



## ZEE- EN WATERBOUW IN EN ROND VLAANDEREN 4 JUNI 2015

UITVOERING WINDMOLENPARKEN  
& ANDERE TOEKOMSTIGE  
GROENE STROOM OPWEKKERS



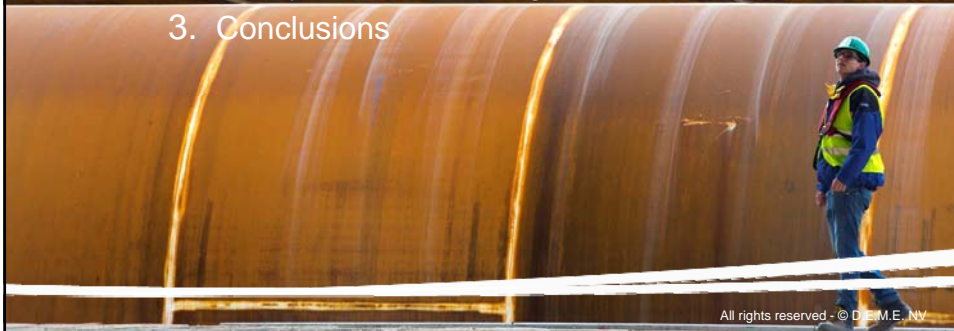
Bart De Poorter – General Manager GeoSea

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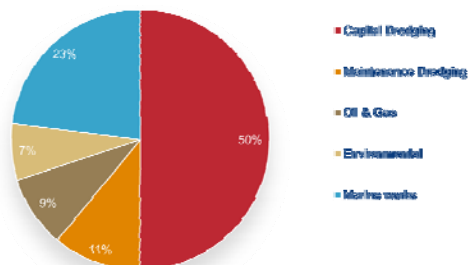
1. Introduction DEME / GeoSea
2. Groene Stroom
  - Offshore Wind
  - Wave Energy
  - Tidal Energy
  - (Hydro-electric Storage)
3. Conclusions



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- Global player + 150 years offshore history
- Annual turnover +2,5 bn €
- 4500 employees
- Multi disciplinary approach



- Strong focus on 'green energy'





## GROENE STROOM – WHAT?

- Offshore wind
- Wave energy
- Tidal energy
- (Hydro-electric storage)



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## OFFSHORE WIND



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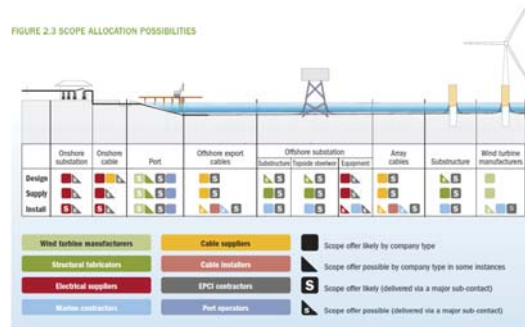




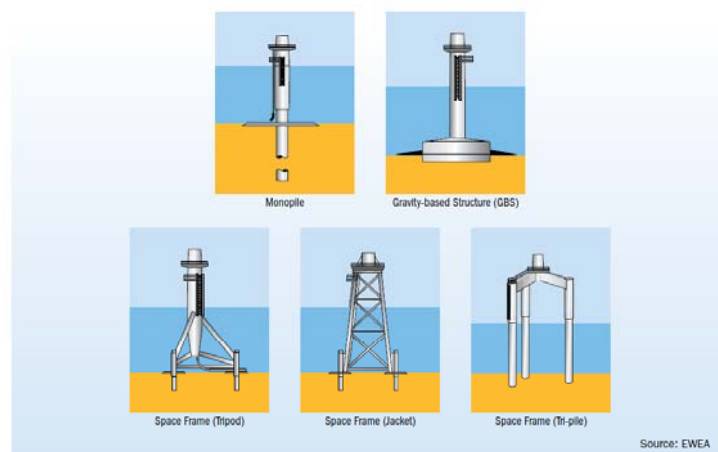
## OFFSHORE WIND

- Site Investigation
- Foundations incl. Scour Protection
- Infield Cables – Export Cable
- Wind Turbines Supply & Installation
- Electrical Infrastructure (OHVS)
- Maintenance

FIGURE 2.3 SCOPE ALLOCATION POSSIBILITIES



## FOUNDATIONS



Typical fixed offshore foundations



## FOUNDATIONS

- Monopile Foundations
- Gravity Based Foundations
- Jacket Foundations
- Tripod Foundations
- Floating Foundations



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## SEABED PREPARATION & EROSION PROTECTION



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## ELECTRICAL INFRASTRUCTURE

- Power cable laying
- Power cable protection
- OHVS (Offshore High Voltage Station) design, construct and installation
- Trench dredging
- Landfall construction
- Crossing of submarine cables and pipelines



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## WTG INSTALLATION, LOGISTICS & REPAIRS



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## OFFSHORE WIND FARM ASSISTANCE

- Foundation monitoring
- Periodic seabed inspection
- Electrical installation repair
- Navigation aids maintenance
- Wind turbine maintenance



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## OFFSHORE WIND BELGIUM



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REBO



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## OFFSHORE WIND – BELGIAN INDUSTRY?



- ✓ Wind turbine manufacturers
- ✓ Foundations Supply Chain
- ✓ Electrical Suppliers
- ✓ Marine Contractors
- ✓ Cable Supply
- ✓ Cable Installation
- ✓ EPCI Contractors
- ✓ Design
- ✓ Port & Port Operators

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TIDAL ENERGY



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TECHNOLOGIES

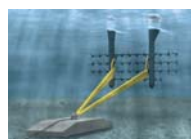
Alstom



Voith



Schottel



BlueWater



Andritz Hydro/Hammerfest



Tocardo



ARC



MCT



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## TIDAL ENERGY – BELGIAN INDUSTRY?



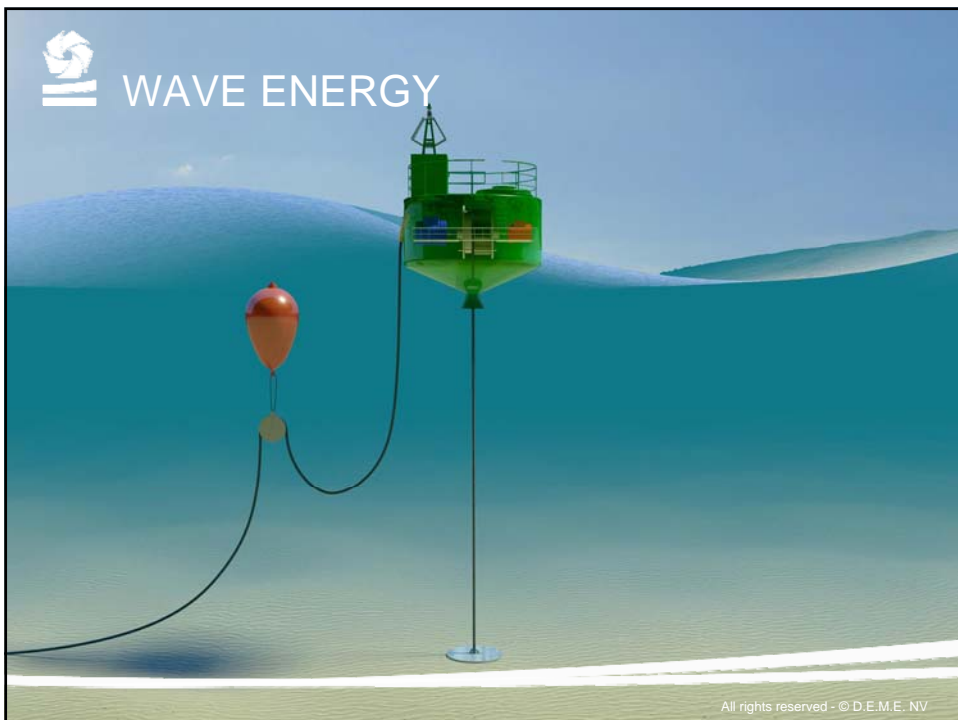
- Tidal turbine manufacturers
- ✓ Foundations Supply Chain
- ✓ Electrical Suppliers
- ✓ Marine Contractors
- Cable Supply
- ✓ Cable Installation
- ✓ EPCI Contractors
- ✓ Design
- Port & Port Operators

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## WAVE ENERGY



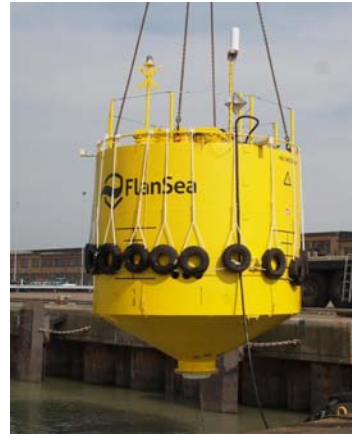
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## WAVE ENERGY – A DEVELOPING INDUSTRY

- FlanSea: Research project for the development of a wave energy convertor in a moderate wave climate
  - 2002: Stage 1 – Concept
  - 2003: Stage 2 – Flume Testing
  - 2011: Stage 3 – Flume Testing (scale 1:8)
  - 2012: Stage 3 – QnD (scale 1:5)
  - 2013: Stage 4 – Wave Pioneer (scale 1:2)



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## ILAND – RENEWABLE ENERGY



C-POWER, Oostende

**WIND and SOLAR  
are INTERMITTENT.**

**STORE ENERGY at times of  
excess generation, RELEASE  
ENERGY at times of shortages.**



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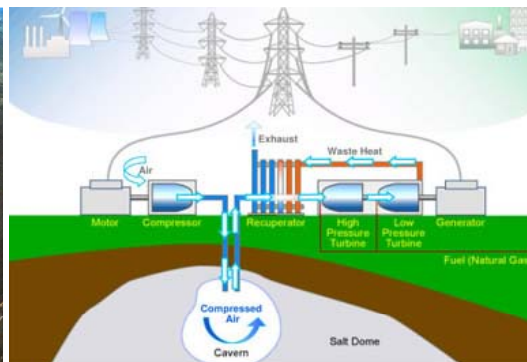


## ILAND – LARGE SCALE ENERGY STORAGE



### PUMPED HYDRO STORAGE:

98% of all large scale energy storage  
worldwide.  
*In Belgium: important on-shore spatial  
constraints.*



### COMPRESSED AIR ENERGY STORAGE:

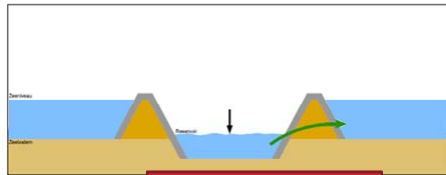
2 stations (1 in USA, 1 in Germany) built since 1978.  
*In Belgium: unfavourable subsoil conditions.*

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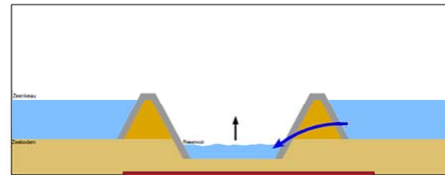
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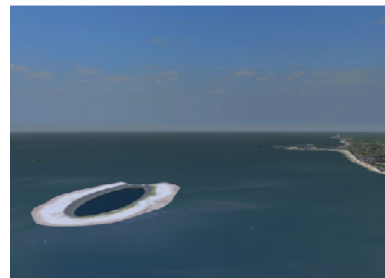
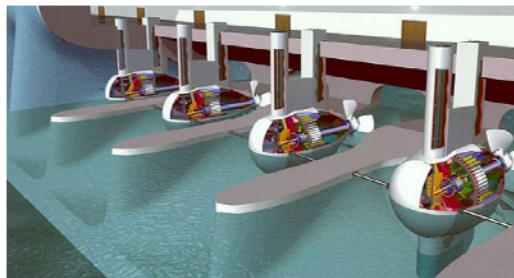
## ILAND = ENERGY STORAGE AT SEA



STORE ENERGY



RELEASE ENERGY



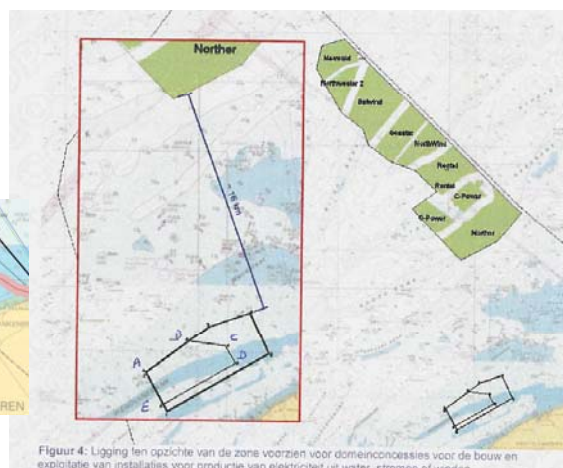
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## ILAND – BASE CASE: LOCATION

Requested domain concession ABCDE within zone 1 (Wenduinebank) of the Marine Spatial Plan.



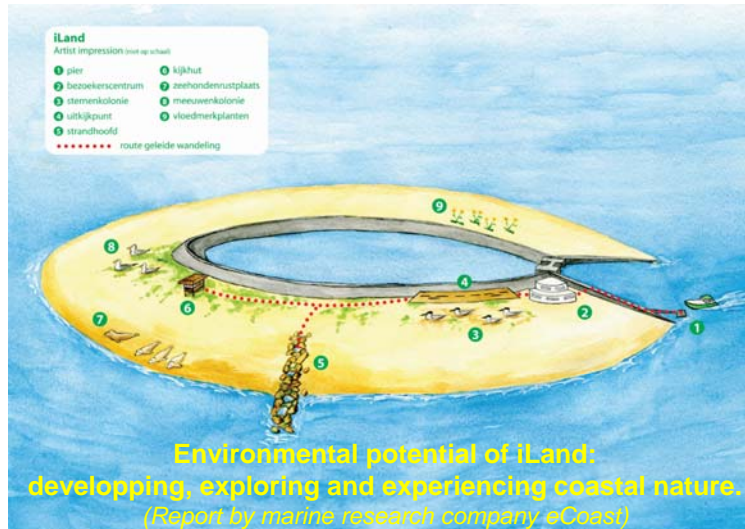
Figuur 4: Ligging ten opzichte van de zone voorzien voor domeinconcessies voor de bouw en exploitatie van installaties voor productie van elektriciteit uit water, stromen of winden

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## ILAND – BASE CASE



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## MORE INFO?

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