North Sea Energy Projects under pressure; an outlook on offshore wind and the role of system integration on the North Sea

Experts: René Peters (Business Director Gas Technology, TNO)
Miralda van Schot (Energy Analyst/ Project Manager, NEC)

Moderator: Leon Stille (Manager, EDI)

16 April 2020, 13:00 – 14:00 CET
Energy Delta Institute, Groningen
ENERGY TRANSITION IN THE NORTH SEA

MIRALDA VAN SCHOT – NEW ENERGY COALITION
RENE PETERS - TNO
Decommissioning on the North Sea is large endeavour
The current sum earmarked as a provision for the
decommissioning of all Dutch wells and infrastructure is
some €7 billion, most (55%) of which is for the offshore sector
REMOVAL OF ASSETS IN ADVANCE OF REUSE OPTIONS

NEXSTEP, 2018
# THE DECOMMISSIONING CHALLENGE

<table>
<thead>
<tr>
<th>Assets/Cost</th>
<th>NL</th>
<th>UK</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Platforms</td>
<td>150</td>
<td>323</td>
<td>119</td>
</tr>
<tr>
<td>Subsea</td>
<td>&lt;10</td>
<td>370</td>
<td>350</td>
</tr>
<tr>
<td>Pipelines</td>
<td>3500 km</td>
<td>20,000 km</td>
<td>8800 km</td>
</tr>
<tr>
<td>Cost estimate</td>
<td>7 (+5) B€</td>
<td>50 B€</td>
<td>17 B€</td>
</tr>
<tr>
<td>Societal share</td>
<td>73%</td>
<td>50 - 80%</td>
<td>80 – 90%</td>
</tr>
<tr>
<td>Peak activity</td>
<td>~2025</td>
<td>~2025</td>
<td>~2030</td>
</tr>
</tbody>
</table>
Trends: strong growth for offshore wind

Development in offshore wind power until 2050

Offshore wind growth up to 2023 or ~4.5 GW (NL)
2024-2030 of ~11.5 GW (NL)
2050 of 60 GW (NL)?

→ 2023: €8-11 billion investments, at least 4 billion for infrastructure
→ Large offshore grid (vision 2050): 24 Billion Euro (NL only)
LARGE CLAIM ON THE NORTH SEA FOR TRANSITION

THE ENERGY TRANSITION

- **>2°**
  - INCREASE RISE IN TEMPERATURE
  - Use black energy (oil, coal)
  - Use grey energy (gas)
  - Electrify offshore platforms

- **1,5°/2°**
  - REALISE CLIMATE GOALS
  - Use CO₂ neutral energy
  - Use blue H₂ as feedstock
  - Use blue H₂ as energy

- **CO₂**
  - LIMIT RISE IN TEMPERATURE
  - Use green H₂ as feedstock
  - Use green H₂ as energy
  - Use green electricity

Connect wind and gas
Offshore Storage CO₂ CO₂ transport
Offshore Power to Gas, H₂ transport large scale energy storage
NORTH SEA ENERGY PUZZLE

CO₂
Hydrogen
Natural Gas
Electrons
Onderhandelaarsakkoord
voor de Noordzee
REUSE POTENTIAL OF PIPELINE INFRASTRUCTURE
SYSTEM INTEGRATION OPTIONS

How can system integration of large-scale offshore wind and offshore gas infrastructure accelerate the energy transition?

**Electrification of offshore gas platforms**

**Power to Gas (P2G) & H2 transport**

**Carbon Transport and Storage (CCS)**

**Energy Islands**

**Energy storage**

**Targets:**
- Emission reduction ($\text{CO}_2$, NOx)
- Grid balancing & energy storage
- Efficient use of socialised cost
- Re-use of invested capital
- Efficient use of marine space

* Full report on [www.tno.nl](http://www.tno.nl) see [www.north-sea-energy.eu](http://www.north-sea-energy.eu)
TIME LINE FOR SYSTEM INTEGRATION OPTIONS

Period from now

Zero emission

Negative emission

Fully decarbonised

Conventional oil & gas production

now

Electrified oil & gas production

5-10y

Carbon capture & storage

5-20y

Hydrogen conversion

5-20y

North Sea Energy
OFFSHORE ELECTRIFICATION

Tractabel-engie, 2019

North Sea Energy
Storage Capacity 1700 Mt CO₂
OFFSHORE STORAGE POTENTIAL OF HYDROGEN IN DEPLETED GAS FIELDS

- Storage volume 60 Bcm H2
- Equals 179 TWh of energy
POSHYDON – OFFSHORE HYDROGEN PRODUCTION PILOT

1 MW PEM unit
200 Nm³ H₂/hr
Vision Energy Transition Accelerator North Sea

One North Sea: Collaboration and leadership

Inclusive energy strategy for North Sea hubs

Stop sector thinking; start system thinking

Fast track from idea to portfolio of pilot and demonstration projects, scaling up!
IMPACT OF CURRENT CRISIS ON OFFSHORE ENERGY PROJECTS

Perfect storm:
- Low oil and gas price
- Tax incentives delayed (NL) or more attractive in UK/NO
- Stringent NO\textsubscript{x} emission regulation offshore
- Slow and delayed permitting processes
- Health risk for offshore personnel (COVID-19)

Potential impact for offshore operations:
- Offshore Investments delayed (O&G majors)
- Lower interest in offshore wind development (ref. Vattenfall)
- Offshore maintenance minimised to bare minimum
- Low gas price may accelerate decommissioning of late life assets
- Potential for reuse of assets declines
More on the North Sea Energy program

https://www.north-sea-energy.eu/
COMING UP – 2 WEBINARS
(INCLUDING 2 LEARNING ACTIVITIES)

• **Thursday 23 April 13:00 – 14:00 CET**
  *Spatial impact of the energy transition (Learning activity)* with Theo Fens (Senior research fellow at Technical University of Delft)

• **Thursday 30 April 13:00 – 14:00 CET**
  *Surviving disruptive change for energy companies (Learning activity)* with Yousri Mandour (Senior consultant and partner as ICSB Marketing and Strategy)

• **Thursday 7 May HOLIDAY**
  There will be no webinar due to the holiday week

Please check our website [www.energydelta.org](http://www.energydelta.org) or go to [www.energyacademy.org](http://www.energyacademy.org) and [www.newenergycoalition.org](http://www.newenergycoalition.org)

We hope to welcome you back!