



# ENERGIE VAN DE NOORDZEE

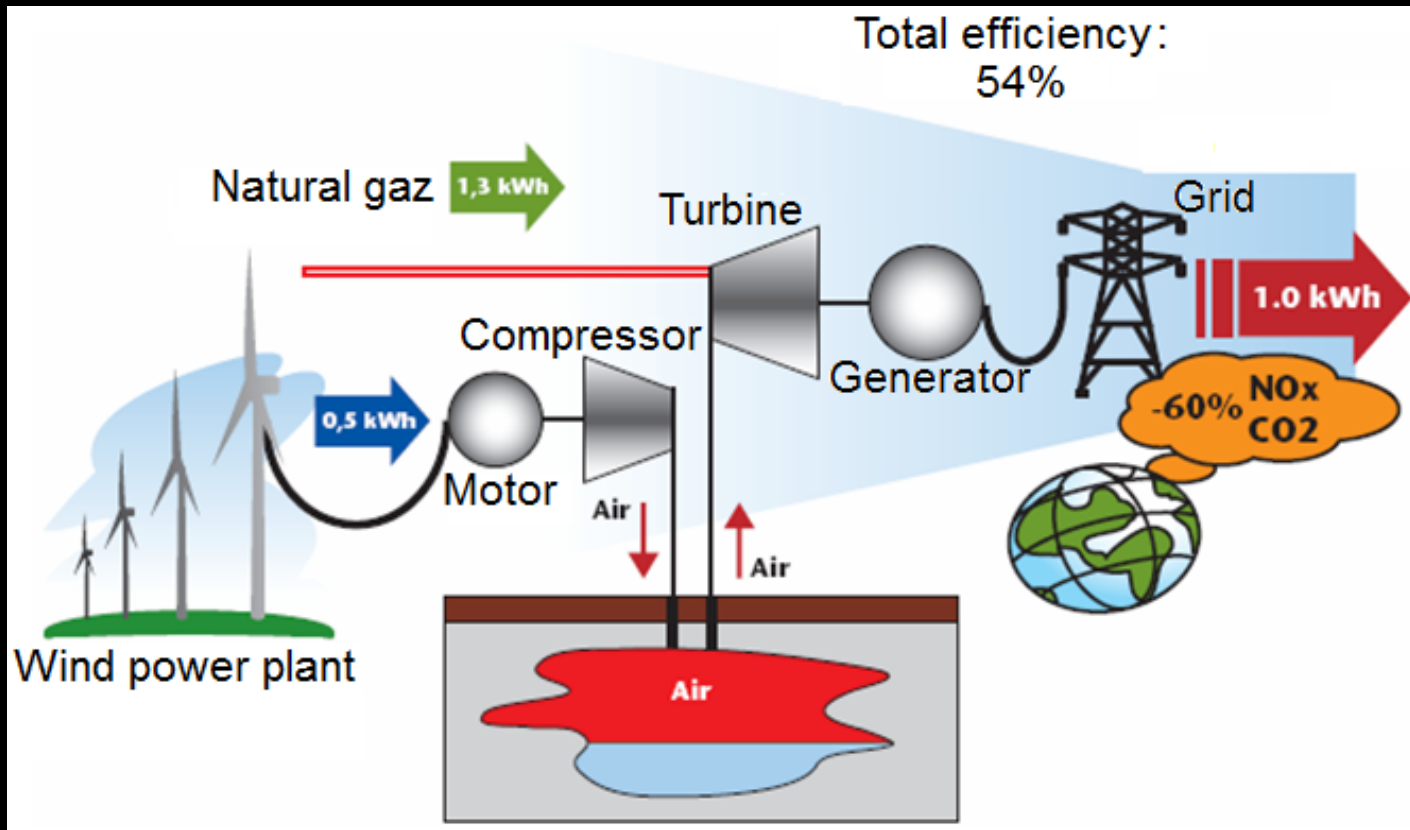
TNO, RWS, Slowmill, Port of Rotterdam, Delta21, TenneT, TKI-WOZ, MVI-Lab

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<https://www.onsaardgas.nl/energiemix/#noordzee>

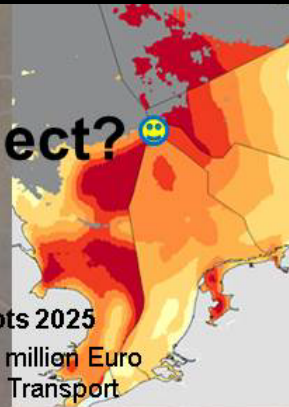
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# Energetic North-Sea a great and compelling WE project? 😊

## AiPiDiCiMi



- **OrientationFase 2015...**

- Investment costs 50.000 Euro
- 3D North Sea maquette
- Cocreation TKI wind op zee
- MVI-Lab Northsea Energy
- Future Generation Forum

- **Ai Fase DE&NL&UK area research 2020...**

- Investment costs 5 million Euro (Ai)
- Start International taskforce ENNS
- Monitoring hub at Doggersbank at 3 countries point
- Monitoring Doggersbank
- Market consultation
- Research, patents and concepts
- Piggybacking with EZ 14 GW distant wind at sea Projects and UK projects

- **PiDi Fase Design and Pilots 2025**

- Investment costs 250 million Euro  
Production Storage & Transport
- 3D modeling
- Prototypes, design and engineering
- Energy motor at Doggersbank

- **CiMi Fase Realisation and Maintain 2030**

- Investment costs 1000 Billion Euro (CiMi)
- Output 250 GW.

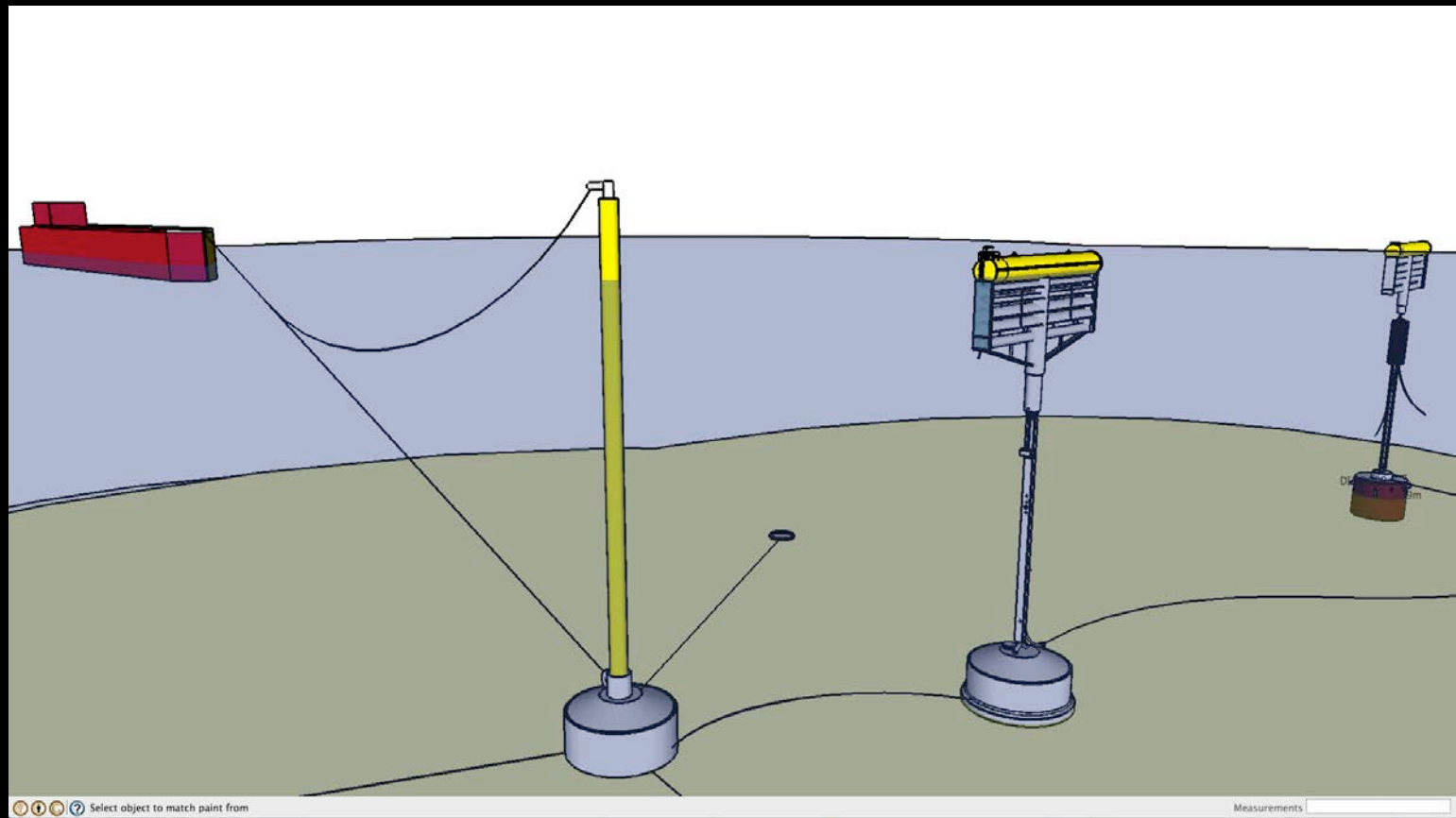




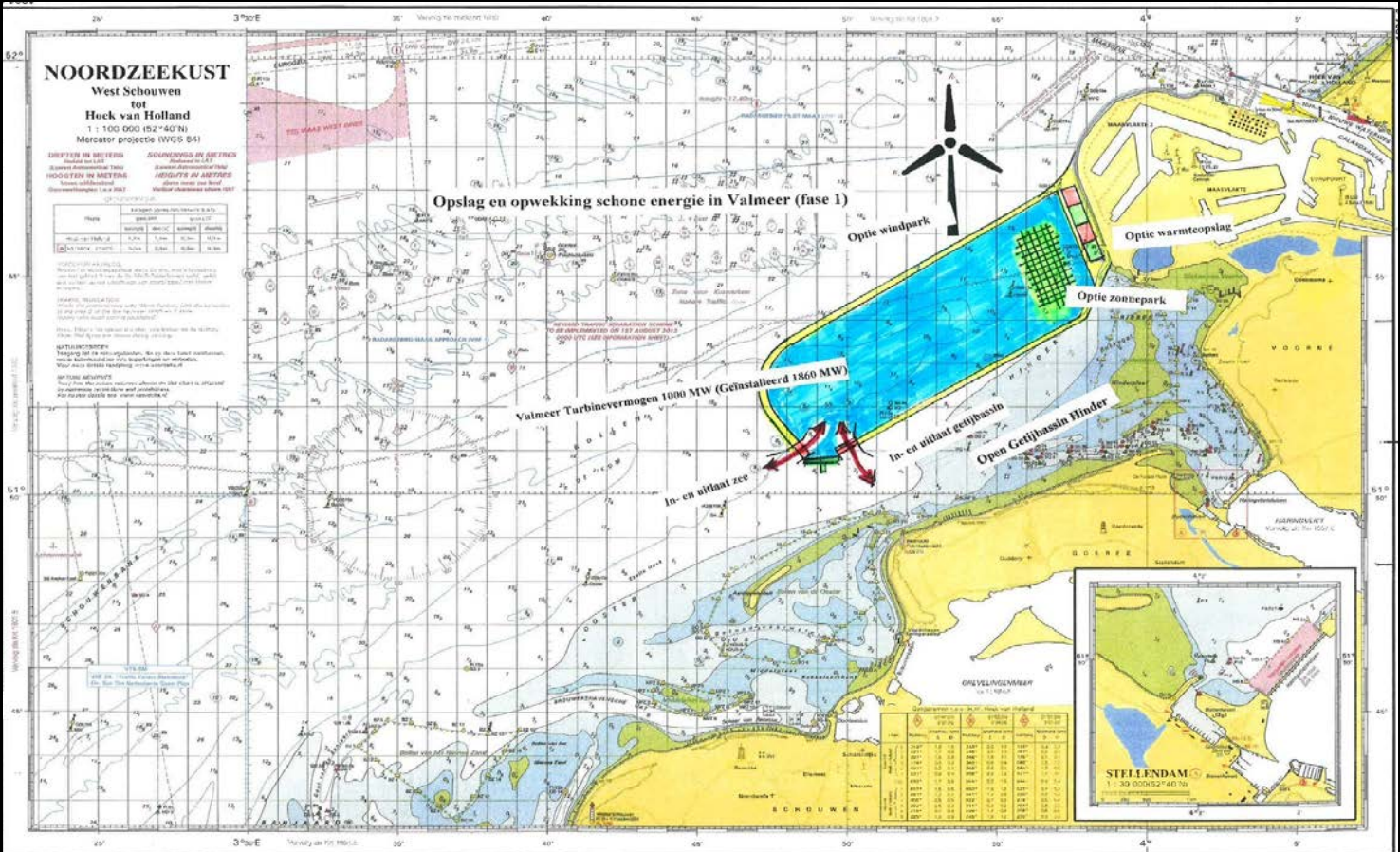
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**NOORDZEEKUST**

West Schouwen

tot

Hock van Holland

1 : 100 000 (2° 40' N)

Mercator projectie (WGS 84)

**DEPTHTEN IN BEVEERS**  
 Diepte in meters  
 Hoogte in meters  
 Hoogte in meters  
 Hoogte in meters

Naam	Diepte	Hoogte	Hoogte	Hoogte
1	10	10	10	10
2	20	20	20	20
3	30	30	30	30
4	40	40	40	40
5	50	50	50	50
6	60	60	60	60
7	70	70	70	70
8	80	80	80	80
9	90	90	90	90
10	100	100	100	100

**VERTICALE AFRIJFEN**  
 Verticaal afrijfen in meters  
 Verticaal afrijfen in meters  
 Verticaal afrijfen in meters

**WATERSCHIEDEN**  
 Waterstand in meters  
 Waterstand in meters  
 Waterstand in meters

**OPSTROMINGEN**  
 Opstrooming in m³/s  
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 Opstrooming in m³/s

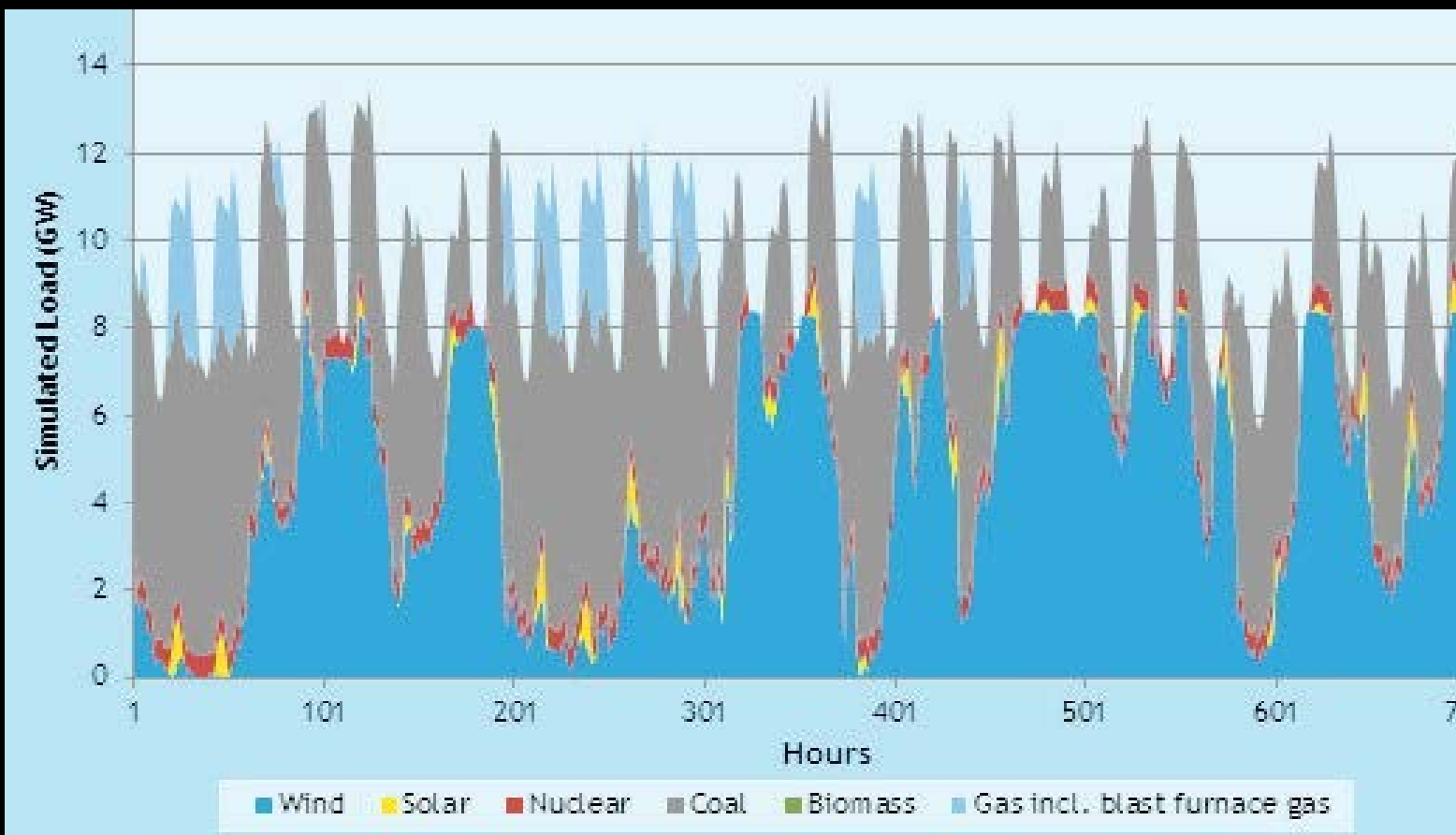
**OPSTROMINGEN**  
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Locatie	Diepte	Hoogte	Hoogte	Hoogte
1	10	10	10	10
2	20	20	20	20
3	30	30	30	30
4	40	40	40	40
5	50	50	50	50
6	60	60	60	60
7	70	70	70	70
8	80	80	80	80
9	90	90	90	90
10	100	100	100	100



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A wide-angle photograph of an offshore wind farm in the North Sea. Numerous white wind turbines with yellow bases are visible, stretching into the distance. The sky is clear and blue. In the center, a service vessel is positioned near one of the turbines. The overall scene conveys a sense of large-scale renewable energy infrastructure.

# **GENERATING SHARED SUCCESS. MAKE IT HAPPEN.**

**MANIFEST VOOR PUBLIEK-PRIVATE SAMENWERKING  
IN OFFSHORE WIND IN ROTTERDAM**

**ROTTERDAM.  
MAKE IT  
HAPPEN.**





**Future North Sea  
Infrastructure**  
Enabling the change

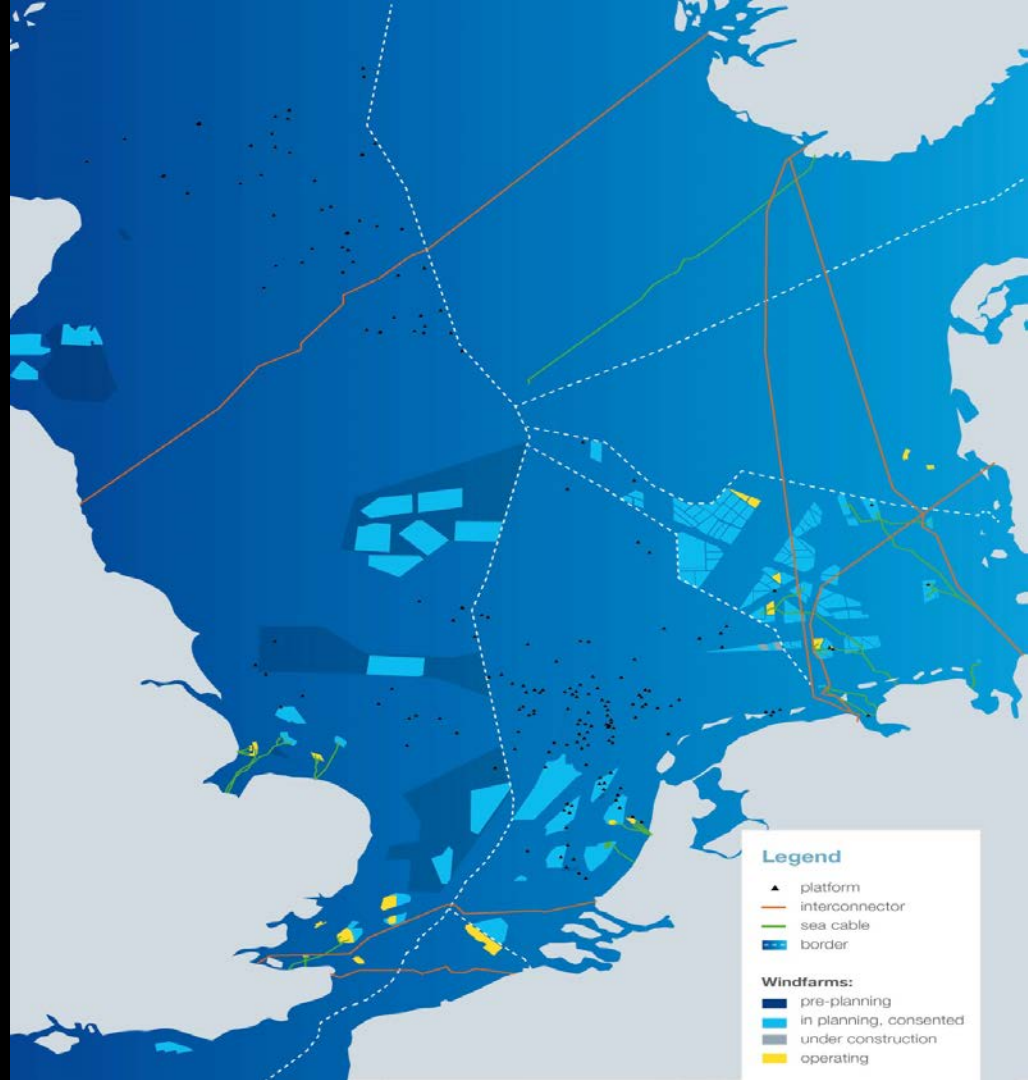


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# Step 1

## Explore & develop 'near shore' wind

- Individual projects by North Sea countries
- Relatively short term goals
- NL: 3.500 MW (additional) in 2023
- TenneT offshore grid developer & operator
- Separate interconnectors
- Onshore wind

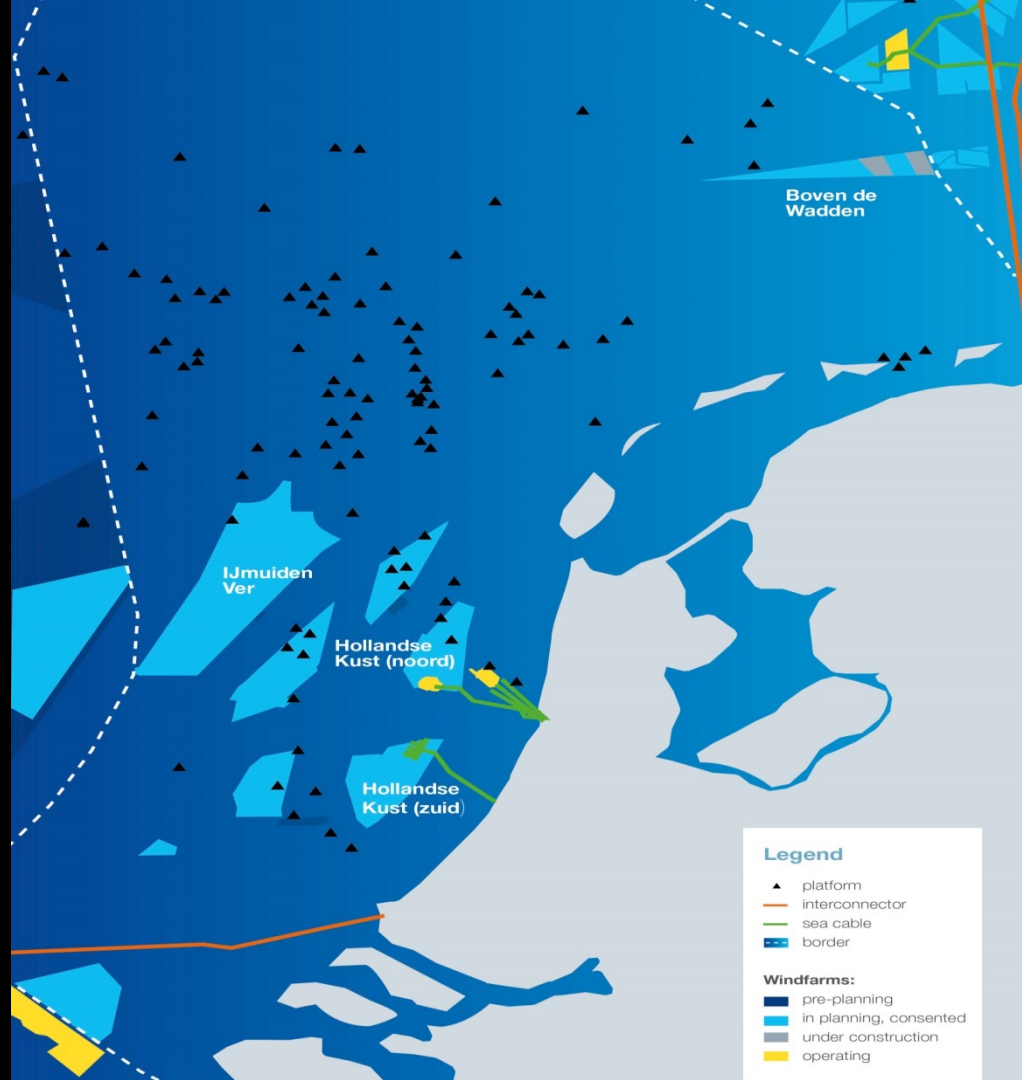




# Step 2

## IJmuiden Ver

- Develop grid concept for IJmuiden Ver
- Development of currently appointed areas (Boven de Wadden and Hollandse Kust) possible with standardized TenneT 700 MW concept
- First tender 2020
- In operation from approx. 2024



# Step 3

## Connect to infra UK

- Connect IJmuiden Ver to UK energy area (e.g. East Anglia)
- Investigate island solutions
- Cooperation with UK
- Connect to existing oil and gas infrastructure
- Approx. 2025 – 2030
- Timing possibly simultaneously to step 2



# Step 4

## Large scale, far shore

- Facilitates required economies of scale
- Optimal wind conditions
- Shallow waters
- Central position North Sea countries
- Interconnection hub: Wind Connectors
- Development up to 2050







# The modular island

The big step: hub and spoke model





## Het North Sea Energy Lab: *maatschappelijk innoveren*

Frans A. van der Loo  
TKI-WOZ / Programma MVI-E  
10 november 2016

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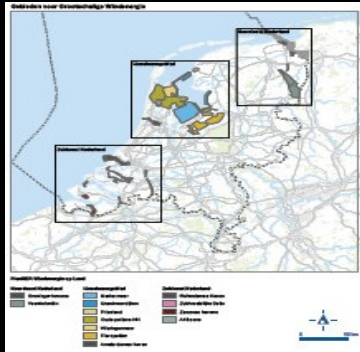
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# Leren van Wind op land



2 of 3 rotorbladen

Inpassing in landschap



Ruimtelijke ordening



Gedragscode



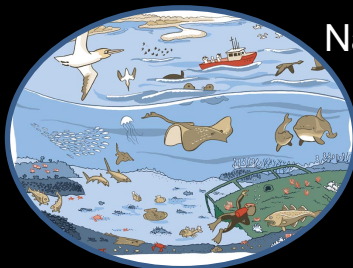
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# Noordzee Energie: vele bureen

Buren op zee



Natuur



Overheid / Landen



Havens

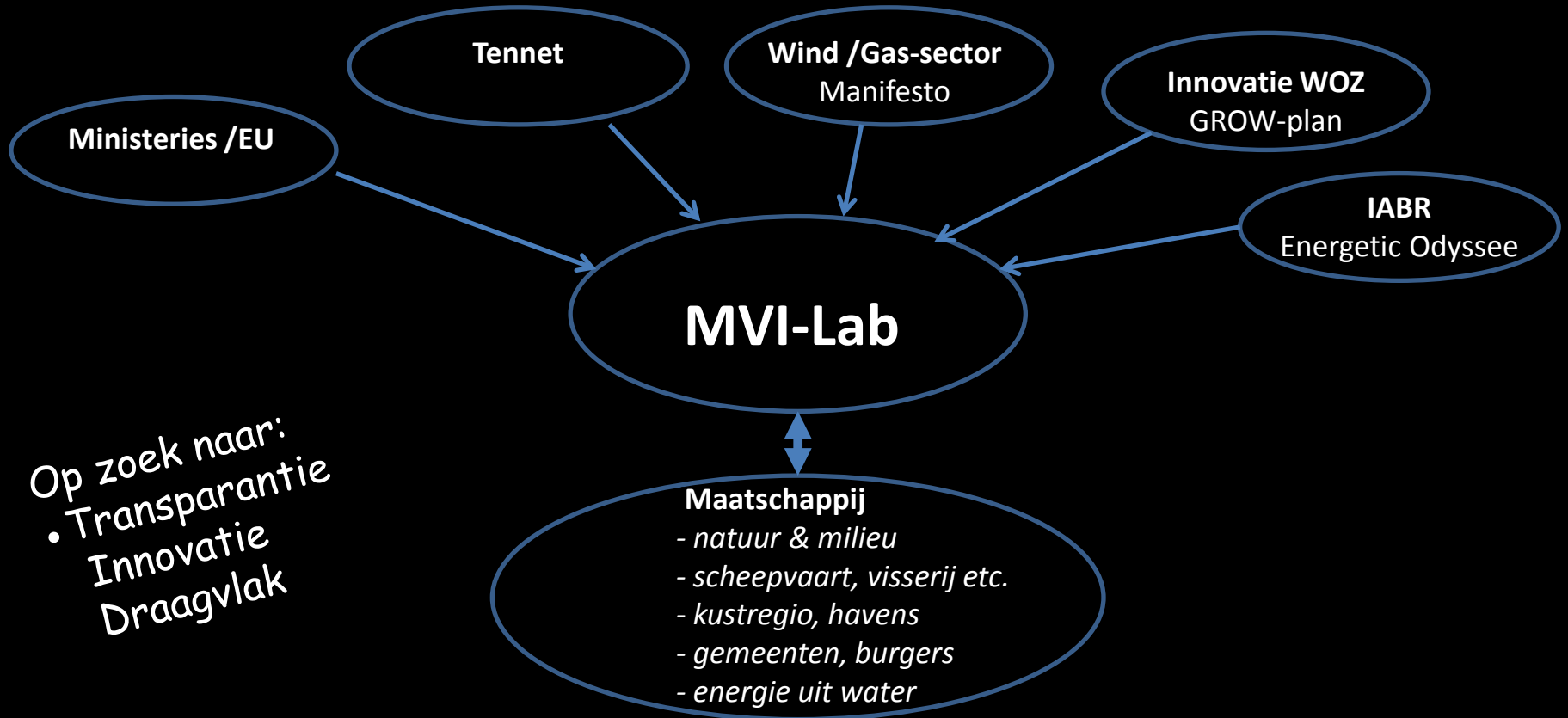


Kustregio



Burgers

# North Sea Energy Challenge





# ENERGIE VAN DE NOORDZEE

Wat vind u daarvoor nodig?

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DANK VOOR UW BIJDRAGE !

ENERGIE VAN DE NOORDZEE

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