create up to 16,000 jobs and 1 billion euro in revenue per annum. As per a recent report published by Offshore Wind Industry Council the UK region has seen a positive impact of offshore wind industry developing in the region. It has led to creation of 11,000 long term jobs in the sector currently and is expected to grow to 27,000 by 2030.

As can be seen the impact would likely be positive across the various EU member states with value creation in terms of job opportunity for the installation and running of these new energy implementations. This will also result in additional infusion into the region's economy through sustained revenue generation from the operational activities. Apart from the gains and opportunities brought in through larger operators and asset owners, it is also likely that the growth will have a positive impact on small scale local suppliers, installers and other support industries (e.g. local shipyards, steel manufacturers, electricians etc.) which are to see additional business given the large ambitions for new energy installation in the region.

An increasing and changing price (£bn)

	Vision 2035 production x today's oil & gas prices	CCC wind x £40/MWH	CCC H_2 x £2/kg	CCC CCS x £50/t	Total
2020	24	2	0	0	26
2030	20	5	1	2	28
2040	16	11	5	4	36
2050	11	16	13	9	49

Figure 10: The value of energy transition at the UK sector from offshore oil and gas towards wind, CCS and hydrogen (source: OGTC 2020)

Workshop Blue Hydrogen

Blue or 'low carbon' hydrogen is derived from reforming natural gas into H2 and capturing and storing CO2. So far hydrogen is used as feedstock in a.o. the petrochemical industry and the CO2 is released to the atmosphere. Soon it is expected that hydrogen will be used for burners and boilers too, thereby replacing refinery fuel gases and natural gas.

In the Rotterdam area three refineries of BP, ExxonMobil and Shell investigate reforming their refinery fuel gases into H2 and storing the CO2 in depleted off-shore gas fields. H-vision, the name of the project, prepares for a pre-combustion CC(U)S route for the Rotterdam petrochemical industry.

From the Mid 20's the first phase should be operational. In the workshop there was much interest in this way towards climate neutral production of petro products. Some challenging questions were raised, such as the competitiveness as the costs per tonne CO2 avoided is 100+ euro and the public and political support for large scale CO2 storage is still to be seen.

The workshop participants however consider low carbon H2 for the industry as the main kick starter for a hydrogen economy. On the longer term it is expected that green hydrogen from off-shore wind will take over and replace natural gas reforming.

4 License to operate
and societal challenges

The license to operate for energy companies to execute activities on the North Sea is to be obtained from different stakeholder groups. The North Sea is a busy place, spatially organized for shipping (dedicated lanes, anchor locations), fishing, military practicing areas, mining (e.g. sand), recreation (beach) and nature reserves (Natura 2000 areas). Energy production, oil and gas platforms and pipelines, and a growing number of large windfarms have their own (large) spatial claims too.

For professional interest groups such as shipping and fishing, the license to operate is mainly based upon economic conditions: shipping routes and fishing areas versus occupation by windfarms which do not allow shipping nor fishing between the wind turbines (due to cables on the seabed).

For nature and environment NGO's it is about the balance between nature, environment and economic usage. Protected Nature 2000 areas such as the Dogger Bank are under threat from long term windfarm and energy island plans. Also the placement of wind turbines' foundations is nature sensitive due to the noise of pile driving.

For the general public it is their recreation, mainly at the beach, and their support for NGOs' battle for nature and the environment e.g. seals and birds. Wind turbines are very visible, reason why windfarms on land generate opposition and court cases. Off-shore however there is opposition for the same reason: visibility. This leads to more distant – and therefore more expensive – windfarms.

The oil and gas industry is now facing a period of decommissioning. There is a societal debate about what to remove from the sea: top structure only, subsurface structures and pipelines too? The re-use of infrastructure for other purposes like hydrogen production and transport, or for nature ('from rig to reef') have their license to operate challenges. For windfarms the first lot to be decommissioned or replaced respectively is still some 10 – 15 years down the road.

Last but not the least, the planned CO2 storage in depleted oil and gas fields under the seabed is disputed from two angles. First: is large scale offshore CO2 storage safe for the environment for an infinite time? Second: if CO2 storage is allowed, will other waste streams follow such as nuclear?

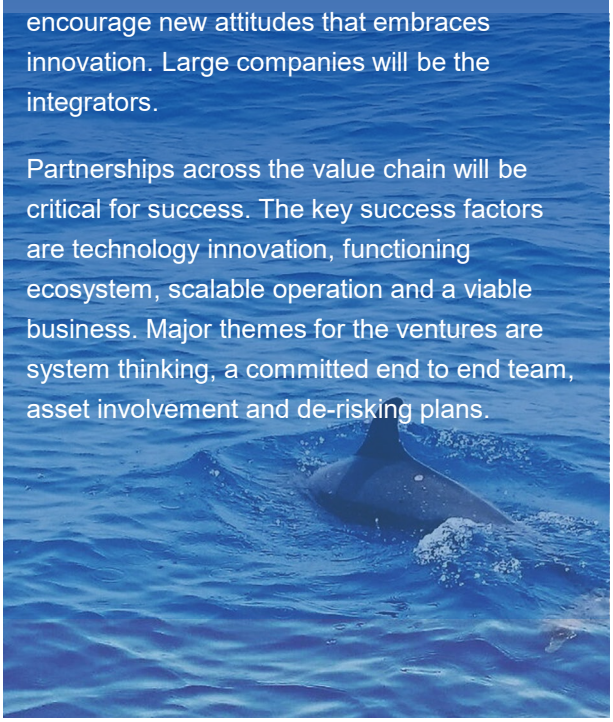
Multi-stakeholder consultations and continuous LOI maintenance from new insights will be necessary during the full cycle of planning – building – operating and end-of-life or re-use.

Workshop Business Models

The oil and gas industry is facing an unprecedented challenge as there is not enough margin to fund innovation, starving the oil and gas sector of much needed efficiency improvements. Margins are under pressure competing with renewables and companies have set new ambitious net zero carbon emission targets. Innovation of the value chain is required to meet these targets. Part of the solution is to scale up innovative startups to be a part of the value chain through corporate venturing.

The North Sea wind power hub accelerates deployment of offshore wind and its integration in the North Sea system. To succeed it not only requires new incentives to stimulate and drive innovation through the value chain and supply chain, it also requires incentives to stimulate project managers to accept the technology risk and procurement managers to buy differently. The realization of the North Sea vision requires an interplay between government institutions and the private sector. Oil and gas companies have a key role to play as they need to encourage new attitudes that embraces innovation. Large companies will be the integrators.

Partnerships across the value chain will be critical for success. The key success factors are technology innovation, functioning ecosystem, scalable operation and a viable business. Major themes for the ventures are system thinking, a committed end to end team, asset involvement and de-risking plans.



5 Conclusions
and key messages

The energy transition offers an attractive opportunity for the oil and gas sector to develop new business in the new energy space, which is particularly relevant for the North Sea countries considering the potential for offshore wind, CCS, hydrogen production and energy storage.

In the new energies offshore sector, new value can be created from reuse or repurposing of existing infrastructure, such as pipelines, platforms and depleted reservoirs. Extending asset life will delay some of the imminent spend while potentially offering continued positive cash flow.

The North Sea has an excellent location with proximity to international harbors, demand centers and support in terms of policies and legislations.

Significant investment in technologies and pilots are required to achieve the necessary scale and to generate a customer base but the potential economic value of the offshore new energy is comparable to the existing oil and gas revenues streams.

Legislation is often not yet in place to enable reuse or repurposing of oil and gas assets for new energy use and should be developed.

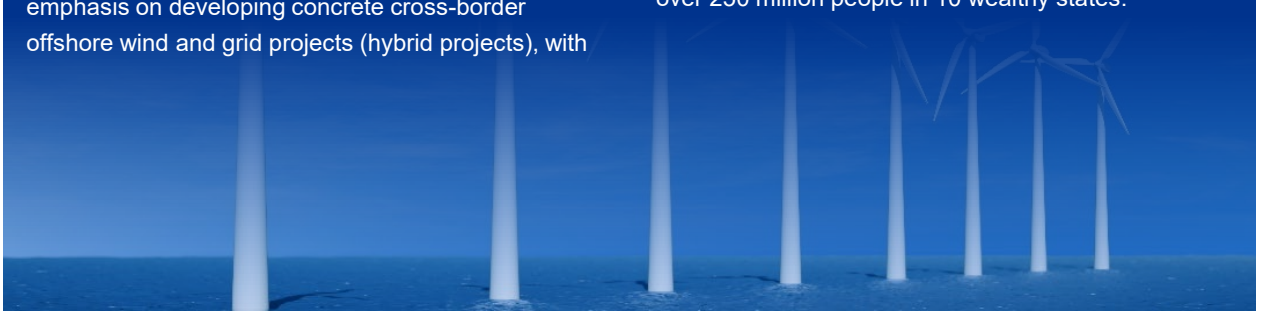
EU North Seas Energy Cooperation

The North Seas Energy Cooperation (NSEC) supports and facilitates the development of the offshore grid development and the large renewable energy potential in the region. This is a long-standing energy priority for the EU and the concerned countries.

The European Green Deal emphasizes the importance of offshore wind in meeting the EU's 2030 and 2050 climate and energy objectives and stresses the importance of regional cooperation. Belgium, Denmark, France, Germany, Ireland, Luxembourg, the Netherlands, Norway and Sweden are currently members of the NSEC – due to the Brexit the UK is no longer member of this cooperation. The work program for 2020-2023 and the new structure has put emphasis on developing concrete cross-border offshore wind and grid projects (hybrid projects), with the potential to reduce costs and space of offshore developments.

The European Commission expects a 150% increase in Europe's electricity consumption going towards decarbonization in 2050. This new electricity consumption might be located close to the coast, but it will also be likely to be placed in some of the existing industrial clusters – e.g. chemical industrial clusters, where there we will be a high need for renewable based hydrogen and other e-fuels. The need for the NSEC to look further than producing electricity is inevitable. (source: www.ec.europa.eu)

Including the UK, 10 North Seas countries account for over 250 million people in 10 wealthy states.



References

OGA - UKCS Energy Integration (2020)
https://www.ogauthority.co.uk/media/6625/ukcs_energy_integration_phase-ii_report_website-version-final.pdf

NexStep: reuse and decommissioning report (2020)

https://www.nexstep.nl/wp-content/uploads/2020/07/Re-use-decommissioning-rapport-2020-ENG_final.pdf

TNO - North Sea Energy: Unlocking the potential of the North Sea (2020)

https://north-sea-energy.eu/static/3e19bcb9aa57735fe1bbc423ca22d5e7/FINAL-North-Sea-Energy-Unlocking-potential-of-the-North-Sea-program-findings-2020.pdf

WEC - The North Sea Opportunity (2017)

OGTC – Closing the Gap: Technology for a net zero North Sea – (2020)
https://www.ogtc.com/media/3874/closing-the-gap-full-report.pdf

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