



SHAPING THE FUTURE OF OFFSHORE WIND



Inspired by
renewable energy



A woman with long blonde hair, wearing a brown ribbed cardigan and a grey scarf, stands in a field of tall, golden-brown grass. She is looking upwards and to the left, with her eyes closed. The background shows a landscape of rolling dunes under a blue sky with scattered white clouds. The overall mood is serene and natural.

innogy SE is a leading European energy company. With its three business divisions Grid & Infrastructure, Retail and Renewables, innogy addresses the requirements of a modern, decarbonised, decentralised and digital energy world. We plan, build and operate plants to generate power and heat and extract energy from renewable sources. Our portfolio includes wind and hydro power plants as well as solar and biomass plants. Our aim is to expand our renewables business further, both on our own and working with partners.

Shaping the future of offshore wind

With involvement in the deployment of 2.5 GW¹⁾ of offshore wind capacity, we are one of the world's leading operators of offshore wind farms worldwide, trailblazing the industry since 2004. Together with investment partners, we own operational wind farms off the UK, German and Belgian coasts. As well as our offshore wind farms in operation we develop offshore projects worldwide. One of the key development projects is the 860 megawatts Triton Knoll offshore wind farm in the UK, for which innogy secured a route to market in 2017. In addition we have been awarded in the second German offshore auction the rights to build and operate the Kaskasi offshore wind farm in the German North Sea with an installed capacity of circa 325 megawatts.



"Realising the potential of offshore wind is crucial to meeting European and global renewable energy targets. The technological developments and innovation along with the cost reductions achieved in the offshore wind sector over recent years have confirmed it as a key part of the future energy mix."

Paul Cowling,
Director of Offshore Wind



"The expansion of renewable energy is one of innogy's main targets and offshore wind plays a vital role. We are already one of the worldwide leading offshore wind companies and we are growing further – in Europe and beyond. For this our strong operational portfolio and our highly skilled offshore professionals are the backbone."

Dr Hans Bunting,
Chief Operating Officer Renewables

We are one of the worldwide leading offshore wind companies

#1 Pioneer in the UK offshore industry –

In 2004 we built, and continue to operate, the UK's first ever commercial scale offshore wind farm, North Hoyle.

#5th largest offshore wind developer –

Our track record and portfolio means we are one of the world leaders in a dynamic global market.

Driving innovation and technology – We have a track record of installing bigger turbines, farther from shore and in deeper waters.

Growing supply chain – We are working hand in hand with local businesses to grow the regional supply chain.

Partner of choice in offshore wind – We have extensive experience of delivering flexible energy partnerships in the offshore wind sector.

¹⁾ This includes the total installed capacity of all offshore wind farms innogy has stakes in or was involved in the development and/or construction. The company has currently around 1,000 MW of installed offshore wind capacity (pro-rata view).

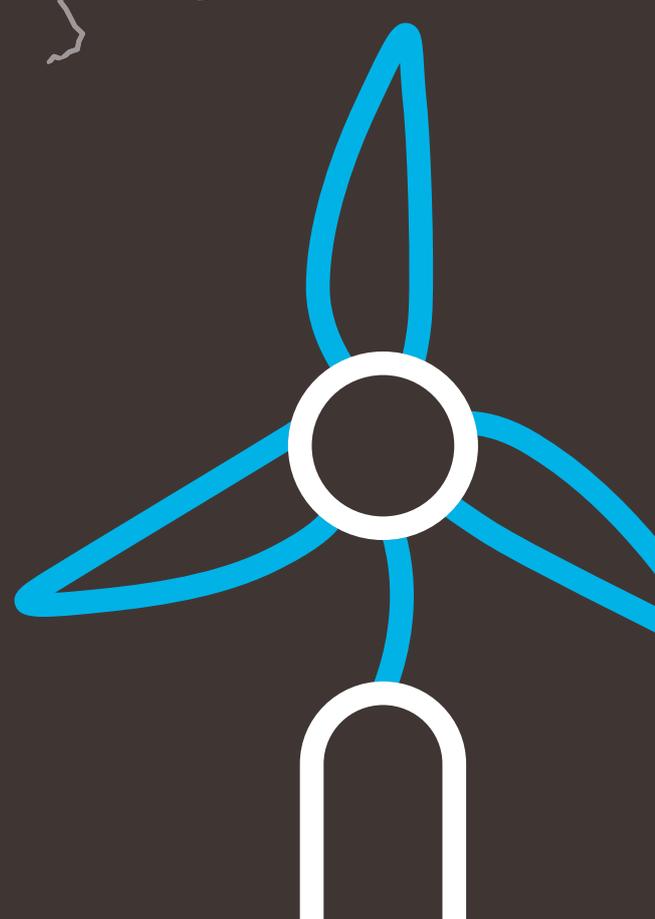


World leading operator of offshore wind farms

In operation

- 1. North Hoyle, UK, 60 MW***, (2004**)
 In July 2016, innogy SE sold its ownership interest in North Hoyle. innogy SE provides O&M services to North Hoyle offshore wind farm on behalf of the owner, Greencoat UK Wind PLC.
- 2. Rhyl Flats, UK, 90 MW***, (2009**)
 innogy SE (50.1%), Greencoat UK Wind PLC (24.95%), Green Investment Group (24.95%)
- 3. Greater Gabbard, UK, 504 MW***, (2012**)
 innogy SE (50%), SSE PLC (50%)
- 4. Thornton Bank I-III, BE, 325 MW***, (2013**)
 innogy SE (27%), C-Power Holdco (Belgian consortium of local companies) (54%), Marguerite (10%), EDF (8%), DEME and other
- 5. Nordsee Ost, GER, 295 MW***, (2015**)
 innogy SE 100%
- 6. Gwynt y Môr, UK, 576 MW***, (2015**)
 innogy SE (50%), Stadtwerke München (30%), Siemens (10%), Green Investment Group (10%)
- 7. Nordsee One, GER, 332 MW***, (2017**)
 innogy SE (13.5%), Northland Power Inc (85%), ENOVA (1.5%)
- 8. Galloper, UK, 353 MW***, (2018**)
 innogy SE (25%), Siemens Financial Services (25%), Sumitomo (12.5%), ESB (12.5%) and a consortium managed by Green Investment Group and Macquarie Infrastructure and Real Assets (25%)

*total installed capacity **completely commissioned



We have an excellent
end-to-end track record
across the entire offshore
wind value chain



Competences at all stages of the value chain

We bring a wealth of experience, knowledge and lessons learnt, throughout the project lifecycle from early stage development, through construction and into operations.

In the development phase we have specialists to deliver the consenting and permitting processes. We negotiate and work with suppliers through the contracting and procurement processes; we create detailed designs and carry out site optimisation with a focus on value maximisation and cost reduction; whilst ensuring that the project structure and risks meet investor and partner expectations.

In the construction phase we are well versed in delivering complex projects, carrying out end-to-end project and construction management processes and working with our project partners and suppliers to manage interfaces and risks.

In the operations phase we have built up an excellent track record as an operator. Over the last 15 years we have established ourselves as a trusted operations and maintenance (O&M) service partner for joint ventures. Our focus is on innovative O&M concepts which improve technical availability, performance and HSE management.



“Our experienced team is our greatest advantage. Our people transfer best practices and lessons learnt from project to project and bring the ideal technical and social competences to make your project a success.”

Jenneke Verhoef,
Head of Offshore Project Services CE

We deliver construction projects on time, budget and quality.

We handle financial and commercial risks.

We are successful in auction processes.

We operate a Safety First approach.



“We are very flexible in our partnerships. We are happy to deliver the development, construction and operational role within a project. This ensures that the project is managed to a high level and benefits from our experience, including valuable lessons learnt being applied. Equally we are very happy to participate in a joint venture with a minority share and deliver our experiences through a joint delivery team.”

Richard Sandford,
Director of Offshore Investment & Asset Management

Driving innovation and technology

We help to reduce the cost of renewables, making it possible to operate the assets economically and encourage a state of harmony between humans and the environment.



“An improved offshore foundation design has helped to reduce monopile installation times at Galloper offshore wind farm by half, compared to its sister project Greater Gabbard, constructed five years earlier. This is a fantastic example of how innovation and progress in this fast paced industry is significantly decreasing cost, risk and construction timescales.”

Johannes Rosen,
Head of Research & Development Renewables

We are reducing the levelised cost of energy (LCOE) of offshore wind with innovative solutions in many areas including:

- improved foundation and installation technologies
- improved energy yield forecasts
- reduction of transmission losses
- the use of condition monitoring systems (CMS) and predictive maintenance strategies

Improved installation method on the open sea

We have launched the “VIBRO” research project in collaboration with partners from industry and academia in Cuxhaven in order to reduce installation times and noise emissions during the construction of offshore wind farms. The findings of the project have shown that vibratory pile driving is an efficient alternative to the conventional method of hammering piles into the seabed when installing offshore foundations.

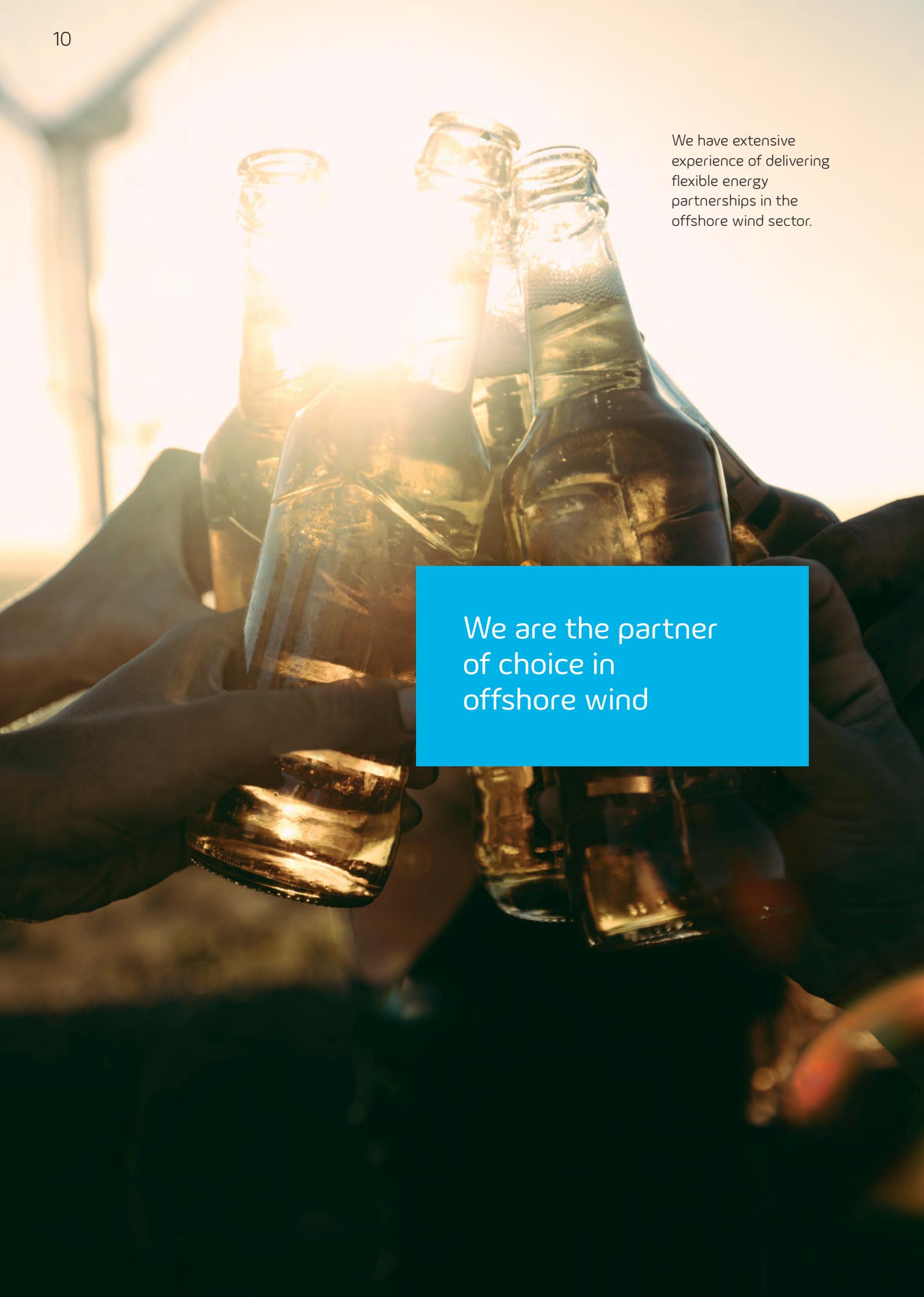
Alternative measurement method for wind data

innogy has been testing the use of innovative buoys to measure wind speeds in the Netherlands and the UK. Co-funded by the Carbon Trust and in cooperation with other operators we have given a number of manufacturers the opportunity to install their LIDAR buoys in the vicinity of our wind turbines. This project has shown that measurement buoys are capable of satisfying the criteria considered suitable for future commercial use.



We drive innovation





We have extensive experience of delivering flexible energy partnerships in the offshore wind sector.

We are the partner of choice in offshore wind

Collaboration



“We are very pleased to have partnered with a world class utility in innogy, who has provided significant expertise and manpower to support the development, construction and now operation of Nordsee One.”

John Brace,
Chief Executive Officer of Northland Power



“We are excited that innogy, with their extensive offshore wind experience, are on board with us in the development of the Dublin Array project. Once operational, Dublin Array will contribute to increasing the diversity of renewable energy supply in Ireland and will deliver much-needed clean electricity to Dublin.”

Aidan Forde,
Director of Saorgus Energy

Our offshore partnerships in development in operation

Nordsee One 
Northland Power Inc and ENOVA

Nordsee Two and Three 
Northland Power Inc and ENOVA

Rhyl Flats 
Greencoat UK Wind PLC and
Green Investment Group

Gwynt y Môr 
Stadtwerke München, Siemens and
Green Investment Group

Dublin Array 
Saorgus Energy

Greater Gabbard 
SSE PLC

Galloper 
Siemens Financial Services, Sumitomo,
ESB and a consortium managed by
Green Investment Group and Macquarie
Infrastructure and Real Assets

Thornton Bank 
C-Power consortium (Belgian consortium
of local companies), Marguerite, EDF, DEME
and other

North Hoyle 
innogy SE provides O&M services to
North Hoyle offshore wind farm on behalf
of the owner, Greencoat UK Wind PLC.

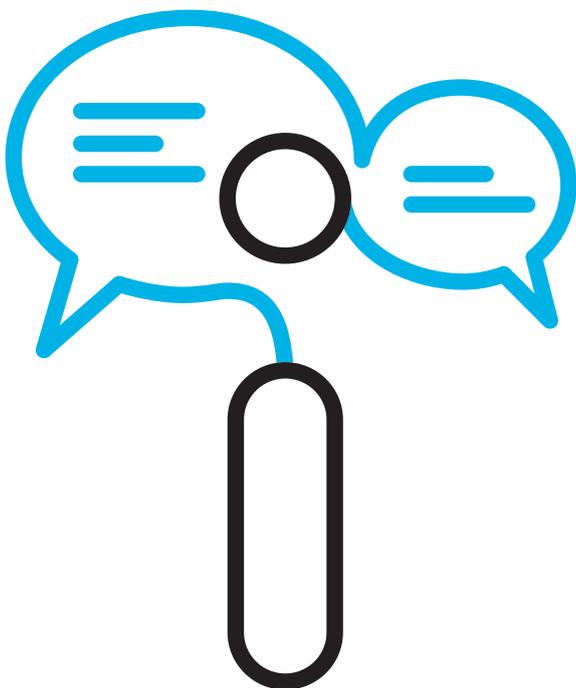
Triton Knoll 
Electric power Development Co. Ltd
(Operating under the name of J-Power),
Kansai Electric Power Co. Inc.

Growing supply chain

We are working hand in hand with local businesses to grow the national and regional supply chain. Our offshore projects support valuable economic investment and regeneration into coastal infrastructure and areas.



We are developing
offshore wind farms
in a number of
countries worldwide



Let's talk about offshore wind



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innogy continues to make significant progress to grow its renewable energy ambitions globally. We are expanding our traditional European offshore wind focus to explore global opportunities. Our aim is to actively pursue and unlock opportunities worldwide. We plan to do this by entering into partnerships with both global and local partners who we can work with throughout the full lifecycle of the project, from early development through to operations.



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Together with you
we want to expand
our offshore business





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