

Grontmij in Offshore Wind Energy





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Preamble

Imagine that all projects and new developments would be executed with a zero carbon footprint. Would we be able to prevent further climate change? We aim to raise this question with our clients and set an example in climate conscious behaviour. Grontmij executes numerous projects each and every year. In this way we deliver a significant contribution to mitigation of climate change, especially by designing and management of renewable energy projects for our clients.

In the light of mitigation of climate change, off shore wind energy projects are of prime importance to our society. Our ambitions in mitigation and adaptation to climate change, has led Grontmij to become active in a wide variety of wind energy projects, both onshore and offshore.

In offshore wind energy, Grontmij offers added value throughout the process of strategic consultancy, site selection, environmental impact assessment and permitting, design, engineering, procurement and contracting and multidisciplinary project management. The vast experience of our staff in all stages of development and realization of off shore wind farms puts us in a lead position in this sector.

This booklet presents a selection of our involvement in offshore wind energy projects for a variety of clients in the renewable energy industry.



Marc Kreft



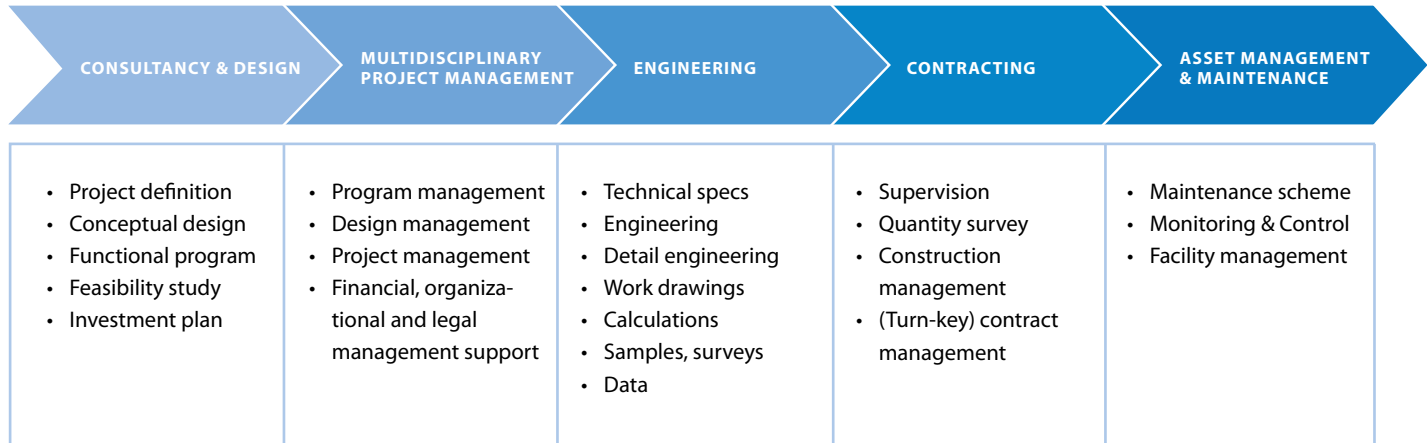
Herman Postma



Company Profile

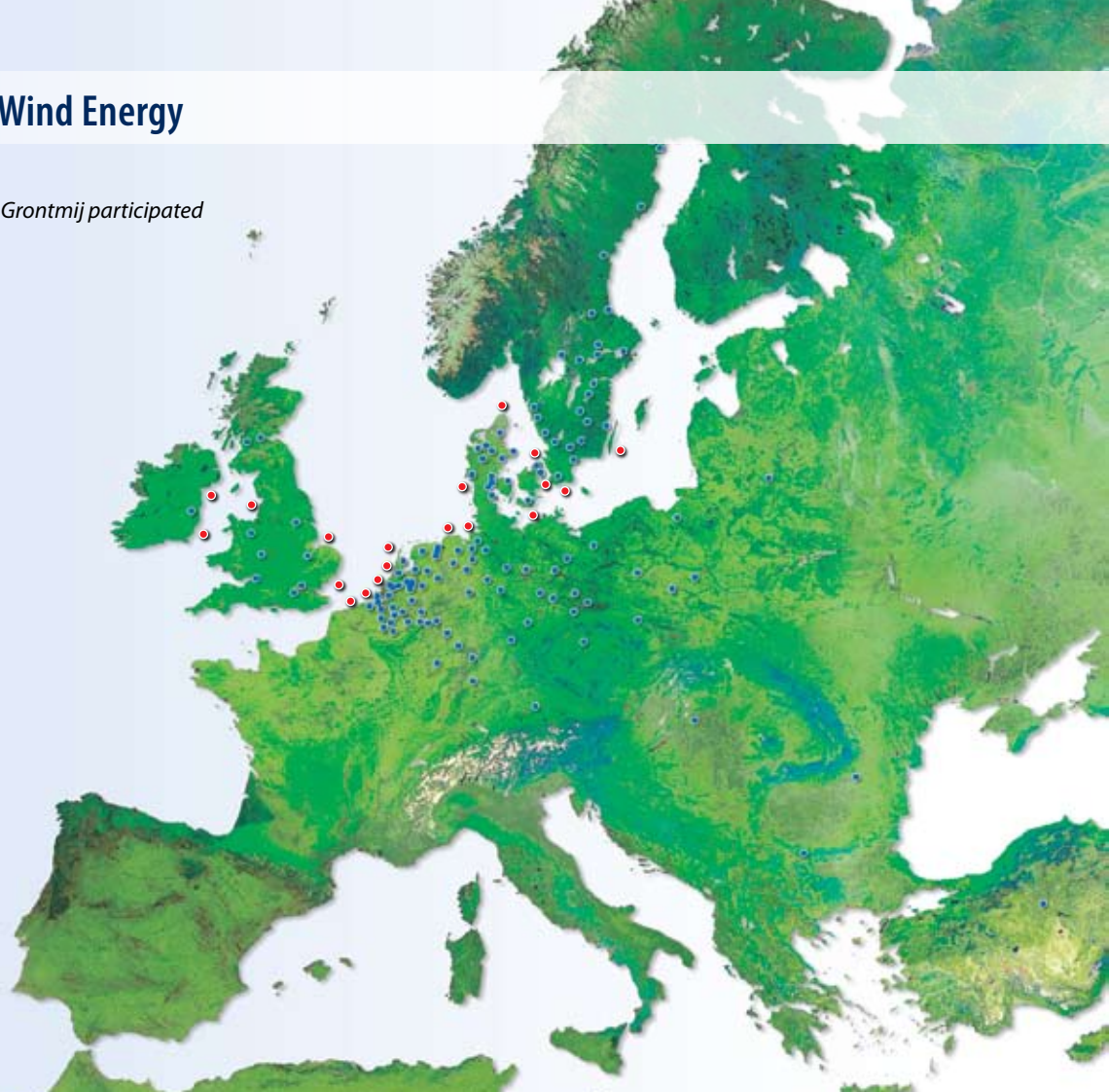
Grontmij is a multidisciplinary design, consultancy and engineering firm employing more than 8,000 professionals active in the environmental, water, energy, building, industrial and transportation sectors.

We aim to be the best service provider in North-West Europe and provide added value throughout the entire process of design, consulting, engineering, contracting and managing multidisciplinary projects.



Grontmij in Offshore Wind Energy

- Offshore wind farms in which Grontmij participated
- Grontmij offices



Project Development

- Development Strategy Advice
- Development Management
- Consents Management
- Stakeholder Management

Environmental Management

- Environmental Impact Assessment
- Site selection and Appraisal
- Stakeholder Management
- Environmental Permitting

Financial Engineering

- Due diligence
- Project feasibility and implementation,
- Business case analyses

Grid Connection

- Electrical Engineering
- Routing and Permitting
- Grid Connection Management

Design and Engineering

- Park design and optimisation
- Foundation design
- Evaluation of turbines and specifications

Geotechnical

- Geotechnical investigations
- Foundation engineering
- Subsea cabling

Wind Analysis and Data Management

- Review of wind data and energy output estimates
- GIS and Data Management
- Layout design, noise and shadow, wind turbine type selection (WindPro)

Tendering

- Tender specifications
- Project Management

Procurement and Contracting

- Contract Management
- Expediting
- Logistics



References Offshore Windfarms North-West Europe

The Netherlands

- Offshore Wind Farm Callantsoog - Noord
- Offshore Wind Farm Q10
- Offshore Wind Farm Katwijk/Beaufort
- Offshore Wind Farm IJmuiden
- Offshore Wind Farms The Haque I & II
- Offshore Wind Farm Egmond aan Zee
- Quick Scan Stimulation Offshore Wind Wind Energy

Belgium

- Offshore Wind Farm Atlantis

Denmark

- Offshore Wind Farm Rødsand 2
- Fish. Horns Rev Offshore Wind Park 2
- Assessment Fish Attraction
- Offshore Wind Farm Nysted
- Offshore Wind Farm Omø Stålgårde
- Offshore Wind Turbine Park Grenaa
- Offshore Wind Farm Middelgrunden

Sweden

- Offshore Wind Farm Kriegers Flak

United Kingdom

- Offshore Wind Accelerator
- Offshore Wind Farm Greater Gabbard
- Offshore Wind Farm Lynn and Inner Dowsing

Ireland

- Clogher Head Offshore Wind Farm

Germany

- Offshore Wind Farm Baltic I
- Offshore Wind Farm Alpha Ventus

France

- Offshore Wind Farm France

Offshore Wind Farm Callantsoog – Noord (The Netherlands)



Client: ENECO

Year: 2007 - 2008

The planned wind farm consists of 154 turbines of 3 MW (462 MW in total). Project management, site selection, drafting the EIA and necessary Permit Requests.

Services delivered:

- Strategic advice
- Project Management
- Permit Requests
- Environmental Impact Assessment

Offshore Wind Farm Q10 (The Netherlands)

Client: ENECO

Year: 2007 - 2008

The planned wind farm is to consist of 67 turbines of 3 MW (201 MW in total). Research on the environmental impact on birdlife, the landscape, morphology & hydrology, underwater life, shipping safety, seismic waves, radar, air traffic, functional uses and energy generation & emission reductions.

Services delivered:

- Strategic advice
- Project Management
- Permit Requests
- Environmental Impact Assessment



Offshore Wind Farm Katwijk/Beaufort (The Netherlands)



Client: NUON, Shell

Year: 2005 - 2006

The planned windfarm consists of 114 turbines of 3 MW (342 MW in total).

Services delivered:

- Project Management
- Permit Request

Offshore Wind Farm IJmuiden (The Netherlands)

Client: NUON, Shell

Year: 2005 - 2006

51 turbines of 3 MW (153 MW in total).

Services delivered:

- Project Management
- Environmental Impact Assessment



Offshore Wind Farms The Hague I & II (The Netherlands)



Client: NUON, Shell

Year: 2006

Wind farm The Hague I:

65 turbines of 3 MW (195 MW in total).

Wind farm The Hague II:

85 turbines of 3 MW (255 MW in total).

Services delivered:

- Project Management
- Environmental Impact Assessment

Offshore Wind Farm Egmond aan Zee (The Netherlands)

Client: Noordzeewind (NUON and Shell Wind Energy)

Year: 2001-2003

The first offshore wind farm in the Netherlands situated about 11 km from the Dutch coast, comprising 36 turbines of 3 MW each (total capacity 108 MW).

Grontmij was selected as the leading consultant to draft the environmental impact assessment study and to deliver supporting project management services

Services delivered

- Project Management
- Environmental Impact Assessment



Quick Scan Stimulation Offshore Wind Energy (The Netherlands)



Client: Province of North Holland

Year: 2004

Study executed for the Province of North Holland, investigating options to stimulate off shore wind energy.

Services delivered:

- Feasibility

Offshore Wind Farm Atlantis (Belgium)

Client: Air Energy

Year: 2008

Drafting the concession for a 220 MW offshore wind farm (44 turbines of 5 MW each).

Services delivered:

- Project Management
- Feasibility, environment and design



Offshore Wind Farm Rødsand 2 (Denmark)



Client: EON Vind AB

Year: 2007 - on-going

Rødsand 2 Offshore Wind Farm is situated in Denmark, south of the island Lolland, approximately 3 kilometres west of Nysted Offshore Wind Farm.

Services delivered:

- Total consultancy and basic design
- EIA
- Preparation and initialization of compensation negotiations

Fish. Horns Rev Offshore Wind Park 2

Client: EnergiE2

Year: 2005 - 2006

In connection with the planned new sea based wind farm at Horns Rev in the North Sea (Horns Rev 2) an EIA covering the fish and fish and fisheries in the area was carried out.

Services delivered:

Grontmij participated in this EIA by collection and compilation of background data (most of it from own earlier surveys in the area). Reporting and conclusions was also a part of the assignment.



Assessment Fish Attraction (Denmark)



Client: Dong Energy

Year: 2004

- Identify the possible effects from Sea Based Windmills on the marine fauna and examine the possible fish attraction to artificial sea based structures
- Test survey on fish distribution, fish stock and species composition based on acoustic methods (horizontal) and gill net fishing around turbine foundations at Nysted offshore wind farm.

Services delivered:

The services of Grontmij comprised development of new application methodology for acoustic echo sounders, in-situ testing, evaluation and reporting.

Offshore Wind Farm Nysted (Denmark)

Client: Dong Energy

Year: 2000 - 2003

Comprising 72 x 2.2 MW wind turbines. Based on our earlier conceptual evaluations we performed detailed design of gravity-based foundations and input to tender documents for a Design & Construct Contract. We assisted in tender evaluation and provided expert assistance to the supervision during construction.

Services delivered:

- Feasibility, design, Establishment of Design basis
- Conceptual design for gravity foundation of either concrete, composite or mono-piles
- Detailed design of gravity based foundation
- Preparation of Tender Documents.



Offshore Wind Farm Omø Stålgrunde (Denmark)



Year: 2000 - 2001

Establishment of 72 2.5 to 3.0 MW wind turbines. Omø Stålgrunde is located southwest of Stigsnæs in the Great Belt.

Services delivered:

- Establishment of Design basis
- Assistance with construction issues
- Assistance in preparing EIA
- Conceptual design for gravity foundation of either concrete, composite or mono-piles
- Preparation of Tender Documents

Offshore Wind Turbine Park Grenaa (Denmark)

Client: Jysk Vindkraft A/S

Year: 2000 - 2001

EIA of 18 MW offshore wind turbine park (nine turbines) at Kalkgrunden of the Port of Grenaa. In a joint-venture, ElsamProjekt and Grontmij carried out consultancy and project design for the builder, Jysk Vindkraft. Nine turbines are to be built, each of a height of 100 meters, with a capacity of 2 MW per turbine. The construction site covers an area of approx. 2.5 kilometres from the coast.

Services delivered:

- Evaluation



Offshore Wind Farm Middelgrunden (Denmark)



Client: SEAS (Dong Energy)

Year: 1997 - 2001

Establishment of an offshore wind farm consisting of 27 x of 1.65 MW wind turbines. Assessment of environmental conditions including blockage to water current in Øresund, ship impact, wave load, ice load, geotechnical conditions and feasibility study of the foundation for 27 x 1.65 MW wind turbines.

Services delivered:

- Conceptual design,
- Detailed design,
- Project management,

Offshore Wind Farm Kriegers Flak (Sweden)

Client: Vattenfall

Year: 2006 - 2010

On the Swedish part of the site 'Kriegers Flak' the power company Vattenfall is planning a 640 MW offshore wind farm constituting 128 pieces of 5 MW turbines. The water depths on the site vary between 15 and 42 m.

Services delivered:

- Foundation Design basis
- Tender preparation for geotechnical investigations
- Supervision of geotechnical investigations
- Feasibility of foundation concepts



Offshore Wind Accelerator (United Kingdom)

Offshore wind power: big challenge, big opportunity

Maximising the environmental,
economic and security benefits



Client: Carbon Trust in corporation with Airtricity,
DongEnergy, RWE Innogy, Scottish Power and
Statoil/Hydro

Year: 2009 - 2010

A research and demonstration program to develop and test new generation foundations for offshore wind farms in deeper waters (30m -60m).

Services delivered:

- Technical Project Management

Offshore Wind Farm Greater Gabbard (United Kingdom)

Client: Scottish and Southern Energy

Year: 2008

Assistance to owners Engineering Team

Services delivered:

- Review of Site Assessment
- Calculation of Wave Loads and combined wind turbine and wave loads



Offshore Wind Farm Lynn and Inner Dowsing (United Kingdom)



Client: Ballast Nedam

Year: 2006

Tender Design of foundations for a tendering contractor.

Services delivered:

- Screening of geotechnical information
- Prediction of combined Wind and Wave Design Loads
- Tender Design of Monopile Foundations
- Tender Design of Concrete Foundations

Clogher Head Offshore Wind Farm (Ireland)

Client: Airtricity

Year: 2002 - 2003

Desk-based pre-feasibility study of foundation works through marine and civil engineering assessment. Site at 20-50 m water depth and envisaged for a Phase 1 of 100 MW and Phase 2 of 400 MW. 3-4 MW wind turbines were assumed.

Services delivered:

- Concept evaluation of floating foundation structure
- Indicative costing estimated
- Preliminary Risk Assessment
- Recommended additional geotechnical and hydrographical site investigations



Offshore Wind Farm Baltic I (Germany)



Client: EnBW

Year: 2008

Tender and contract preparation as well as implementation supervision for offshore geotechnical investigations for the offshore windfarm.

Services delivered:

- Planning of full geotechnical investigation
- Contract preparation and negotiating
- Implementation supervision of offshore geotechnical investigations
- Design cost review

Offshore Wind Farm Alpha Ventus (Germany)

Client: Vattenfall

Year: 2008

Assistance to owners Engineering team.

Services delivered:

- Review of site assessment, design basis and
- Tender design



Offshore Wind Farm France (France)



Client: WPD

Year: 2008 - 2009

Conceptual Foundations Design was made for a 5 MW turbine on water depths in range of 21 – 28 meters including.

Services delivered:

- Concrete gravity based structure (GBS)
- Manufacturing site evaluation
- Installation evaluation

Colophon

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