



Netherlands Enterprise Agency

Offshore Wind Energy in the Netherlands

Your hosts:

Peter-Paul Lebbink

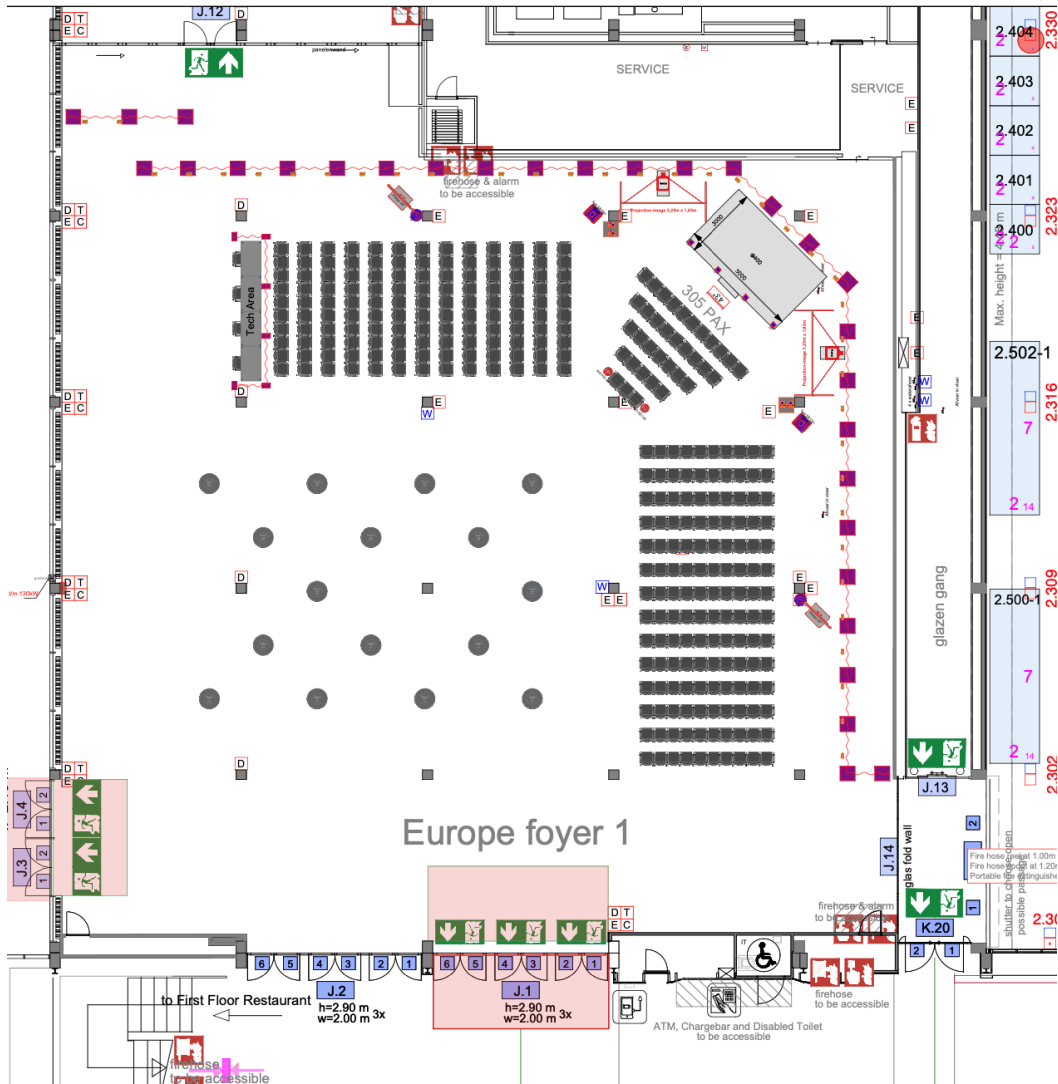
*Programme Manager
Offshore Wind Energy*

Matté Brijder

*Programme Manager
Offshore Wind Energy*

26 November 2025





- Please notice the nearest emergency exits.
- Turn your phone to silent mode.
- This workshop will be recorded and live streamed. A link will be shared afterwards.



Programme

- 13.15 Opening
- 13.30 Policy update on offshore wind energy in the Netherlands
- 13.45 Offshore wind energy ambition: 30-40 GW
Supply & Demand
- 14.30 *Break*
- 15.00 Offshore Wind Energy Roadmap
- 15.35 Update on wind farm site studies
- 15.45 Dutch challenges in the North Sea
Spatial, co-use and maritime safety
- 16.30 *Network drinks at the Netherlands pavilion (2.203)*





Danny Levenswaard

Director Breakbulk & Offshore

Port of Rotterdam Authority



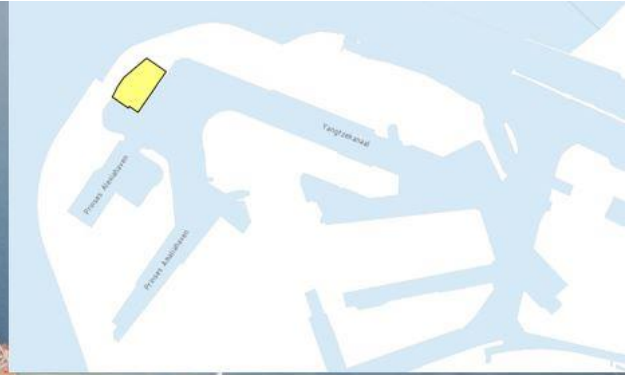
ANNOUNCEMENT

TOWER

TERMINAL FOR OFFSHORE WIND ENERGY IN ROTTERDAM

GREENFIELD TERMINAL MAASVLAKTE 2

45 hectares & 835 meters quay





Start TOWER development plan

Today



Request for Information available via

www.portofrotterdam.com/tower



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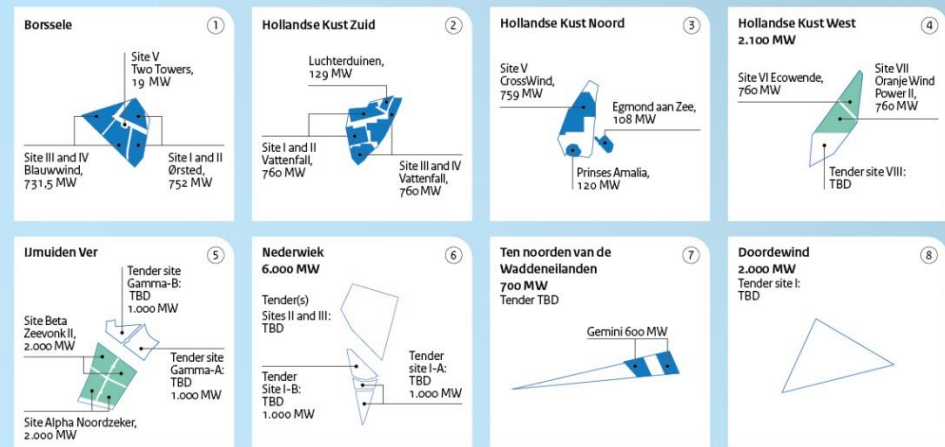


Any questions?





Roadmap Offshore Wind Energy



November 2025

Policy update on offshore wind energy in the Netherlands

Joost Vermeulen
&
Erik van Iperen

Ministry of Climate Policy and
Green Growth



Netherlands Enterprise Agency



Any questions?





Ministry of Climate Policy and Green
Growth

Offshore wind ambitions of the Netherlands for 2040

Erik van Iperen & Simone van Sligter

Offshore Wind Energy Workshop

26 November 2025



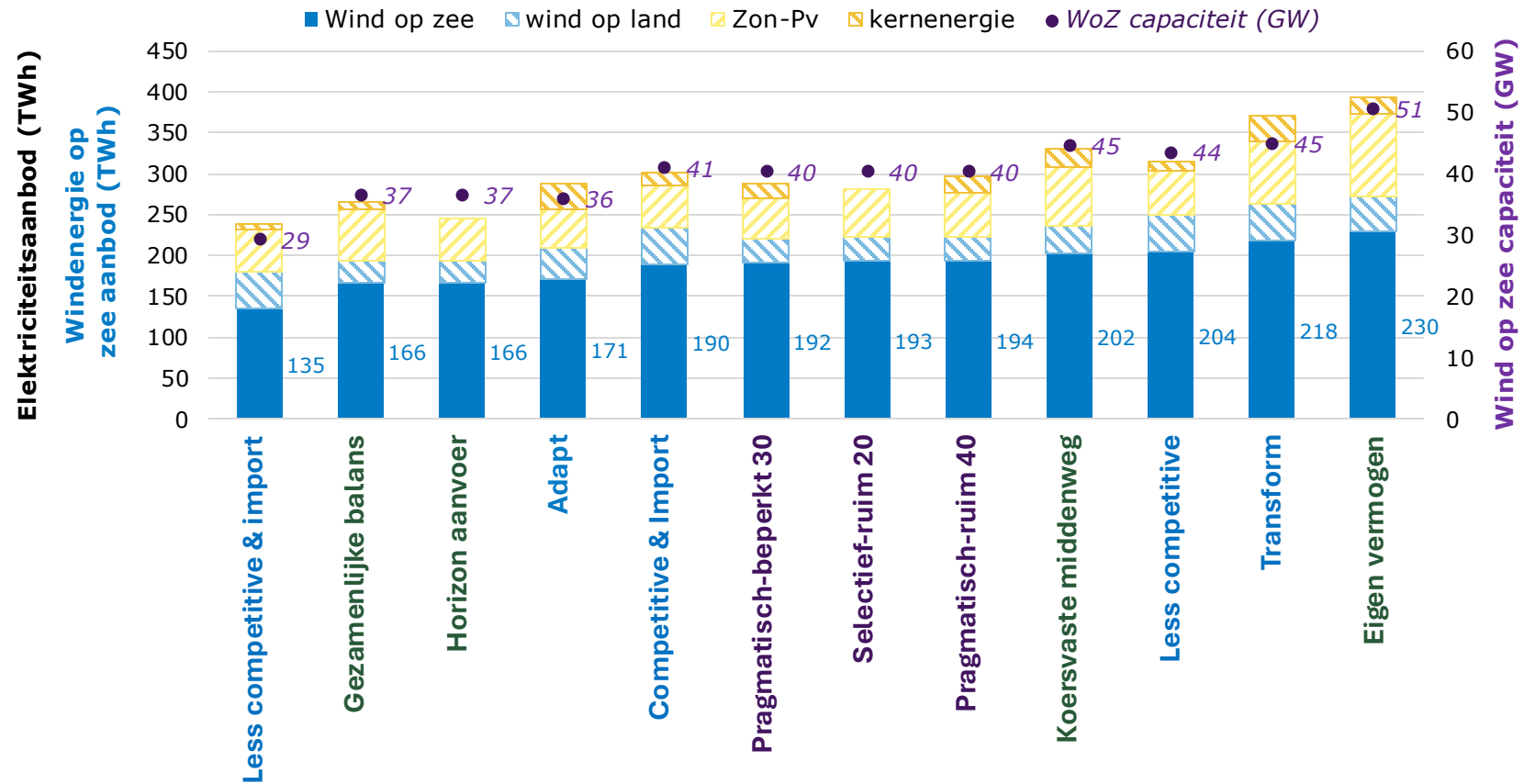
North Sea Wind Energy Infrastructure Plan

- › Sent to Parliament on 16 July 2025
- › Link: [North Sea Wind Energy Infrastructure Plan](#)





Electricity supply – 2040

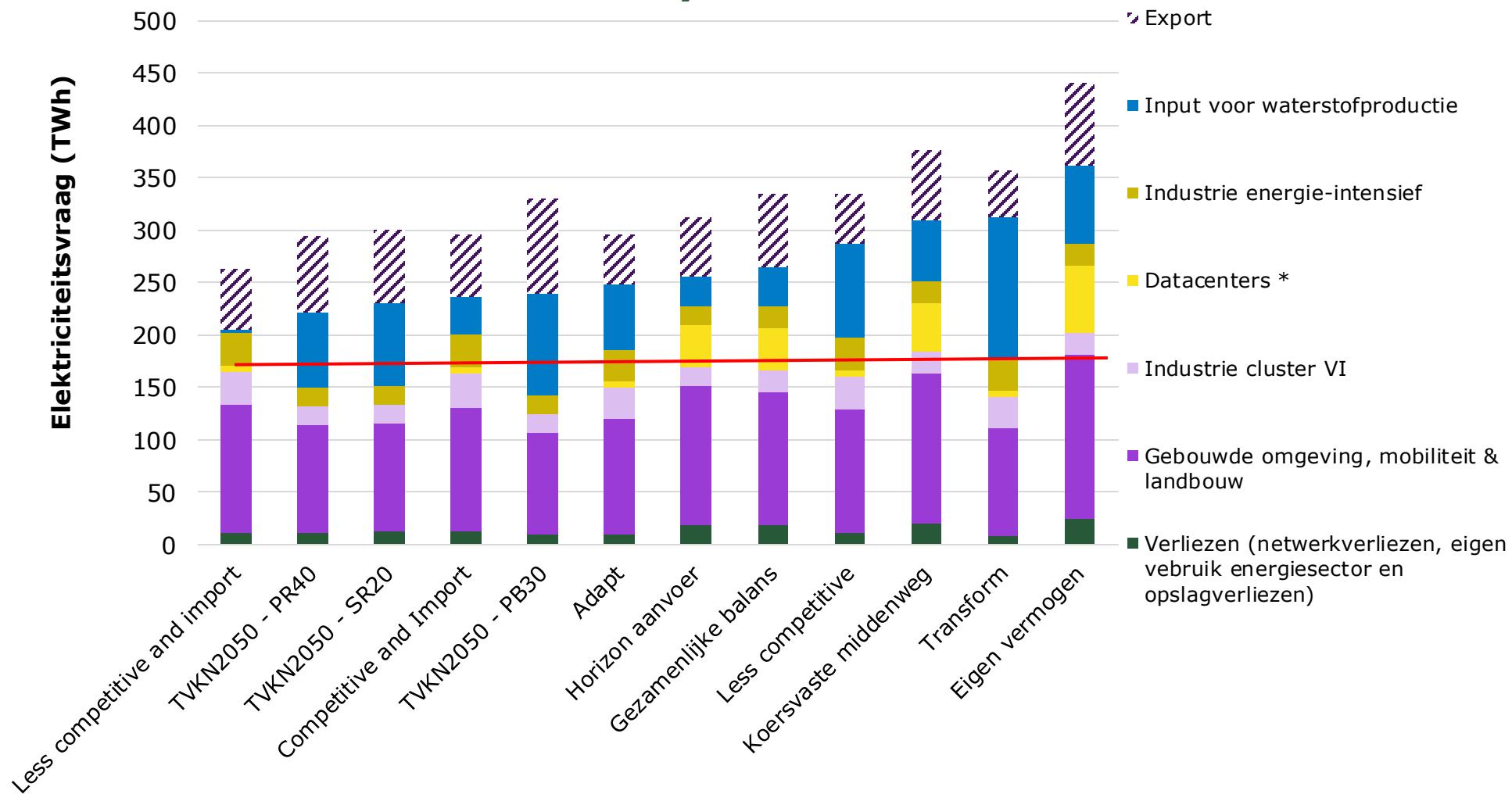


Systemstudies:

1. TNO (2024) ADAPT/TRANSFORM ; 2. NBNL (2025) ; 3. PBL (2024) Trajectverkenning Klimaatneutraal 2050



Electricity demand – 2040





Looking towards future policy

National Energy System Plan (2023) placed the electricity system at the centre of the energy transition and emphasised the important role of electrification in the transition



Update of the **National Energy System Plan** in progress:

- Stakeholder engagement on the draft NPE – planned for March 2026
- Submission to Parliament – planned for September 2026



Offshore Wind Energy Action Plan

- › Sent to Parliament on 16 September 2025
- › Link: [Offshore Wind Energy Action Plan](#)





Offshore Wind Energy Action Plan Measures

- > **Supply:**
 - 2 GW of offshore wind tenders with subsidy planned for 2026
 - Preparations for *Contracts for Differences* – mid 2027
 - *Partial Revision of the North Sea Programme*: plan to confirm space for 21 GW of extra space for offshore wind by the end of 2025
- > **Demand:**
 - Extension of Indirect Cost Compensation scheme until 2028
 - Guarantee fund



Action Agenda for Electrification of Industry

Louis Sol

Ministry of Climate Policy and Green Growth

26 November 2025



Introduction

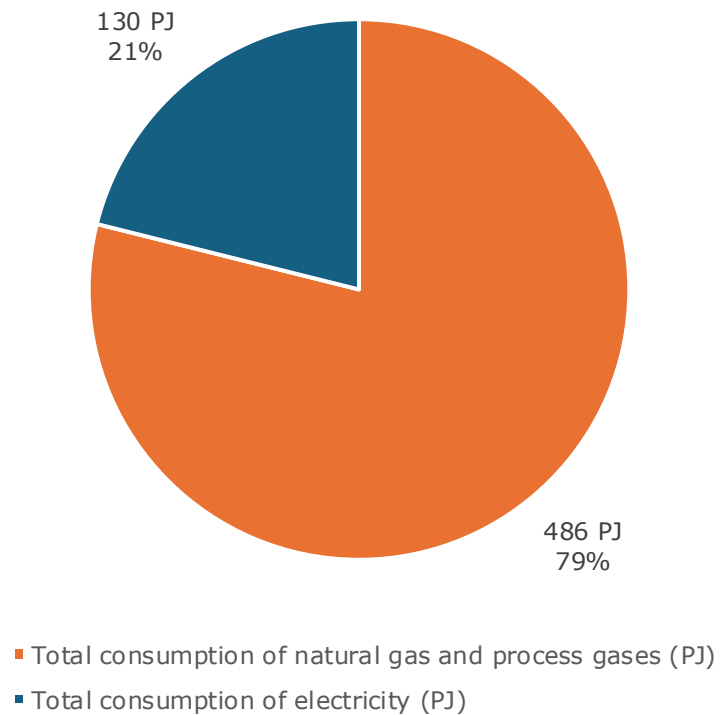
Purpose of the Action Agenda:

- › Accelerate electrification in industry.
- › **Core elements of the approach:**
- › The '*Routekaart Elektrificatie in de Industrie (2021)*' was the starting point for this report.
- › Analysis of energy consumption across the industrial heat segments.
- › Assessment of the technical potential for electrification.
- › Identification of bottlenecks for electrification.
- › Formulation of concrete policy actions.





Energy consumption production processes Dutch industry (2022)



Dutch industry as a key player

- > Around 33% of the total national energy consumption.
- > Around 79% of this energy is used for heat.
- > Around 21 % of this energy is used for electricity.

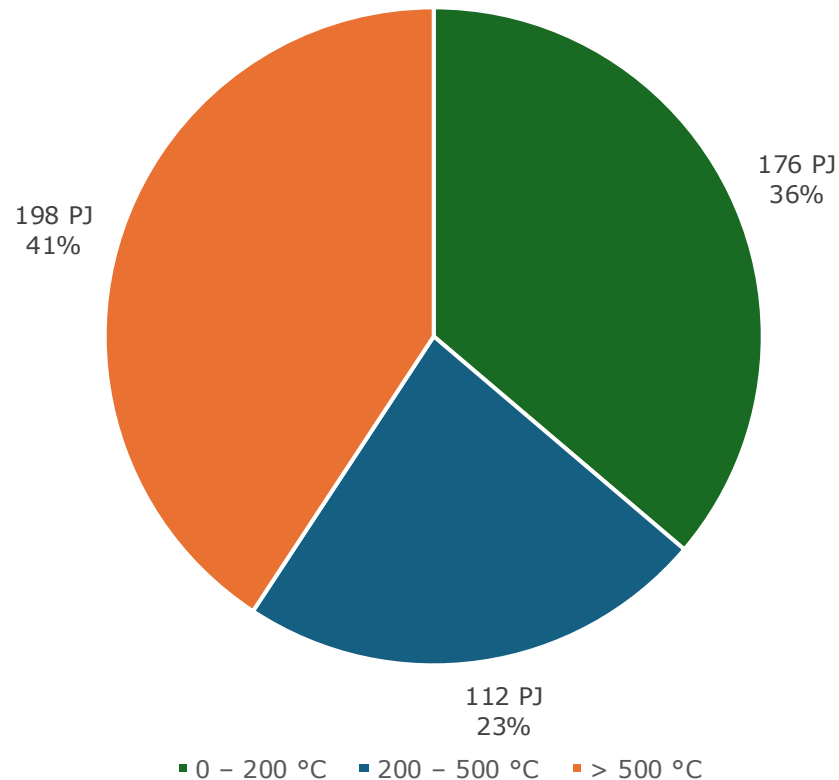
Demand:

- > Concrete growth in industrial demand for electrons is stagnating.
- > Lagging demand increases uncertainty and negatively affects the business case for renewable electricity as well as progress towards climate goals.



Heat segments

Energy consumption heat segments industry (PJ)



- > **36% low temperatures (0 - 200 °C):**
Suitable for heat pumps.
- > **23% medium temperatures (200-500 °C):**
Suitable for heat pumps and electric boilers.
- > **41% high temperatures (>500 °C):**
Induction heating and electric arc furnaces.








Conclusion

- > More than 50% of industrial process heat falls within the low- and medium-temperature segments.



Current status

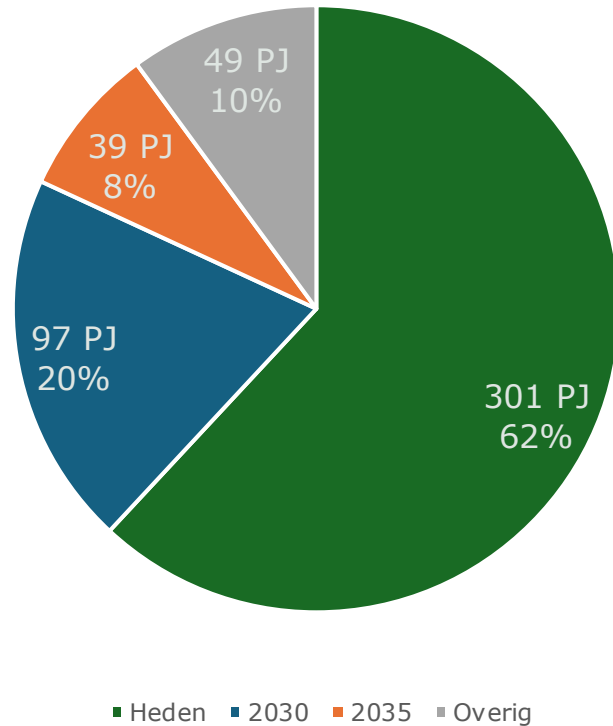
- > Low- and medium-temperature heat electrification is technically feasible in the short term due to mature technologies.
- > High-temperature electrification is possible to a more limited extent due to the following:
 - > Greater complexity in integration with existing processes.
 - > Requires more innovation (lower TRL). These technologies are expected to be fully available from 2035 onwards.
- > The initial focus should be on low- and medium-temperature segments. A phased approach can accelerate electrification by minimising technical barriers.

Beschikbare technieken	Max (°C)	Efficiëntie (%)	Capaciteit (MW)	TRL
 Warmtepomp	300-400	150-600	Modulair	8 - 9
 Elektrische Boilers	500	99	tot 75	9
 Schokgolfverwarming	1.000	90	5-20	6
 Elektrische Boogovens	1.800	1.800	200	9
 Weerstandverwarming	1.850	99	80 kW/m ²	9
 Inductieverwarming	3.000	90	42	9
 Plasmabranders	5.000	50-90	8	7 - 9

Source: Agora (2024)



Technical potential industrial electrification



Technical potential for industrial electrification

Potential:

- > 62% can be electrified today.
- > An additional 20% could be electrified by 2030.
- > By 2035, up to 90% could be electrified from a technical perspective.

Additional benefits:

- > **Energy savings:** through reduced conversion losses and more efficient technologies such as heat pumps.
- > **Reduction of nitrogen emissions:** by replacing fossil fuels, nitrogen emissions are reduced, provided electricity used comes from renewable sources.



Industrial electrification

Key Barriers

High capital costs (**CAPEX**)

Uncertain electricity costs (**OPEX**)

Lack of knowledge and standards

Long payback periods

Infrastructure and grid capacity constraints

Key Pillars (Solutions)

Consistent policy – Introduce stable policy frameworks

Financial incentives – Improve business case

Innovation & knowledge – R&D for high-temperature tech, scaling solutions and standardisation

Flexibility – Tackling grid congestion, demand response & storage for secure, affordable supply

Industrial Electrification Policy



› Positioning and sectoral Approach

- › Electrification as preferred route (low/medium heat)
- › Sectoral archetypes and roadmap (start with food industry)

› Exploring improvement of support frameworks

- › Broaden state aid if possible (SDE++)
- › Explore CfD model (demand-side OPEX)
- › cPPA guarantee fund (Invest-NL)
- › Exploring support for high-temperature electrification
- › Blended-finance models

› Flexibility and storage

- › Focus on demand-side flexibility & (high thermal heat) storage solutions

› Innovation and knowledge

- › Support low-TRL technologies
- › Central knowledge hub for electrification





Conclusions



Industrial Electrification is technically feasible and essential for the energy transition.



Focus on low- and medium-temperature segments offers the greatest short-term gains, with a sectoral approach taking the lead.



Business case: strengthening financial support through subsidies, investments and risk sharing is crucial.



R&D & knowledge sharing: accelerate electrification of low- and medium-temperature segments and develop high-temperature technologies and flexibility solutions.



Consistent policy guidelines and cooperation between companies, grid operators and policymakers is essential.



Offshore Energy Ambition: 30-40 GW

Hermione van Zutphen
Ecowende

Mark Stoelinga
Port of Rotterdam

REFLECTIONS?

Michiel van Rij
RWE

André Craens
NedZero



Netherlands Enterprise Agency



Any questions?

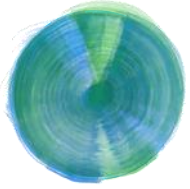




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Break

See you back at 15.00 hrs!



ECOWENDE
Windpark Hollandse Kust West

Update Ecowende

Baseline studies

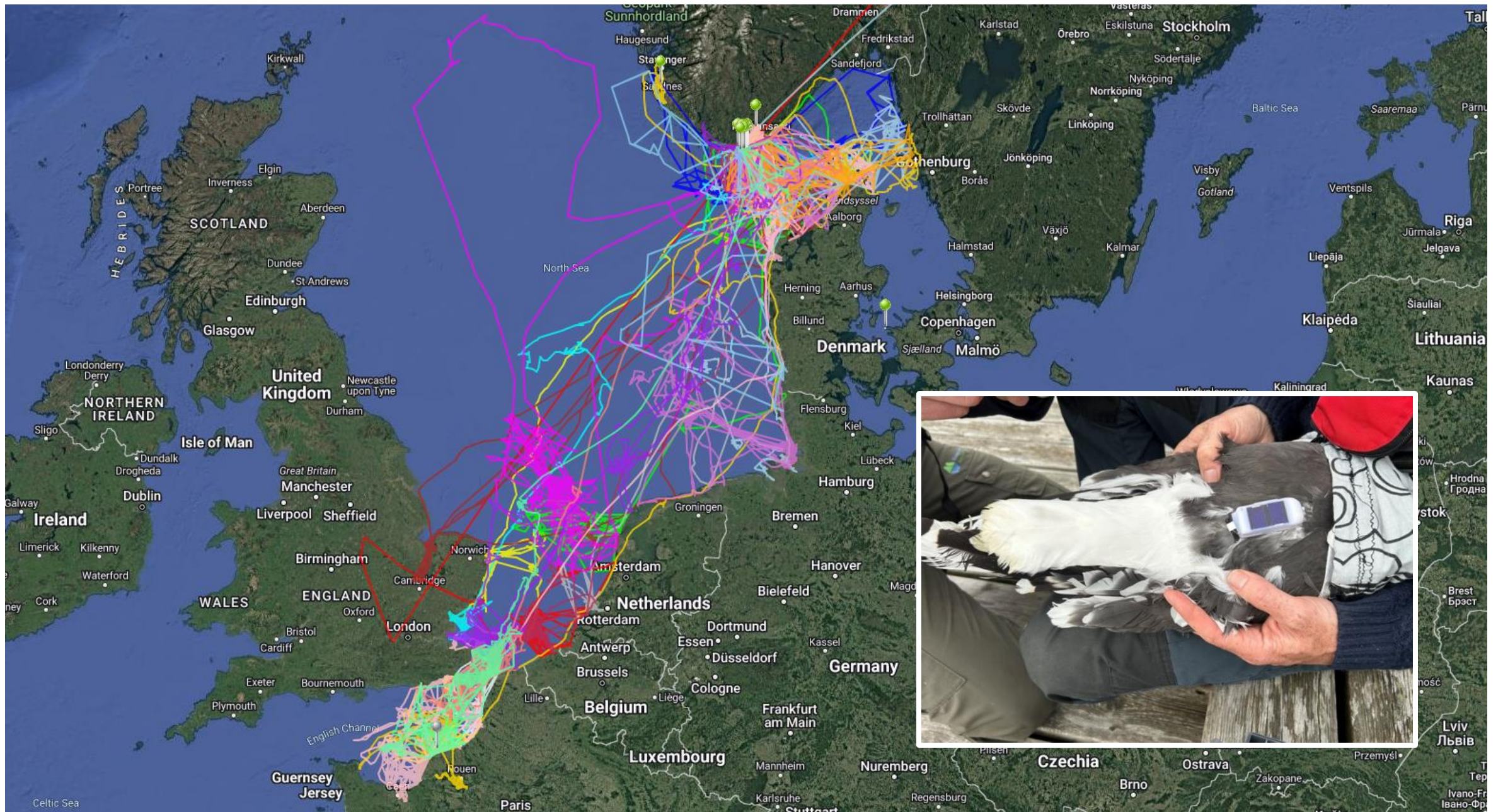
Pauline Roos

ECOWENDE marine ecologist



Above water



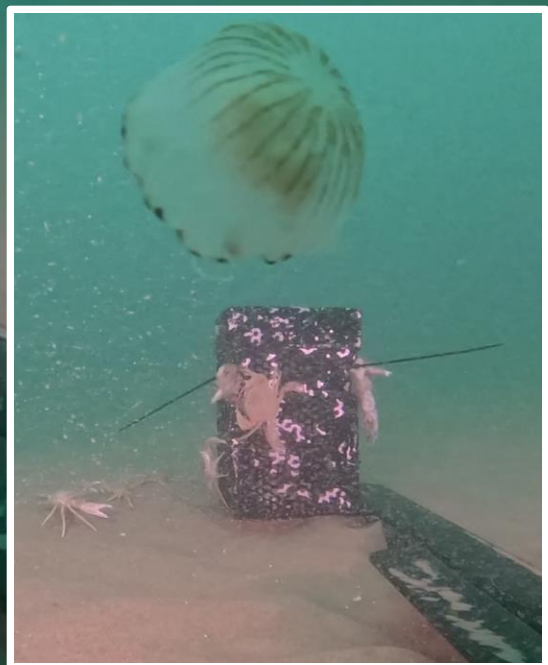
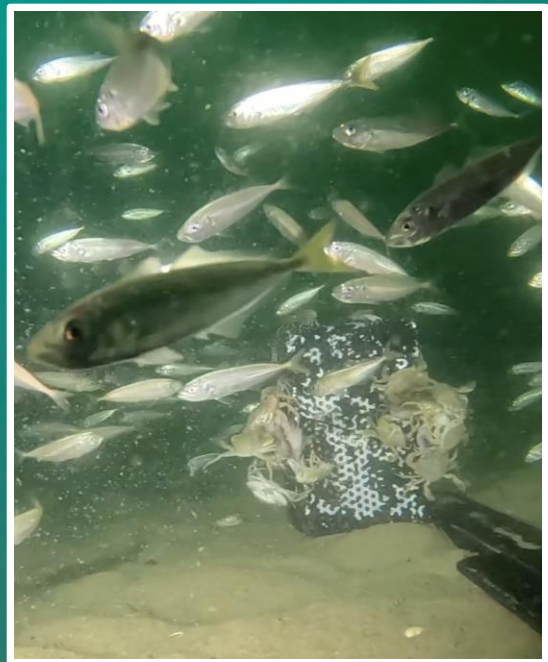




Under water







am
Ecowende

Working Zone

Track 5

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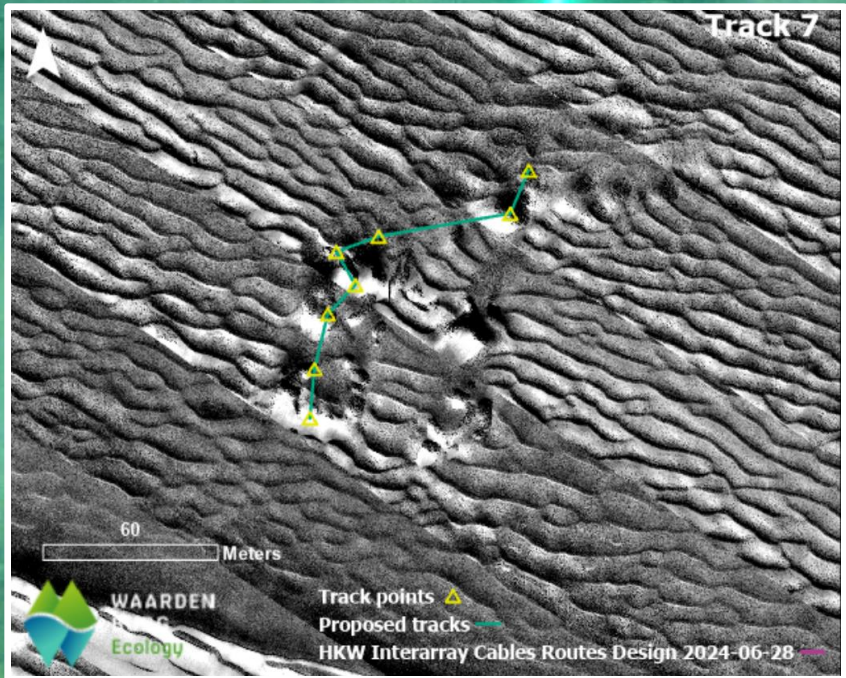
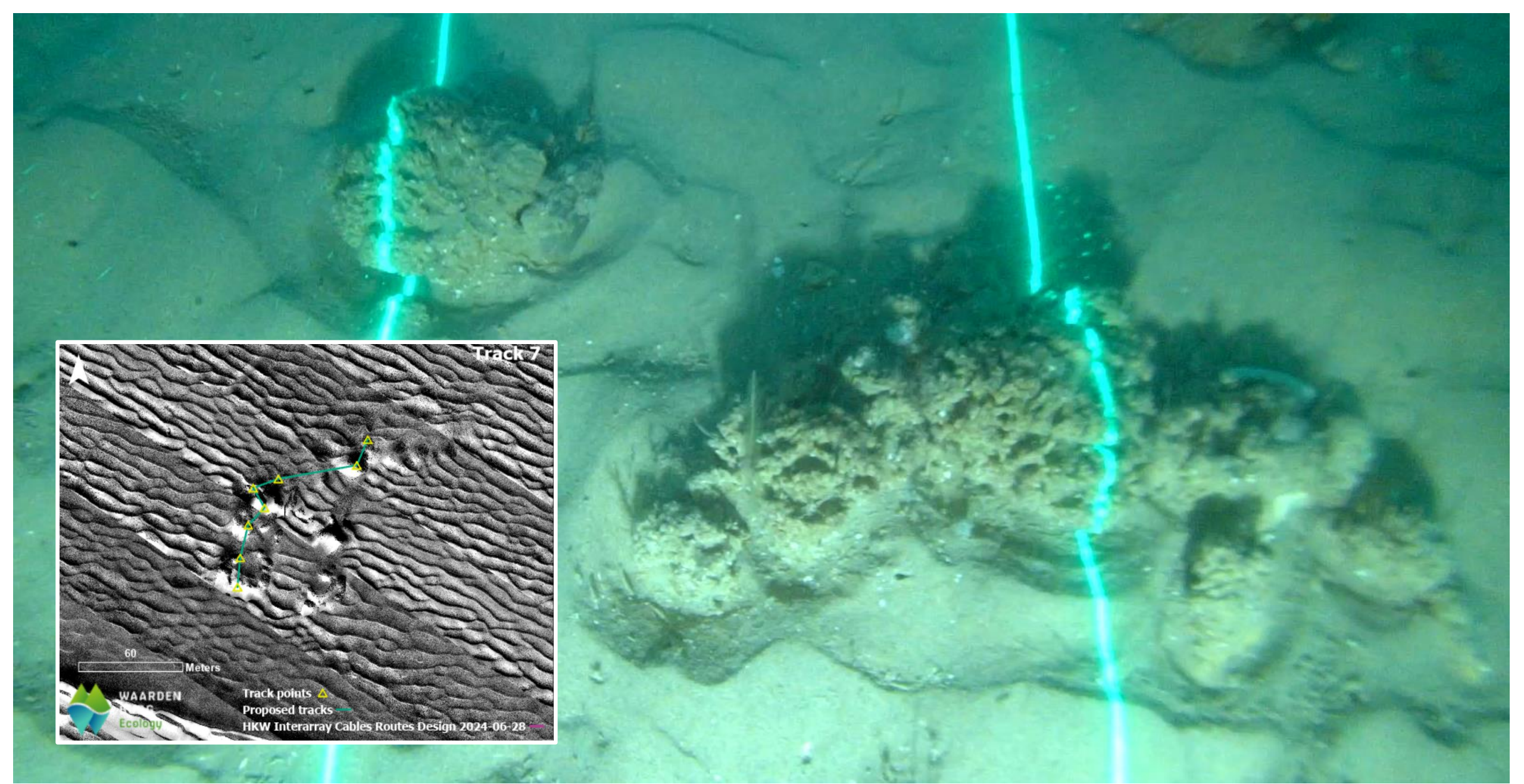
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Heading: 52.4°

Depth-26.4M

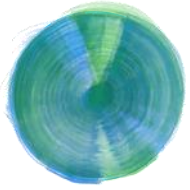
Dive: 18











ECOWENDE

Windpark Hollandse Kust West

SEP 2025	First scour protection installed
NOV 2025	Site closed (construction vessels only)
NOV/DEC 2025	Start monopile installation
MAR 2026	Start cable installation
Spring 2026	Onshore base completed
Mid 2026	Start wind turbine installation
End 2026	Wind park commissioned



Questions or comments? Email: info@ecowende.nl
Or visit us at the Nature Enhancement Pavilion: stand 2.108





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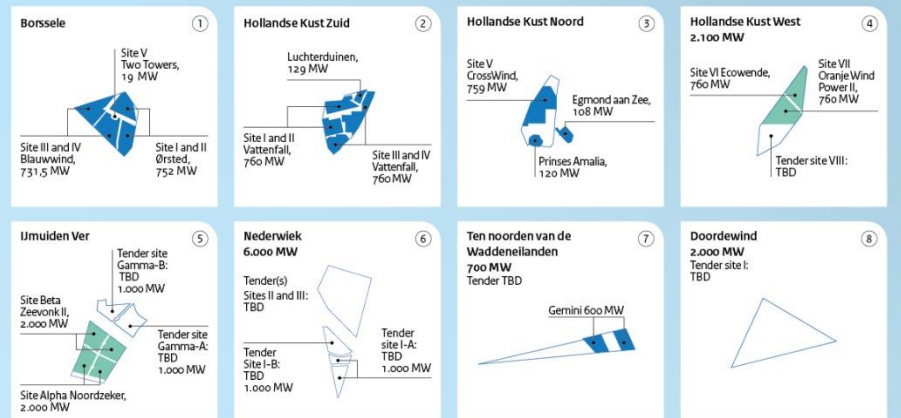
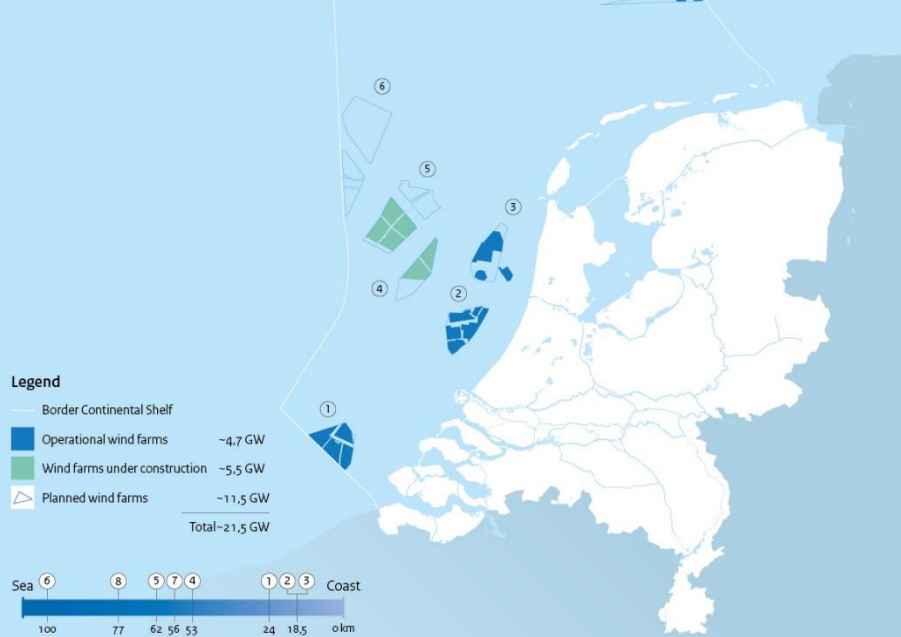


Any questions?





Roadmap Offshore Wind Energy



November 2025

Update: 21 GW Offshore Wind Energy Roadmap

> Aleid Oosterwijk & Frédérique de Rooij

Ministry of Climate Policy and Green Growth

> Saskia Jaarsma
TenneT



Offshore Wind Energy Roadmap

- > Current roadmap for approx. 21GW and Doordewind II (2 GW)
 - Needs adjustment, e.g. due to IJmuiden Ver Gamma and Nederwiek I delays
- > Future roadmap for 30 – 40 GW by around 2040
 - In development
- > Combined into one Offshore Wind Energy Roadmap

Table 1 Sequence for development of offshore wind energy

Capacity (GW)	Wind Farm Site(s)	Tender for sites	(Expected) commissioning date of wind	Status
0.75	<i>Borssele</i> Sites I and II	Realised in 2016	2020	
0.75	<i>Borssele</i> Sites III, IV and V	Realised in 2016	2020	
0.76	<i>Hollandse Kust (zuid)</i> Sites I and II	Realised in 2017	2023	
0.76	<i>Hollandse Kust (zuid)</i> Sites III and IV	Realised in 2019	2023	
0.76	<i>Hollandse Kust (noord)</i> Site V	Realised in 2020	2023	
approx. 0.7	<i>Hollandse Kust (west)</i> Site VI	Realised in 2022	(2026-2027)	
approx. 0.7	<i>Hollandse Kust (west)</i> Site VII		(2027)	
approx. 2.0	<i>IJmuiden Ver</i> Site Alpha	Realised in 2024	(Q3 2029)	
approx. 2.0	<i>IJmuiden Ver</i> Site Beta		(Q4 2029)	
approx. 1.0	<i>IJmuiden Ver</i> Site Gamma-A**	Q3 2025	(Q2 2031)	
approx. 1.0	<i>IJmuiden Ver</i> Site Gamma-B**		(Q2 2031)	
approx. 1.0	<i>Nederwiek</i> Site I-A**		(Q4 2030)	
approx. 1.0	<i>Nederwiek</i> Site I-B**	Q2 – Q4 2026	(Q4 2031)	
approx. 2.0	<i>Nederwiek</i> Site II	Q2 – Q4 2026	(Q2 2032)	
approx. 2.0	<i>Nederwiek</i> (Site III)		(Q4 2031)	
approx. 0.7	<i>Hollandse Kust (west)</i> Site VIII	TBC ***	(TBC)***	
approx. 0.7	<i>Ten noorden van de Waddeneilanden</i> Site I	TBC	(TBC)	
approx. 2.0	<i>Doordewind</i> Site I	Q1 – Q2 2027*	(Q4 2032)****	

Realised:

Under construction:

Scheduled:



Development of future offshore wind energy roadmap

- > Ambition for 30 – 40 GW needs to be translated into offshore wind energy roadmap
- > This requires timely decisions, while market developments are still uncertain
- > Future Cabinet determines roadmap, options are currently in preparation
- > Lessons learned from current roadmap will be incorporated



Update current roadmap + DDW II (± 23 GW)

- > We will look at the following aspects:
 - Planning offshore grid projects and portfolio
 - Wind Farm Site Decisions and offshore grid project procedures
 - The sequence of development of the different sites
 - Time between milestones (Offshore Wind Development Framework) and realisation period
- > Decisions made by the new Cabinet will influence the update of the roadmap:
 - Ambition for 2040
 - Available budget for CfDs and North Sea costs
 - Deployment pace (related to 2040 ambition, available budget, expected demand development, grid capacity)



Decisions to be made for the 2026 tender round

> **Sites**

- Will be decided based upon:
 - Progress of offshore Wind Farm Site Decisions
 - Progress of offshore grid project procedures
 - TenneT offshore portfolio status and developments
 - Landfall location in relation to onshore grid capacity
 - Available budget
- Decision will be published with draft Ministerial Orders (tender regulations)

> **Realisation period and milestones**

- Development Framework will be updated before publication final Ministerial Orders





Planning tender round 2026 and roadmap

★ Today
Workshop @ OEEC

2025

2026

2031-2032

Tender 2026

◆
16 Sept '25:
Action plan
offshore
wind energy

PBL advice & consultation on tender application amount

Preparing draft Ministerial Orders

◆
Dec '25:
Publication draft
Ministerial Orders

Online public consultation
(6-8 weeks)

Preparing final Ministerial Orders

◆
Expected Q2 '26:
Publication final
Ministerial Orders
Government
Gazette

State aid approval

◆
**Expected
Sept '26**
Closing date
tenders

◆
Expected COD
offshore wind
farm

Roadmap

Cabinet formation

◆
T.B.A.:
New cabinet in place

Preparing new roadmap

◆
T.B.A.:
Decisions on
roadmap set-up

Operationalisation decisions on
roadmap set-up

◆
T.B.A.:
Publication new roadmap
and Development
Framework



Market consultation(s)

- › There will be consultations for and/or possibilities to submit your views on specific elements of the roadmap, such as the draft ministerial orders for the tender of 2026, CfD's and Wind Farm Site Decisions.
- › We will organise a lessons learned session from the current roadmap in 2026
- › Are there other elements we should take into consideration in the adjustment of the current roadmap and development of the future roadmap?
- › If you would like to share your thoughts: please contact woz@rvo.nl



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Any questions?



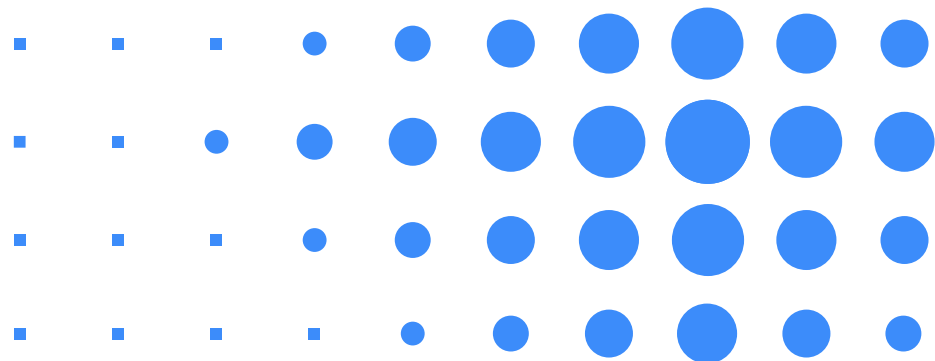


Progress on roadmap and the offshore grid

Saskia Jaarsma

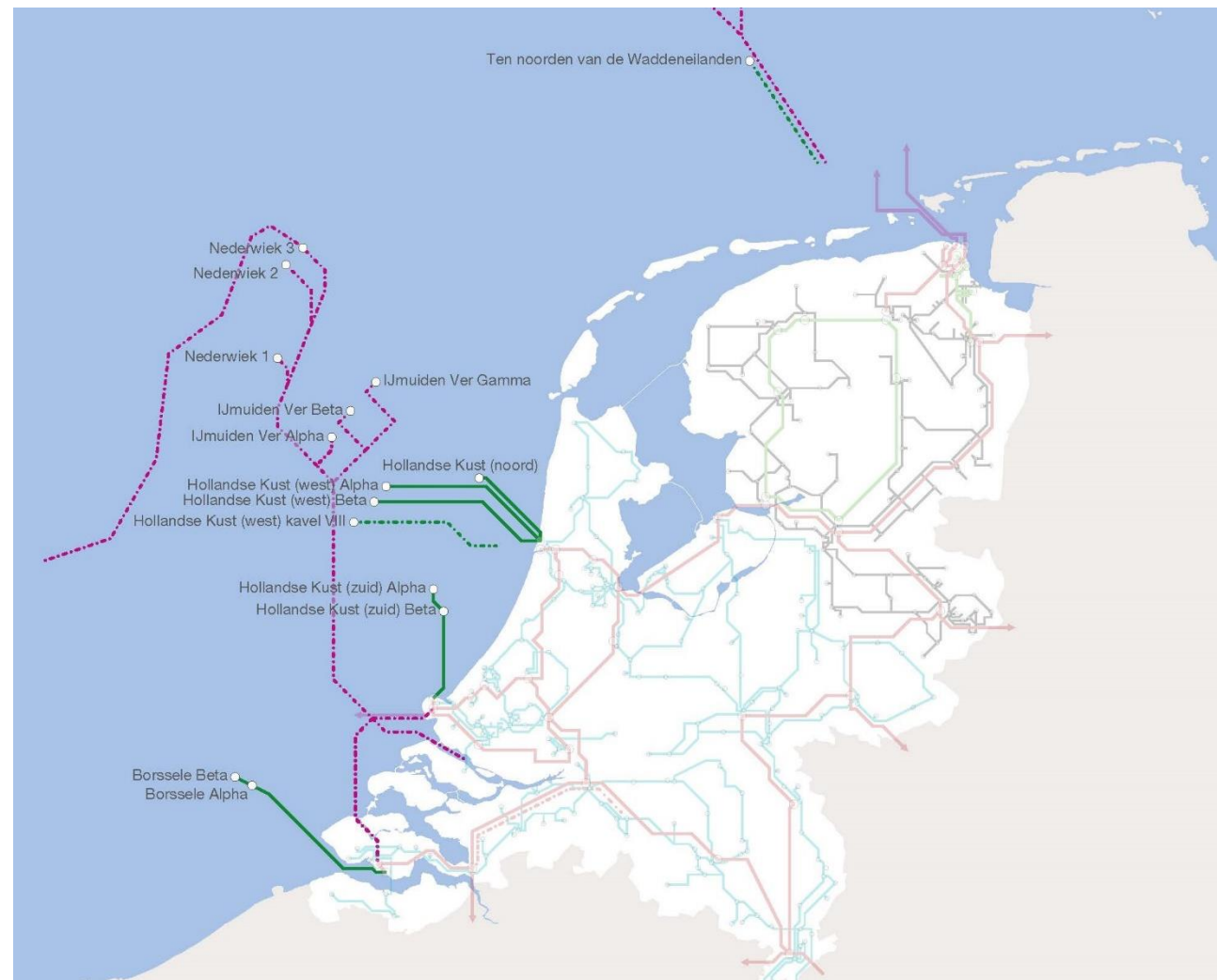
Head Offshore Development TenneT





Roadmap 23 GW in 2033

- 700 MW Offshore Programme complete



2 GW Programme

Standard 2 GW HVDC grid connections

By scaling up standard platforms (2 GW HVDC):

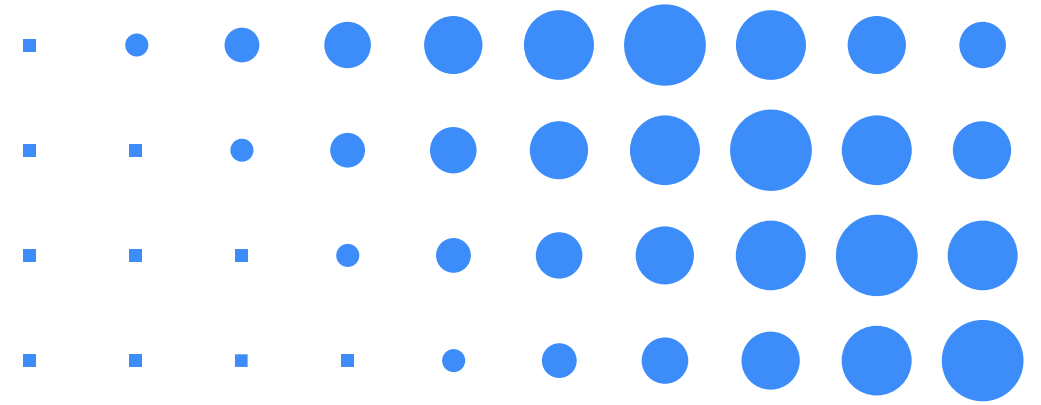
- 2 platforms instead of 6
- 2 cable traces instead of 6

- Less disturbance (onshore and offshore)
- Less space needed

Framework cooperation contracts **securing capacity** for 8 Dutch 2GW grid connection systems in a tight market and **driving investments**



Investments by contractors



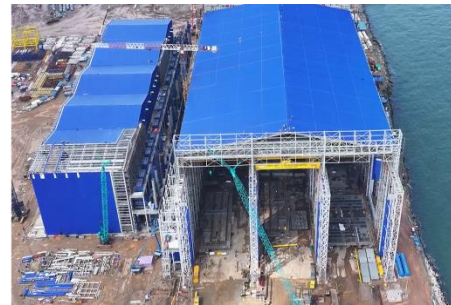
**Cable factory
Nexans**



**Cable ship
Nexans**



**Upgrade yard
in Batam**



**New yard
in Algeciras**



Hitachi Energy / Larsen & Toubro supporting 2 GW Programme



🏠 > TenneT partially terminates contract with offshore projects consortium

TenneT partially terminates contract with offshore projects consortium

TenneT has exercised its right to partial termination of the contract related to the Petrofac scope.

Project	Land station	Country
IJV Alpha	Borssele	
Nederwiek 1	Borssele	
Nederwiek 3	Geertruidenberg	
Doordewind 1	Eemshaven	
Doordewind 2	Eemshaven	
LanWin 5	Rastede	

Progress in 2025



Visitor's Centre @ Veerse Gatdam





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Any questions?





Wind Farm Site Studies

Joep Bronkhorst

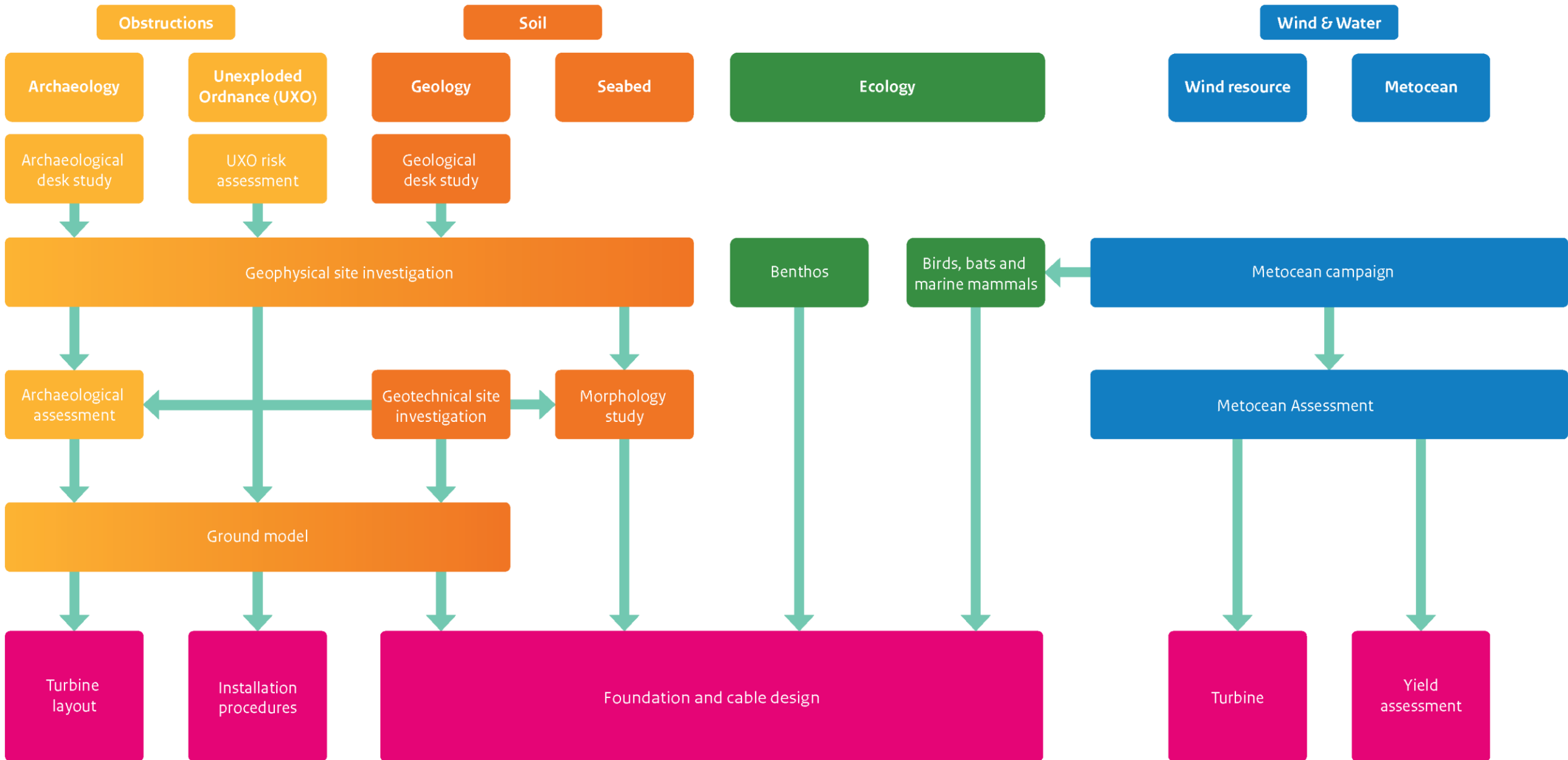
Netherlands Enterprise Agency



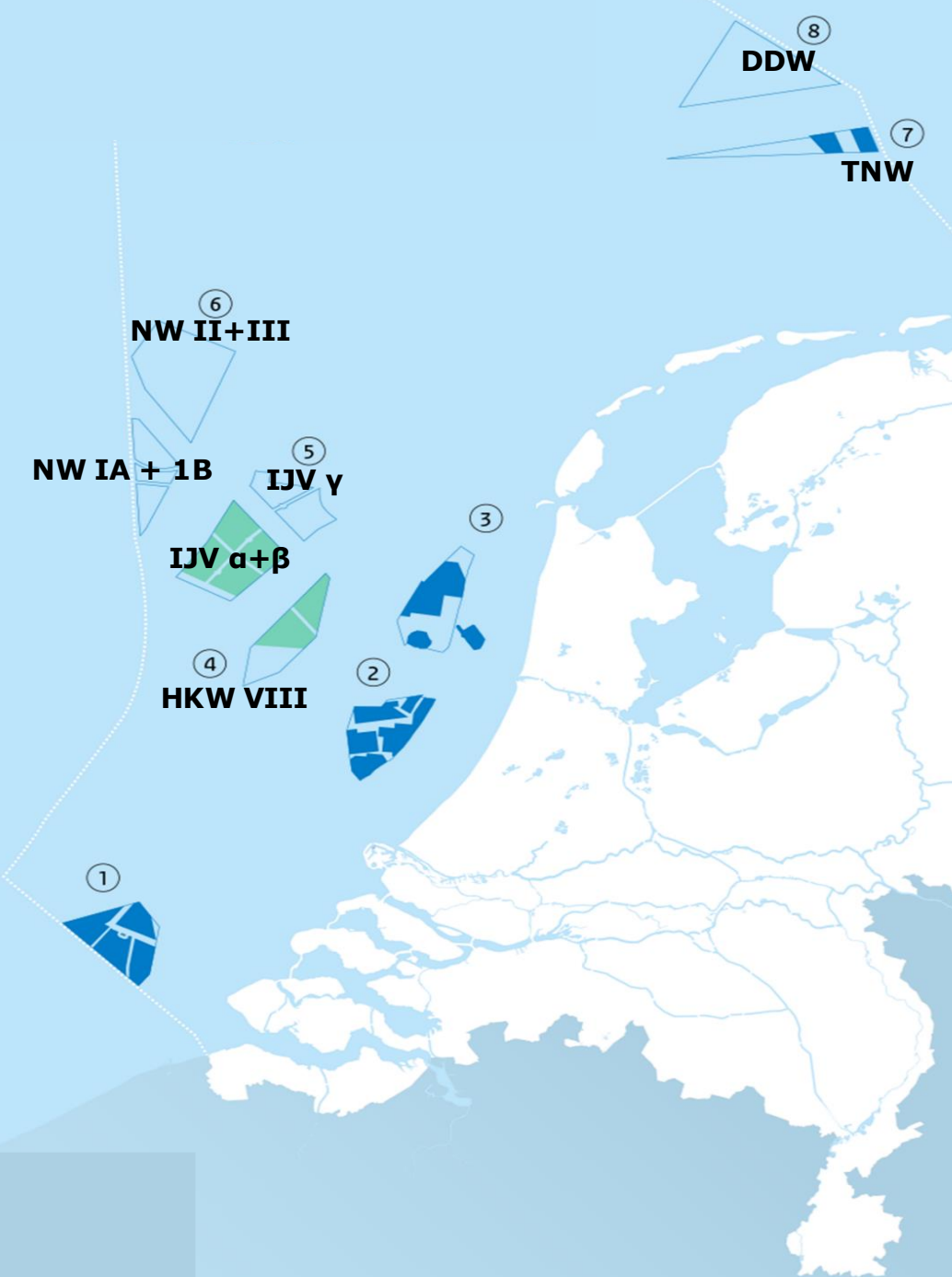


Agenda

1. Site Studies
2. Ancillary Studies
3. Ecology Studies



1. Wind Farm Site Studies



Site	Metocean	WRA/MA	Desktop	Geophysical	GT Seabed	GT Downhole	GGM	IGM	GIR	Overall Certification
Ijmuiden Ver Alpha & Beta (5)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Nederwiek I (A&B) (6)	✓	✓	✓	✓	✓	◆	✓	◆	◆	Q1-2026
Ijmuiden Ver Gamma (5)	✓	✓	✓	✓	✓	◆	◆	◆	◆	Q1-2026
Nederwiek II & III (6)	✓	✓	✓	✓	◆	◆	◆	◆	◆	2026-2027
Hollandse Kust West VIII (4)	✓	✓	✓	✓	◆	◆	◆	◆	◆	2027
Doordewind (8)	✓	◆	◆	◆	◆	◆	◆	◆	◆	2027
Search Area 6 / 7	◆		◆							t.b.d.

✓ = completed and certified ◆ = ongoing



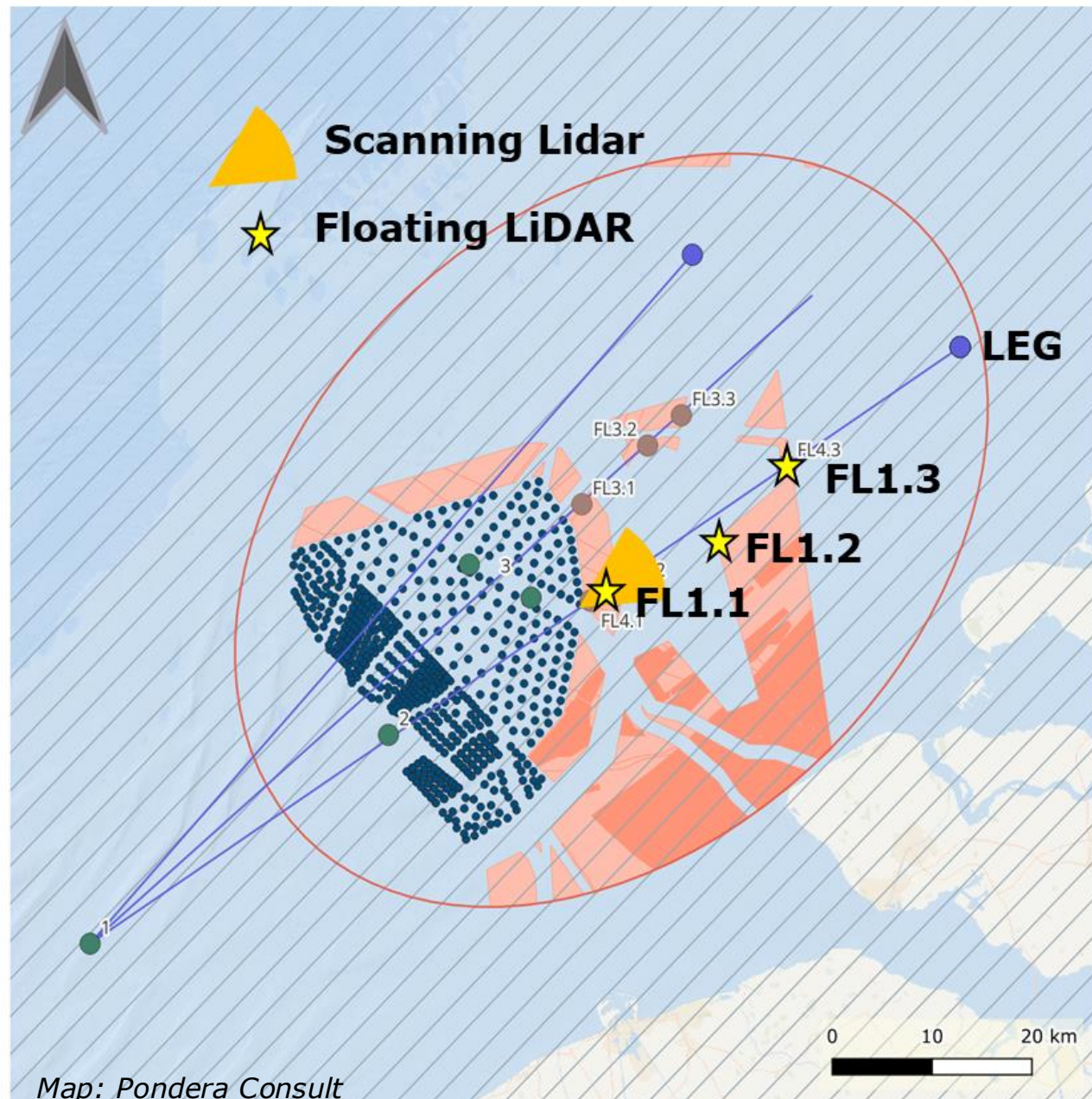
2. Ancillary studies: BeNeWakes

Goal: to bridge knowledge gaps

- Inter-farm wakes
- Cluster effects

Public private initiative

Update: Deployment LiDARs





2. Ancillary Studies: Atmospheric Stability profiler

- > Goal: measure vertical profiles of temperature, humidity and pressure offshore
- > Benefit for AEP, turbine lifetime
- > Update: tender beginning 2026



Other Studies

Additional studies have been conducted to further improve the primary site characterisation and public consultations for the Offshore Wind Farm Zones. These studies provide valuable insights into various aspects of the zones and their surroundings, including safety, visibility, and accessibility. Please note that some of these studies are only accessible in Dutch.

General Documents

Revision Log for Other Studies, August 19th, 2025

Levelized Cost of Energy (LCOE)

General disclaimer LCOE studies below

Report - LCoE NW I - AFRY

Report - LCoE NW I,II,III - DNV

Report - LCoE LL - DNV

Report - IIV Gamma - DNV

Report - LCoE HKW-8 - DNV

Report - LCoE DDW - DNV

Wake Study

Report - Wake Study - Whiffie

Report - Validation of Wake study

Data - Wake Study - Whiffie

README_Datafiles Wakestudy

BeNeWakes Study

BeNeWakes - project status update

Announcement of BeNeWakes Study

System Integration

Co-location of windfarm and CCS - Fugro (November 2024)

Study System Integration Offshore Wind 2030-2040 (In English) (February 2022)

Q&A Study System Integration Offshore Wind 2030-2040 (In English) (February 2022)

Rapport - Systeemintegratie Wind op Zee 2030-2040 (In Dutch) (Februari 2022)

Q&A bij Rapport Systeemintegratie (In Dutch) (Februari 2022)

Report - Safety Study CCS and Offshore Wind Farms

Q&A Safety Study CCS and Offshore Wind Farms

Offshore Wind Employment

Post 2030 offshore wind employment in the Netherlands - Qeam and ECHT (October 2020)

Routing Options across the Wadden Sea Region

Rapport - Rapportage Onderzoek Innovatie Doorkruising Waddengebied - Royal HaskoningDHV (In Dutch) (October 2021)

English summary - Study into innovative routing options across the Wadden Sea region - Royal HaskoningDHV (October 2021)

2. Ancillary Studies: LCOE and Wake study

LCOE: New reports in 2026

Wake study: update after offshore measurements



3. Ecology Studies

Goal RVO work package:

Deliver knowledge and data to support ecologically responsible offshore wind development

Activities:

- A) Policy support
- B) Measurements at sea





3. Ecology studies: RVO work package

A – POLICY SUPPORT

Ecological Impact
Assessment Tender:
Ad-hoc impact analyses

Ecological session OEEC:
Overview mitigation
measures and
effectiveness

B - MEASUREMENTS AT SEA

Baseline survey (SA6/7):
F-pods, acoustics, camera's,
turbidity and chlorofyl

Benthos (DDW & NW I):
Analyse and ground truth
benthic habitats





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Any questions?





The Rich North Sea

The Rich North Sea | Lessons Learned

Marjolein Kelder





Dutch Challenges in the North Sea

Spatial issues

Joost Vermeulen

Ministry of Climate Policy and
Green Growth

Maritime Safety

Kees Storm

Rijkswaterstaat

Co-use

Pieter-Johannes
Steenbergen

Ministry of Infrastructure and Water
management



Ministry of Climate Policy and Green
Growth

Spatial issues

Joost Vermeulen

Team Lead Offshore wind –
Spatial Issues



Partial Revision of the North Sea Programme 2022-2027

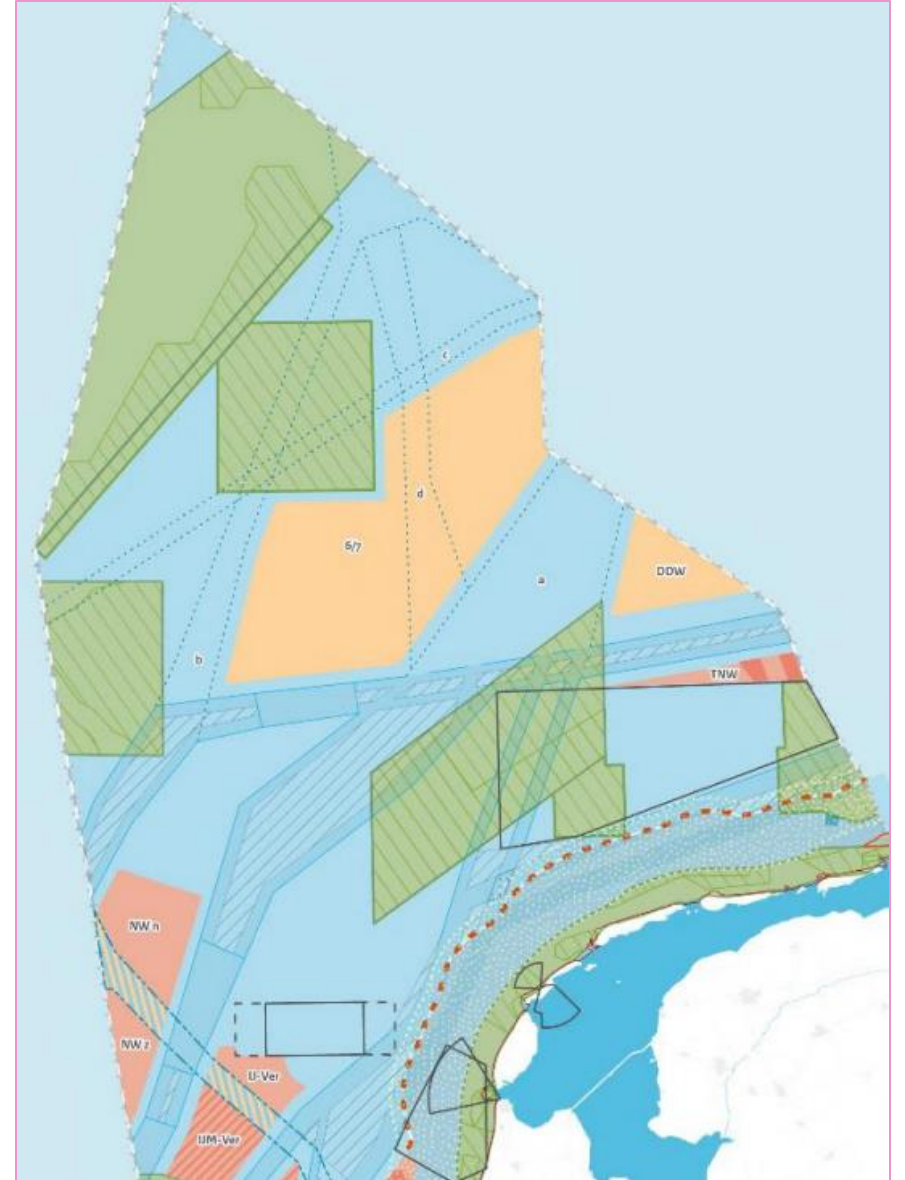
- Space for additional 21 GW:
 - Doordewind Site II (2 GW)
 - Combined search area 6/7 (19 GW)
- Conditions:
 - Active fisheries in Doordewind if feasible and safe.
 - Open zone in search area 6/7
 - Development of area 6/7 only when costs are covered
 - Lagelander Wind Farm Zone not reconfirmed
- Uncertainty:
 - Presence of guillemot
- Draft published 18 April 2025. Final: December 2025





North Sea Programme 2028-2033

- Additional space, if
 - > 40 GW is needed beyond 2040, or
 - parts of area 6/7 cannot be used due to presence of guillemot
- Planning:
 - Q1 2026: Draft scoping document
 - Q1 2027: Draft NSP28-33
 - Q4 2027: Final NSP28-33





Netherlands Enterprise Agency



Any questions?





Ministry of Infrastructure
and Water Management

Co-use in offshore wind farms

Policy developments resulting
from the Partial Revision of
North Sea Programme 2022-
2027 (*draft decision*)

Pieter-Johannes Steenberg

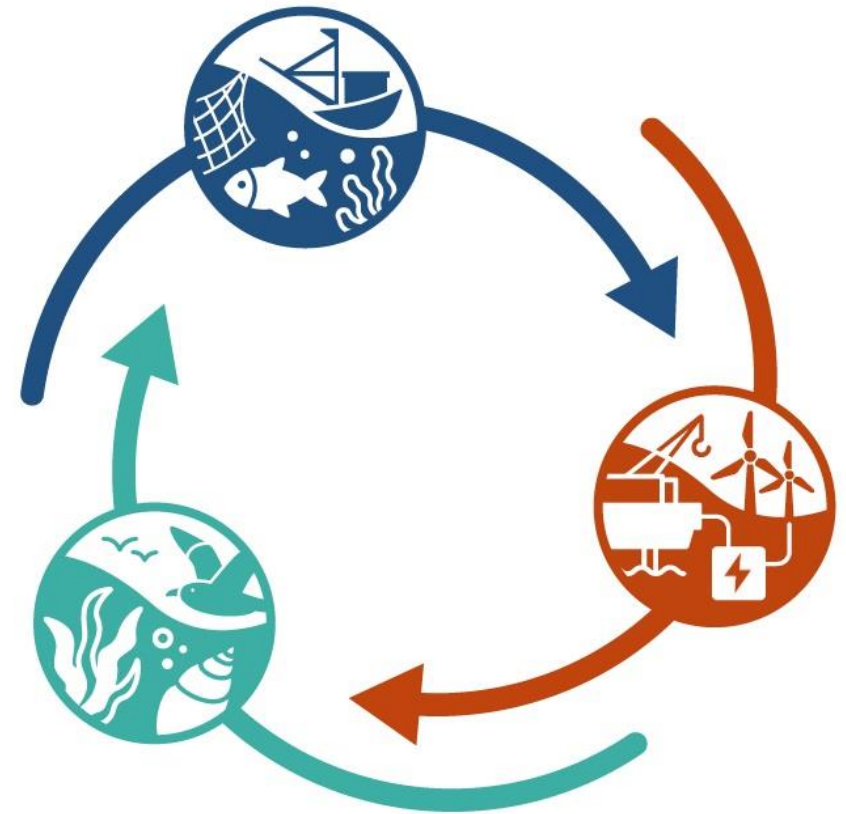
“In order to be able to continue to allocate space for all uses and needs, **co-use of space and integration of tasks are necessary more than ever before.”**



Better position for co-use

Policy developments

- > **Scaling up perspective**
 - *contribute to balance at the scale of the whole Dutch North Sea*
- > **Anticipate in advance**
 - *envision forms of co-use to consider before designing wind farms*
- > **Co-use part of decision making**
 - *new wind farm zones designated with explicit preferences for co-use*





Netherlands Enterprise Agency



Any questions?





Maritime safety

and wind farms at sea



Kees Storm
Rijkswaterstaat

Monitoring and Research Programme on Shipping Safety & Offshore Wind (MOSWOZ)

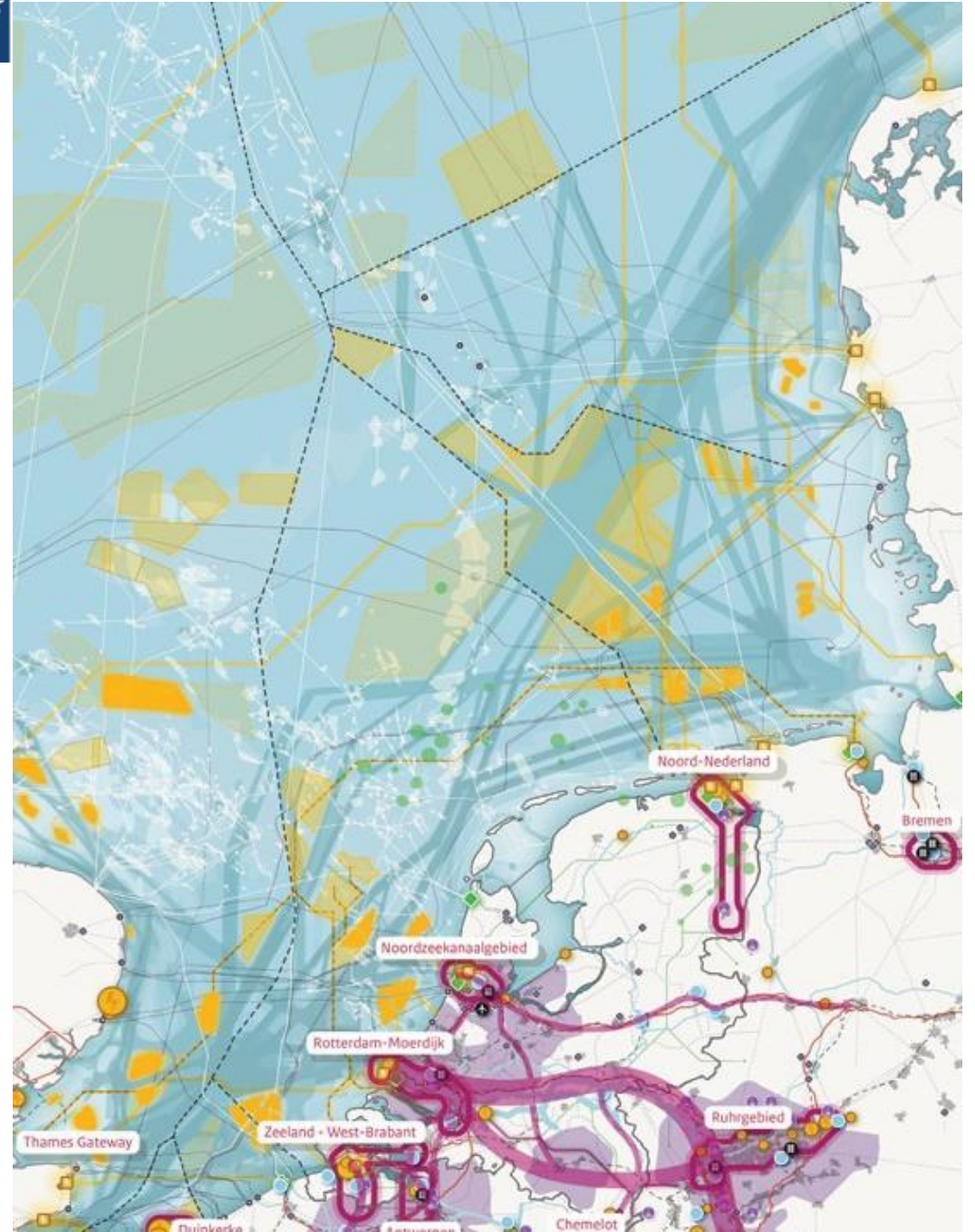
RVO Workshop, OEEC Amsterdam 26 November 2025



Routekaart Windenergie op zee

Legenda

- Grens Continentaal Plat
 - Operationele windparken ~4,7 GW
 - Windparken in aanbouw ~5,5 GW
 - △ Geplande windparken ~11,5 GW
- Totaal ~21,5 GW





Recent incidents ...

Julietta D 31 Jan 2022



Petra L 26 April 2023



Maersk Nimbus and Diamond Sky 18 Feb 2022



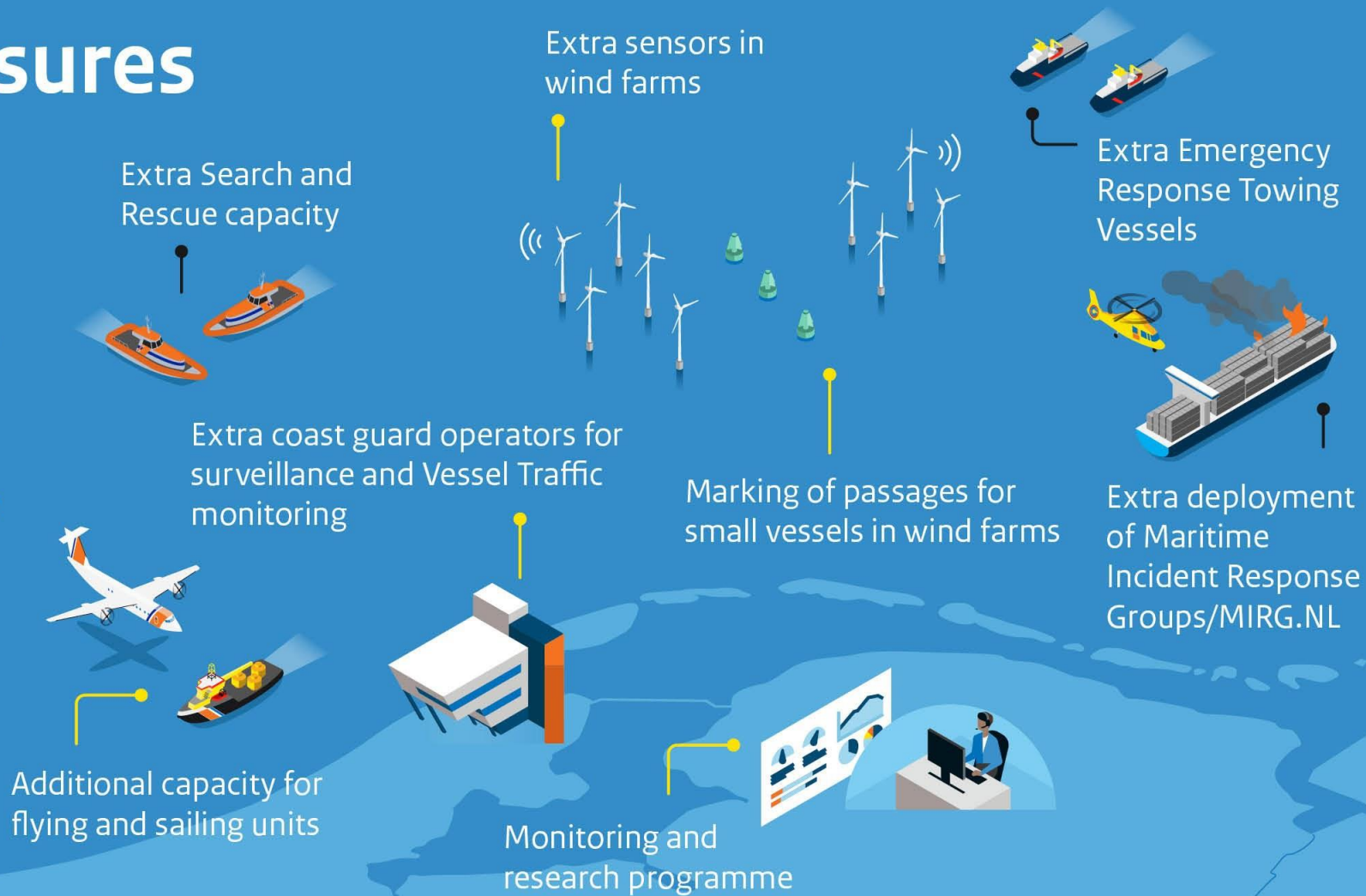
Glomar Venture 20 April 2025



Package of measures up to 2031

Our preventive and repressive measures keep the North Sea safe for shipping. We monitor their development and effectiveness so that we can advise on adjustments should the situation develop differently than expected. We do this through the MOSWOZ programme.

- Preventive measures
- Repressive measures



Vessel Traffic Monitoring (VTMon)

Detect impending danger in time and gain valuable time



Sensors in offshore wind farms

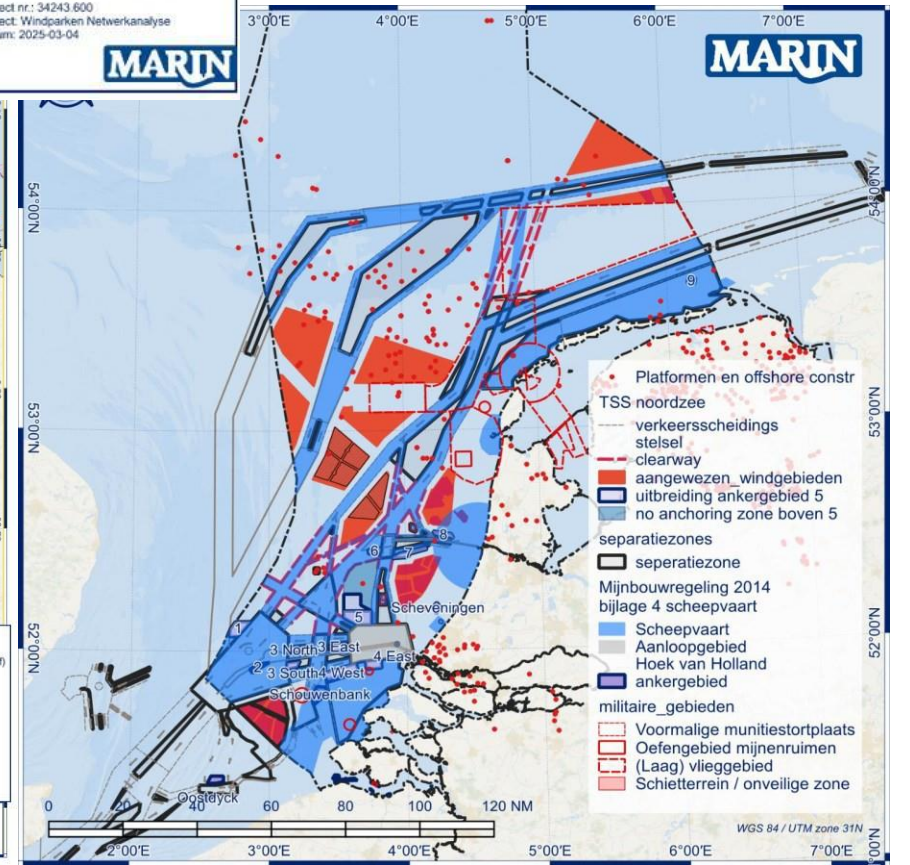
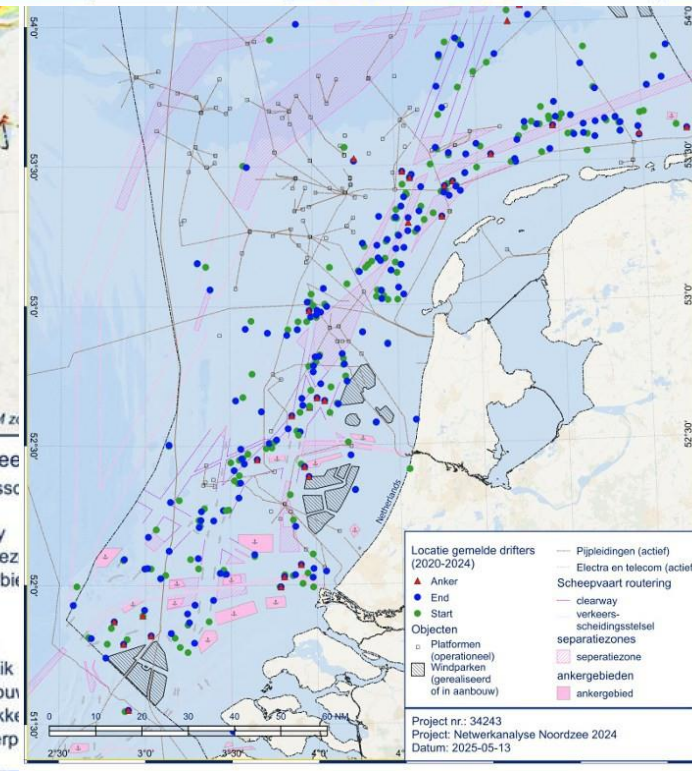
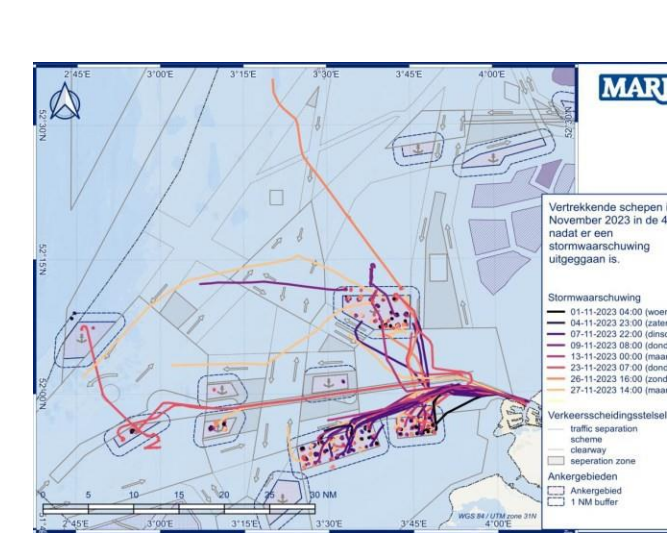
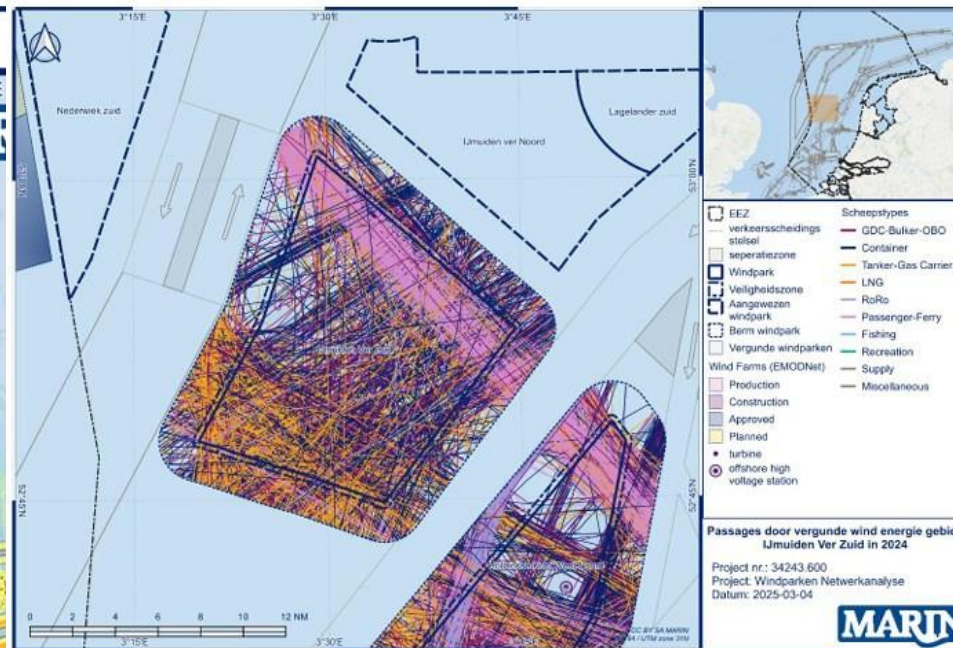
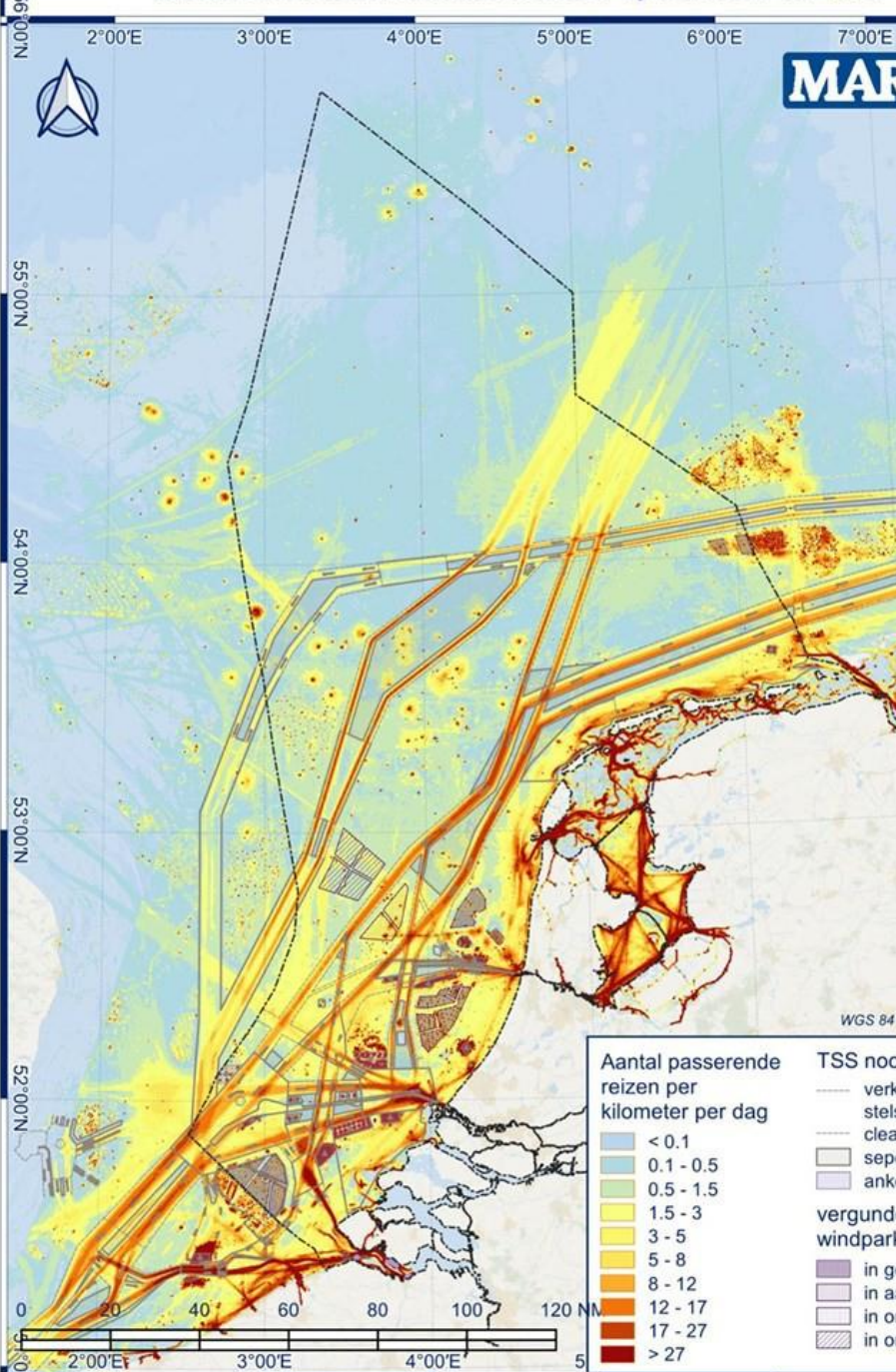


Smart information tools

Use of multiple sources such as shipping congestion, weather and risk forecasting



Intensiteitskaart van alle verkeer op het NCP in 2024





Human Factor



**360 degrees Full Mission
Bridge (FMB)**



360 degrees offshore FMB (ERTV)



VTMon desk



**Part-task bridge
Yachtsmen**



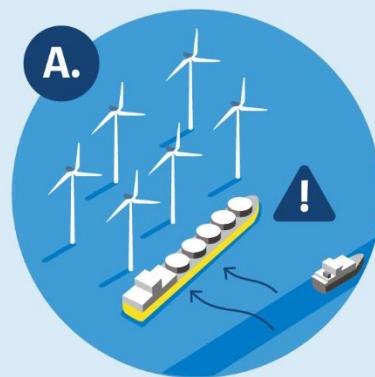


Conclusions

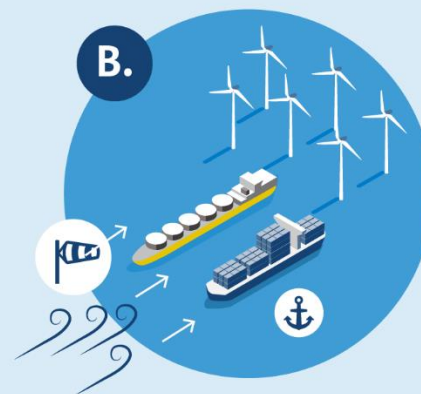
Actual risk approach for nautical safety is insufficient

1. Risks continue to grow with increased offshore wind developments
2. Current safety measures are effective, but they do not mitigate the added risks
3. Policy objective is not achieved

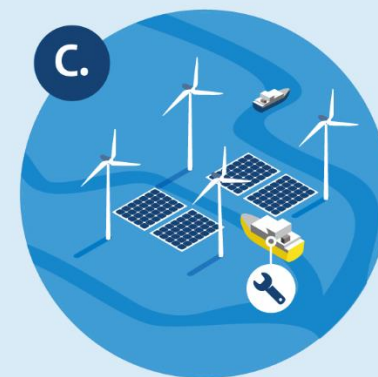
Biggest risks to shipping safety in and near wind farms



Traffic lane near wind farm



Anchoring upwind near wind farm



Working vessels of wind farms and co-use of installations

Offshore wind and shipping safety



Good communication



Self-reliance of crews within wind farms



Aligning turbines (SAR lanes)

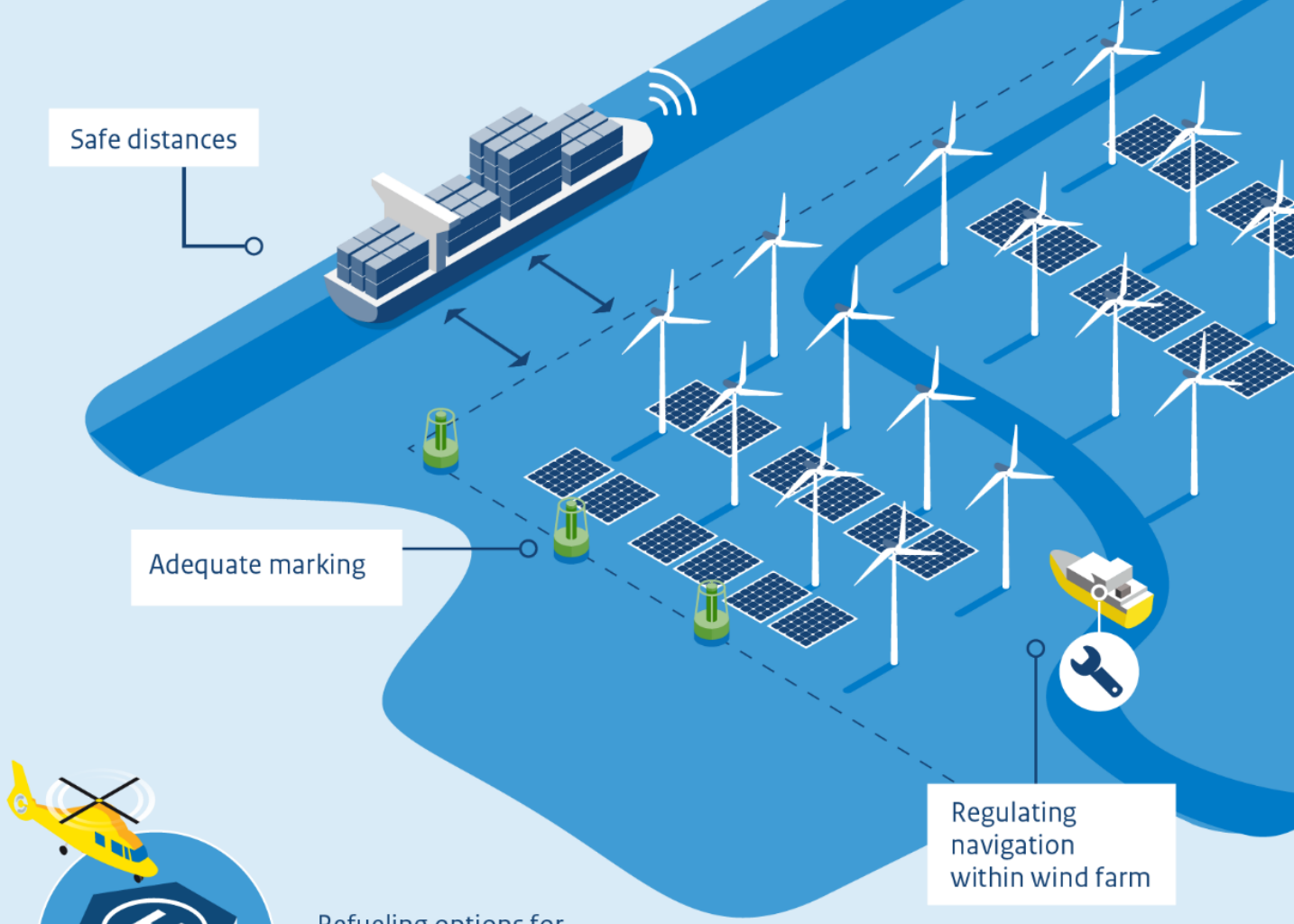


Refueling options for SAR helicopter

Safe distances

Adequate marking

Regulating navigation within wind farm





MOS
WOZ

Thank you for your attention

Reports or Newsletters
www.noordzeeloket.nl

Stay informed of
the latest news
via the MOSWOZ-
Newsletter.





Netherlands Enterprise Agency



Any questions?





- The presentations and recordings of the livestream will be published on offshorewind.rvo.nl as soon as possible.
- Our contact details: woz@rvo.nl.

Let's continue our discussions at the network reception at the Netherlands pavilion! (2.203)

