Offshore Wind Energy in the Netherlands workshop

29 November 2022

Programme

- Outlook 2030-2050 (Mark Stuurman)
- North Sea Energy Infrastructure Plan 2050 (Joost Vermeulen)
- Panel discussion: Impact ambitious goals on the supply chain
  - Jan Vos – NWEA
  - Mark Heine – IRO & Fugro
  - Erik Bertholet - Offshore Wind Port Collaboration & Eemshaven/Groningen Seaports
  - Mariëlle Hetem – Ministry of Economic Affairs & Climate Policy
- IJmuiden Ver WFZ I-IV tender
  - Wind Farm Site Decisions (Bram du Saar)
  - Tenders (Emelie de Wagt)
  - Site characterisation (Matté Brijder)
  - TenneT & the offshore grid (Tiemen Govers)

wind & water works

Introduction

- Safety instructions
- Press

The North Seas Energy Cooperation (NSEC)

What is it?

NSEC supports and facilitates the development of the renewable energy production and the offshore grid in the North Seas region.

Members:

Belgium, Denmark, France, Germany, Ireland, Luxembourg, the Netherlands, Norway, Sweden and the European Commission are currently members of the NSEC.

Working groups:

1. Hybrid and joint projects
2. Maritime spatial planning
3. Support framework and finance
4. Delivering 2050

Priorities Dutch Presidency 2023:

1. North Sea Energy System Vision 2050
2. Integral Transitions on the North Sea
3. Sustainable Supply Chain

The offshore wind energy outlook 2030 – 2050

Mark Stuurman
Ministry of Economic Affairs and Climate Policy

From scenario’s to a plan for 2050

Cabinet published vision on offshore wind development 2030-2050

- Need for a 2050-plan
- Targets for offshore wind 2035, 2040 and 2050 in *National Energy System Plan (NPE)*
- Prepare for high offshore wind scenario’s: 50GW in 2040 and 70GW in 2050
- Adaptive approach

From “sites” to “hubs”

- Further offshore
- New technologies: Offshore hydrogen (and solar)
- Meshed grid and hybrid projects
- Strategic long term outlook (North *Sea* Energy *Infrastructure Plan 2050)*
- Rolling Offshore wind road map
- Policy framework to be updated: HNO, offshore hydrogen hubs, hybrid

Policy agenda coming year(s)

What: Setting targets

- Offshore wind targets for 2035, 2040 and 2050 in *National Energy System Plan*

Where: Wind Farm Zones

- *Partial Revision North Sea Programme 2022-2027*
- Scope and timeline decided in Q1 2023

How: Energy system outlook and design of first hub

- *North Sea Energy Infrastructure Plan 2050*
- First version ready end of 2023

Connect: Landfall options electricity and hydrogen

- *Programme Investigation landfall options offshore wind energy 2031-2040 (VAWOZ)* starts Q1 2023

Prepare: New technologies and policies

- Offshore hydrogen demo's
- Offshore hydrogen knowledge platform by TKI Wind op zee
- "Solar ready"
- Research (a.o. North Sea Energy Programme by TNO)
- Innovation (MMIP)
- Legal and policy framework

wind & water works

North Sea Energy Infrastructure Plan 2050

Joost Vermeulen
Ministry of Economic Affairs and Climate Policy

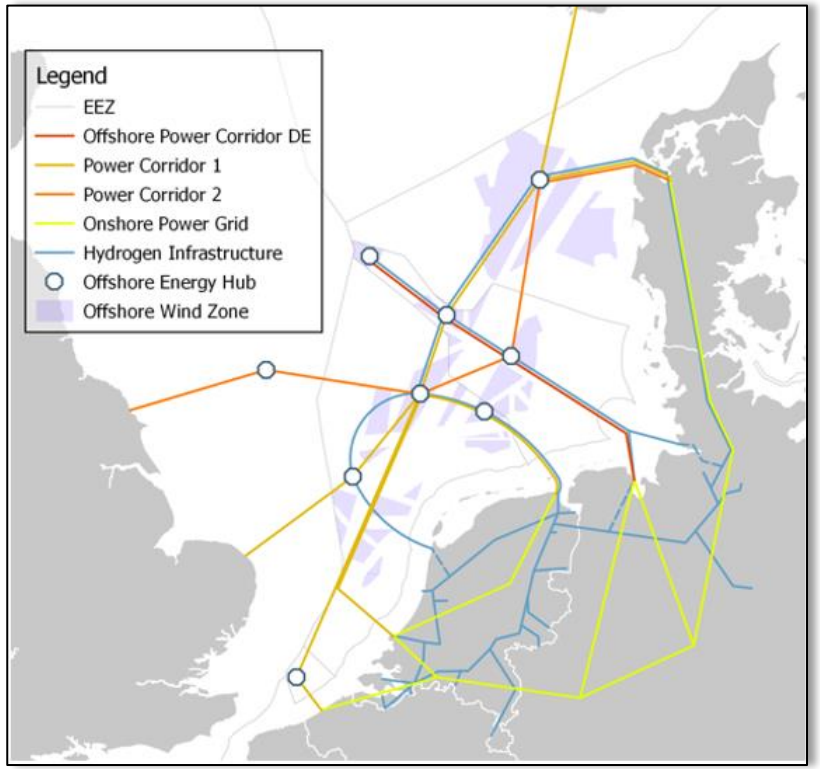
North Sea Energy Infrastructure Plan 2050 – Aim & content

Aim

- To map out which infrastructure is required for the roll-out of offshore wind after 2030
- To provide direction for political choices:
  - Direction for government, TSO/HNO and market to prepare realization in 2031-2040
  - Hub(s) construction form(s) (platforms/islands)
  - (Partial) reuse of existing natural gas infrastructure
  - Division of roles TSO's/market parties/government

Content

- Strategic vison of required infrastructure
- Overview of necessary international connections
- Proof of concept of first large energy hub
- Guiding division electricity/hydrogen landings
- Map showing where capacity is located
- Phasing in time: what first, what later?



Demarcation

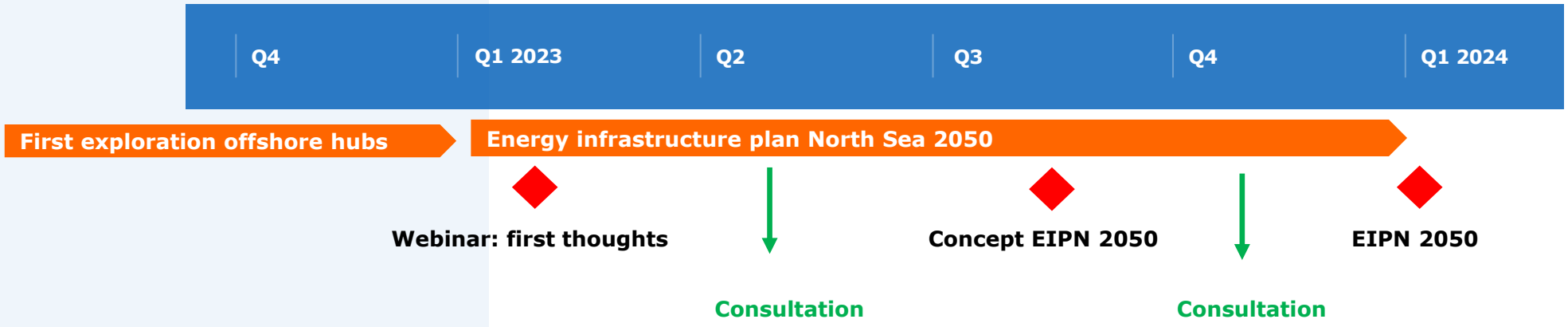
- Includes: market organization, governance, legislation agenda
- Excludes: designation of new wind farm zones (partial revision North Sea Programme 2022-2027), specific landing routes (VAWOZ 2040), CCS

Energy Infrastructure Plan North Sea 2050 – Process & schedule

Process

- Interactive, several consultation rounds
- Special role for TenneT, Gasunie and EBN: development of hub concept, hydrogen infrastructure, re-use of natural gas infra
- Facilitated by consultant

Schedule



Panel discussion

The impact of the ambitious offshore wind energy goals on the supply chain (and vice versa)

Panel:

- Jan Vos – NWEA
- Mark Heine – IRO & Fugro
- Erik Bertholet - Offshore Wind Port Collaboration & Eemshaven/Groningen Seaports
- Mariëlle Hetem – Ministry of Economic Affairs & Climate Policy

Panel discussion lead: Lotte Leufkens

IJmuiden Ver Wind Farm Zone I-IV Wind Farm Site Decisions

Bram du Saar
Rijkswaterstaat

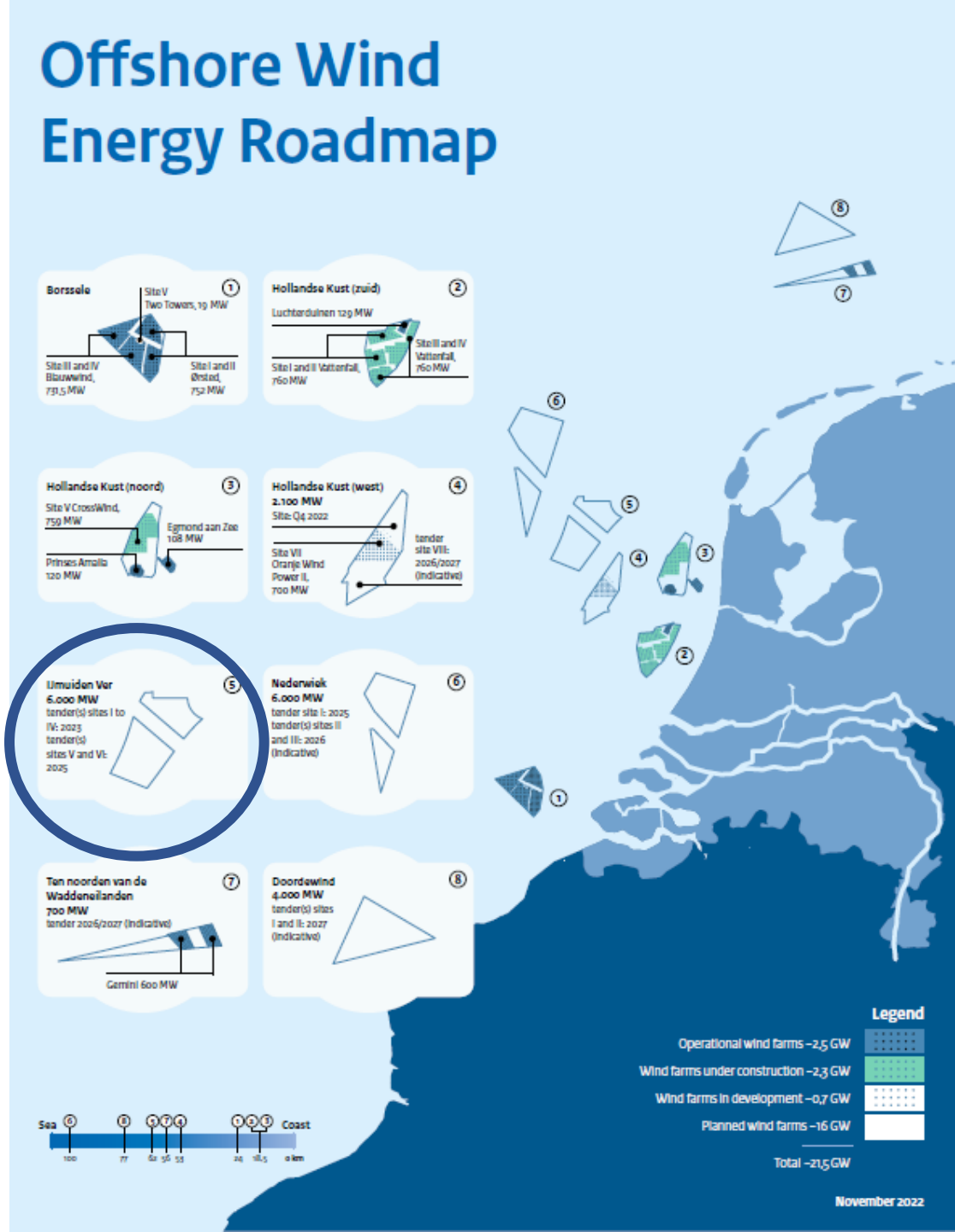

wind &
water
works

IJmuiden Ver Wind Farm Zone
Update upcoming tenders I-IV

Emelie de Wagt
Ministry of Economic Affairs and Climate Policy

Project highlights IJmuiden Ver I-IV (4 GW)

- Additional Roadmap 2030 – increased ambition 21 GW
- IJmuiden Ver I-IV: 4 wind farm sites (approx. 4 GW)
- Landing at Borssele (site I & II) and Maasvlakte (site III & IV)
- First wind farms in the Netherlands to be connected via a direct current connection
- Tender procedure: comparative assessment with financial bid



Highlights tender design – *1/2*

Design of the comparative assessment will contain at least:

- Security of realization
- Contribution to the energy system
- Financial bid
- *Additional criteria (competitive element)*
  - Ecology – at least 2 wind farm sites
  - Circularity and International Responsible Business Conduct (IRBC) – all wind farm sites
  - System Integration (to be determined)

Highlights tender design – *2/2*

- Most likely combined applications (2 x 2 GW)
- No cap on the number of sites that can be awarded to each party or consortium
- The number of applications a party or consortium may submit per tender will be restricted
- Costs site studies and environmental impact assessments passed on to the winner(s)

→ **Looking ahead to further tender procedures:** amendment of the Offshore Wind Energy Act

Planning: IJmuiden Ver

Detailed look at the planning

Expected planning	Milestone
Q1 2023	Draft Ministerial Orders
Q1 2023	Publication draft wind farm site decisions I-IV
Q1/Q2 2023	Site studies finalised
Q1/Q2 2023	Consultation draft Ministerial Orders
Q3 2023	Publication final Ministerial Orders
Q4 2023	Opening date tenders
(end) Q4 2023	Closing date tenders
2024	Winner(s) announced
2028	Expected commissioning wind farms IJmuiden Ver III-IV (beta)
2029	Expected commissioning wind farms IJmuiden Ver I-II (alpha)

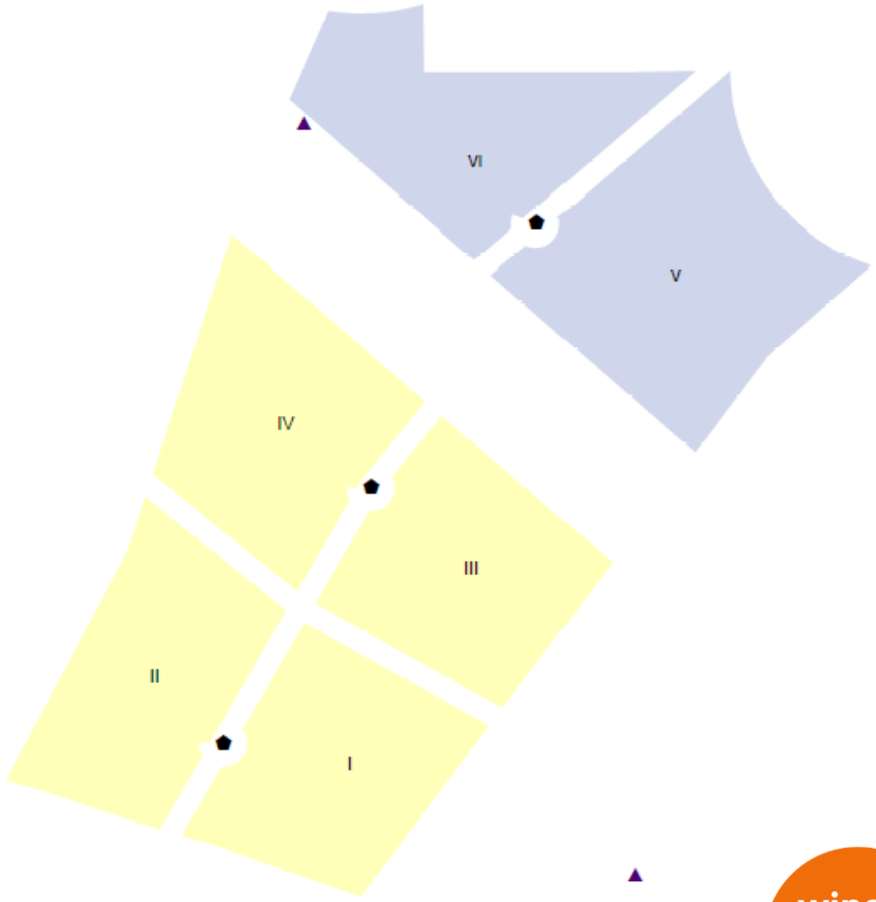
IJmuiden Ver Wind Farm Zone I-IV tender
Site characterisation

Matté Brijder
Netherlands Enterprice Agency (RVO)

IJmuiden Ver site I-IV - Permit tender Q4 2023

Results expected

> Morphological study	Q1 2023
> Intermediate IGM/GIR (for FEED)	Q1 2023
> Final IGM/GIR (all data included)	Q3 2023
> Metocean assessment feas. level	2019
design level	Q3 2023
> Floating Lidar Metocean campaign	2022-2024

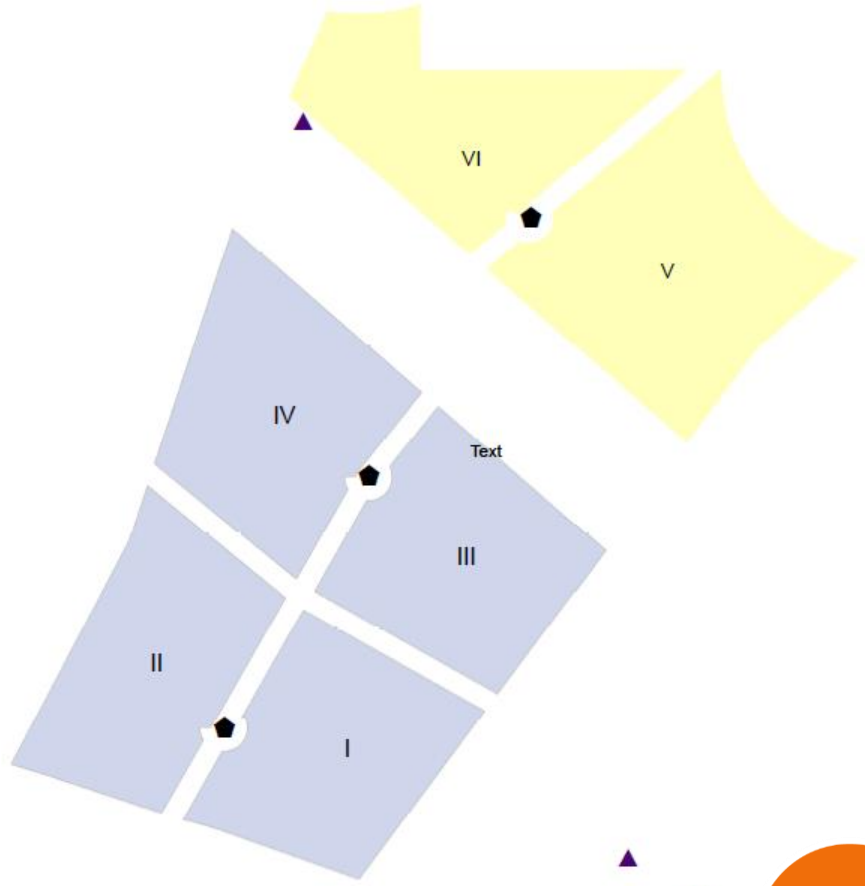


wind & water works

IJmuiden Ver site V-VI - Permit tender Q2 2025

Results expected

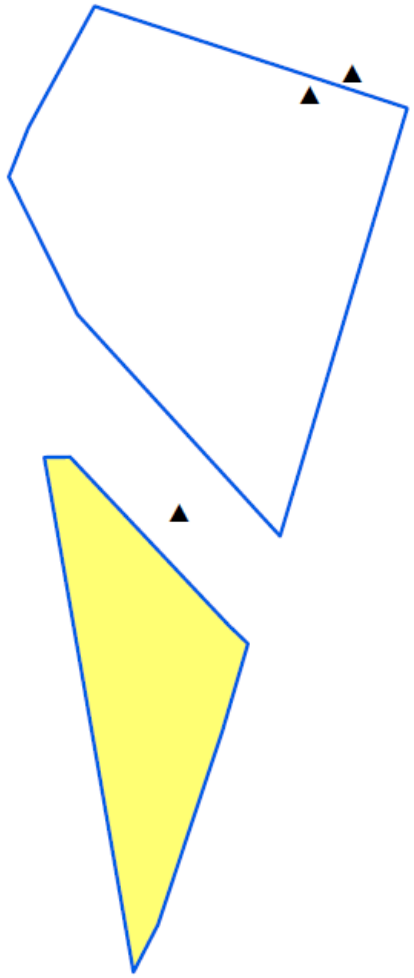
> Morphological study	Q1 2023
> Geophysical survey	Q1 2023
> Geotechnical survey and lab test results	Q2 2024
> Integrated groundmodel and GIR	Q3 2024
> Metocean assessment feas. level	2019
design level	Q1 24/Q3 24
> Floating Lidar Metocean campaign	2022-2024



Nederwiek I - Permit tender Q2 2025

Results expected

> Geophysical survey	Q4 2023
> Morphological study	Q3 2024
> Geotechnical survey and lab test results	Q3 2024
> Integrated Groundmodel and GIR	Q4 2024
> Metocean assessment design level	Q3 24/Q3 25
> Floating Lidar Metocean campaign	2022-2024

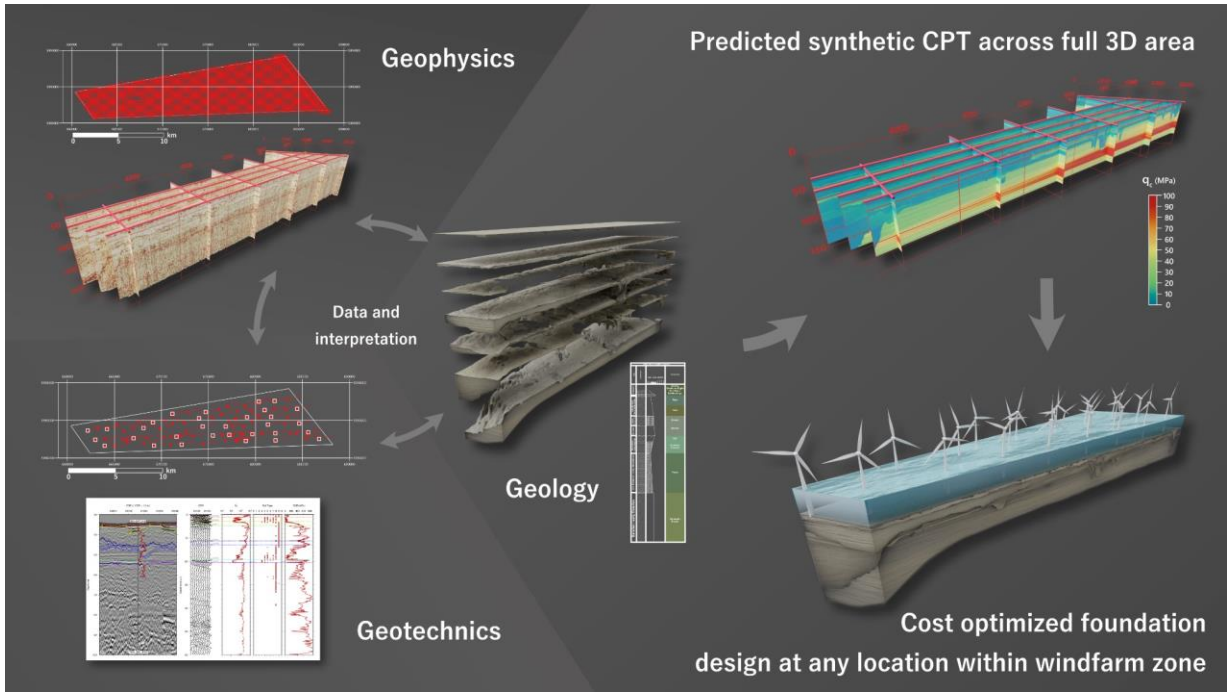


Game-changer: DNV certificate for 3D IGM TNW (incl. Synthetic CPTs)

‘increasing the amount of information to a new level in the OWF site investigation evaluations’

Use of TNW 3D UHRS data and Synthetic CPTs for design

> Market consultation Q1 2023

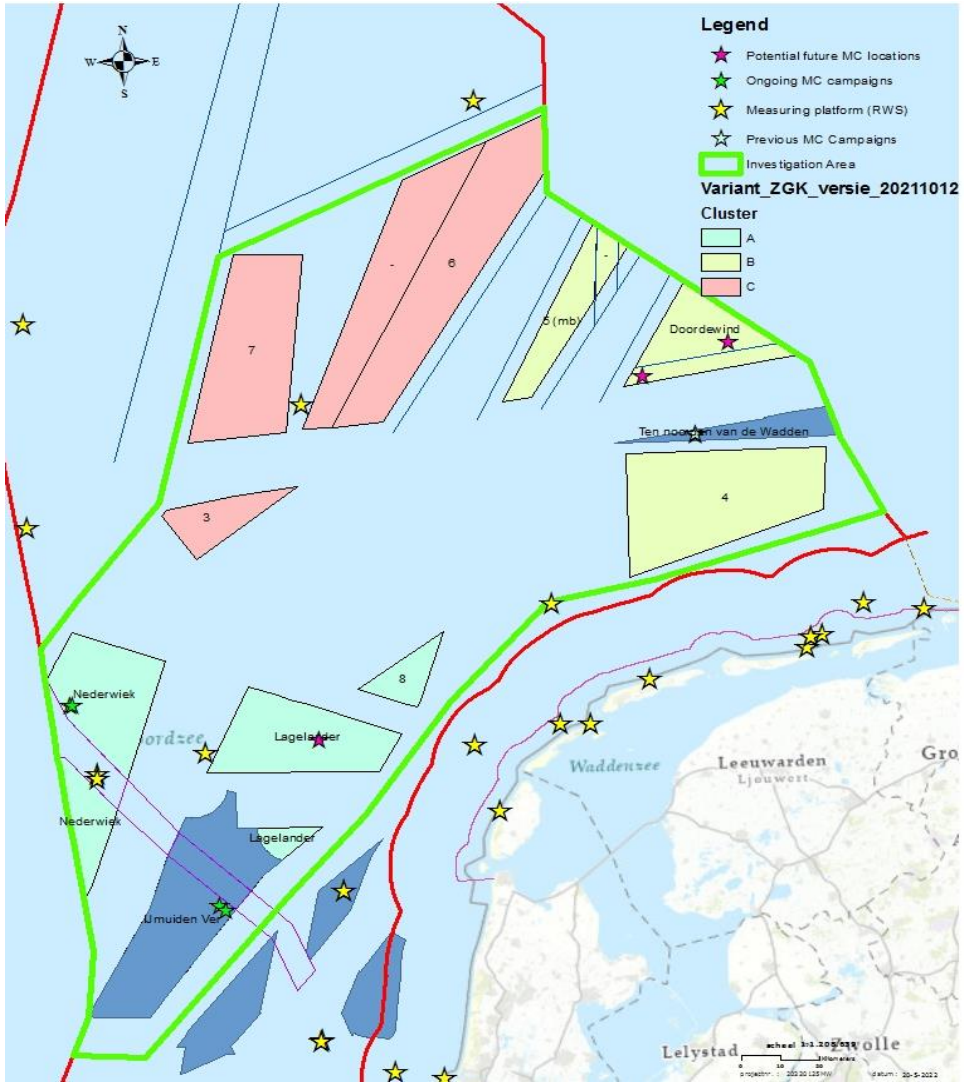


Metocean strategy

Metocean measurement strategy

- Measurements at all Wind Farm Zones including DDW and LL
- Measurements at new search areas?
- Market consultation Q4 2022/Q1 2023

Wind en Water IJmuiden Ver · Offshorewind RVO



What’s next (on procurement)?

Q1 2023

- Geotechnical survey Nederwiek noord
- Groundmodel Nederwiek zuid
- Groundmodel HKW site VIII

Q2 2023

- Groundmodel Nederwiek Noord
- Geophysical survey Doordewind
- Metocean campaigns new areas + wake effects?

Workshop Offshore Wind Energy in NL

Offshore grid

Tiemen Govers – Offshore Development

IJmuiden Ver Alpha

- Sites I-II
- Connection to existing onshore substation Borssele
- Delivery date: Q4 2029

IJmuiden Ver Beta

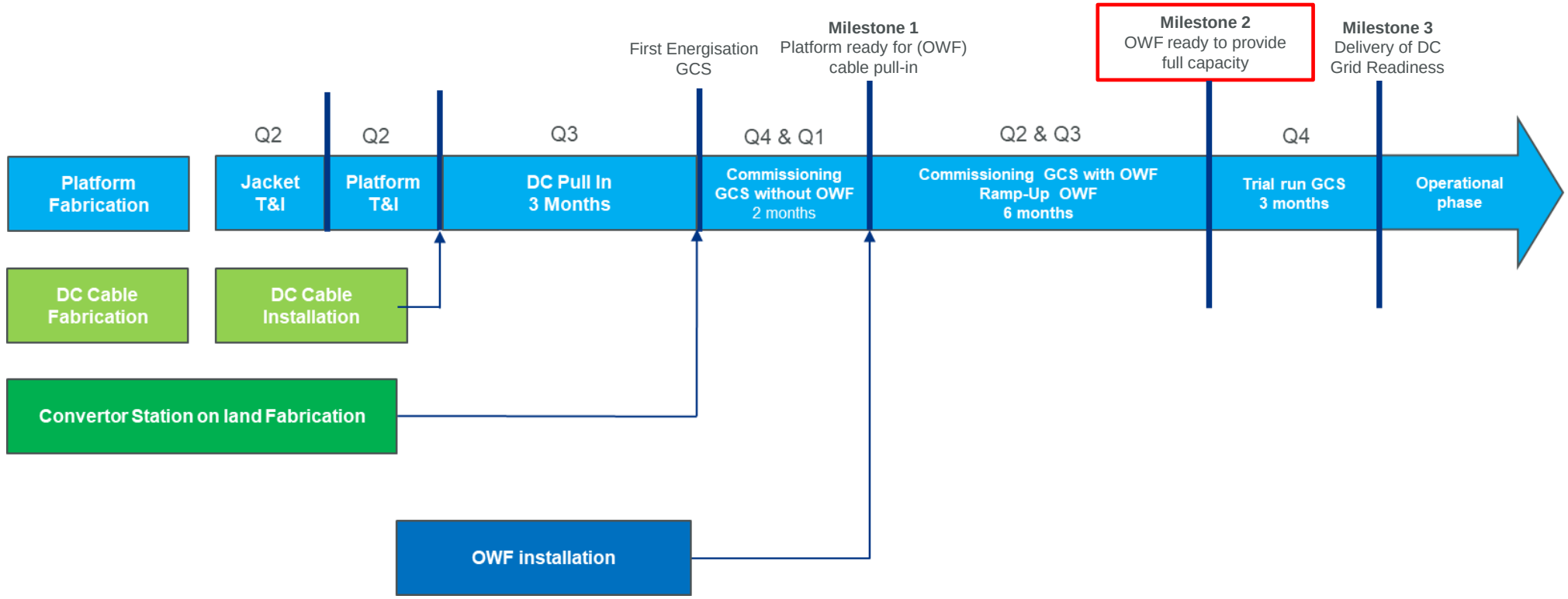
- Sites III-IV
- Connection to new onshore substation Maasvlakte
- Delivery date: Q4 2028

2 GW standard

- Design principles for OWF interfaces consulted in 2019: https://offshore-documents.tennet.eu/nl/consultation-2gw-hvdc-offshore-grid-connection-system-documentation/
- Reflected in Realisation Agreement (REA) & Connection and Transmission Agreement (CTA)

Joint testing & commissioning HVDC system: TenneT & OWF

- Offshore Wind Development Framework defines three milestones to reach delivery date
- At Milestone 2 OWF must have connected all 66 kV cables and be able to provide full capacity
- Power feed-in possible between milestone 1 and 3, but transportation capacity not guaranteed
- Procedures and principles for cooperation during testing and commissioning part of Realisation Agreement
- TenneT plans to hold market information session in February



TenneT is a leading European grid operator. We are committed to providing a secure and reliable supply of electricity 24 hours a day, 365 days a year, while helping to drive the energy transition in our pursuit of a brighter energy future – more sustainable, reliable and affordable than ever before. In our role as the first cross-border Transmission System Operator (TSO) we design, build, maintain and operate 23,900 km of high-voltage electricity grid in the Netherlands and large parts of Germany, and facilitate the European energy market through our 16 interconnectors to neighbouring countries. We are one of the largest investors in national and international onshore and offshore electricity grids, with a turnover of EUR 4.5 billion and a total asset value of EUR 27 billion. Every day our 5,700 employees take ownership, show courage and make and maintain connections to ensure that the supply and demand of electricity is balanced for over 42 million people.

Lighting the way ahead together.

Disclaimer

This PowerPoint presentation is offered to you by TenneT TSO B.V. (‘TenneT’). The content of the presentation – including all texts, images and audio fragments – is protected by copyright laws. No part of the content of the PowerPoint presentation may be copied, unless TenneT has expressly offered possibilities to do so, and no changes whatsoever may be made to the content. TenneT endeavours to ensure the provision of correct and up-to-date information, but makes no representations regarding correctness, accuracy or completeness.

TenneT declines any and all liability for any (alleged) damage arising from this PowerPoint presentation and for any consequences of activities undertaken on the strength of data or information contained therein.

Questions & final remarks

Thank you for attending the workshop

- Presentations and Q&A's will be published on offshorewind.rvo.nl
- Questions: woz@rvo.nl

- Networking reception: stand 1.647

wind & water works