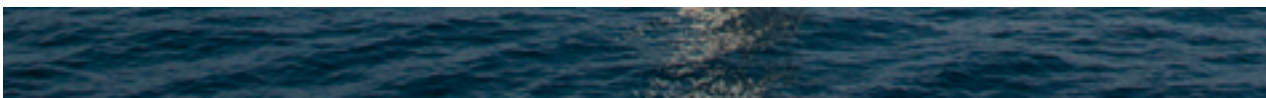
Offshore wind power projects

Answers for energy.

SIEMENS



Offshore projects

1 **Vindeby, DK, 1991**
11x 0.45 MW

2 **Middelgrunden, DK, 2000**
20x SWT-2.0-76

3 **Rønland, DK, 2002**
4x SWT-2.3-93

4 **Samsø, DK, 2002**
10x SWT-2.3-82

5 **Frederikshavn, DK, 2003**
1x SWT-2.3-82

6 **Rødsand I/Nysted, DK, 2003**
72x SWT-2.3-82

7 **Burbo Banks, UK, 2007**
25x SWT-3.6-107

8 **Lillgrund, SE, 2007**
48x SWT-2.3-93

9 **Lynn/Inner Dowsing, UK, 2008**
54x SWT-3.6-107

10 **Rhyl Flats, UK, 2009**
25x SWT-3.6-107

11 **Gunfleet Sands, UK, 2009**
48x SWT-3.6-107

12 **Horns Rev II, DK, 2009**
91x SWT-2.3-93

13 **Hywind, NO, 2009**
1x SWT-2.3-82

14 **Rødsand II, DK, 2010**
90x SWT-2.3-93

15 **Baltic I, DE, 2010**
21x SWT-2.3-93

16 **Pori, FIN, 2010**
1x SWT-2.3-101[2]

17 **Walney, UK**[1]
51x SWT-3.6-107, 51x SWT-3.6-120

18 **Gwynt y Môr, UK**[1]
160x SWT-3.6-107

19 **Lincs, UK**[1]
75x SWT-3.6-120

20 **Sheringham Shoal, UK**[1]
88x SWT-3.6-107

21 **Greater Gabbard, UK**[1]
140x SWT-3.6-107

22 **London Array, UK**[1]
175x SWT-3.6-120

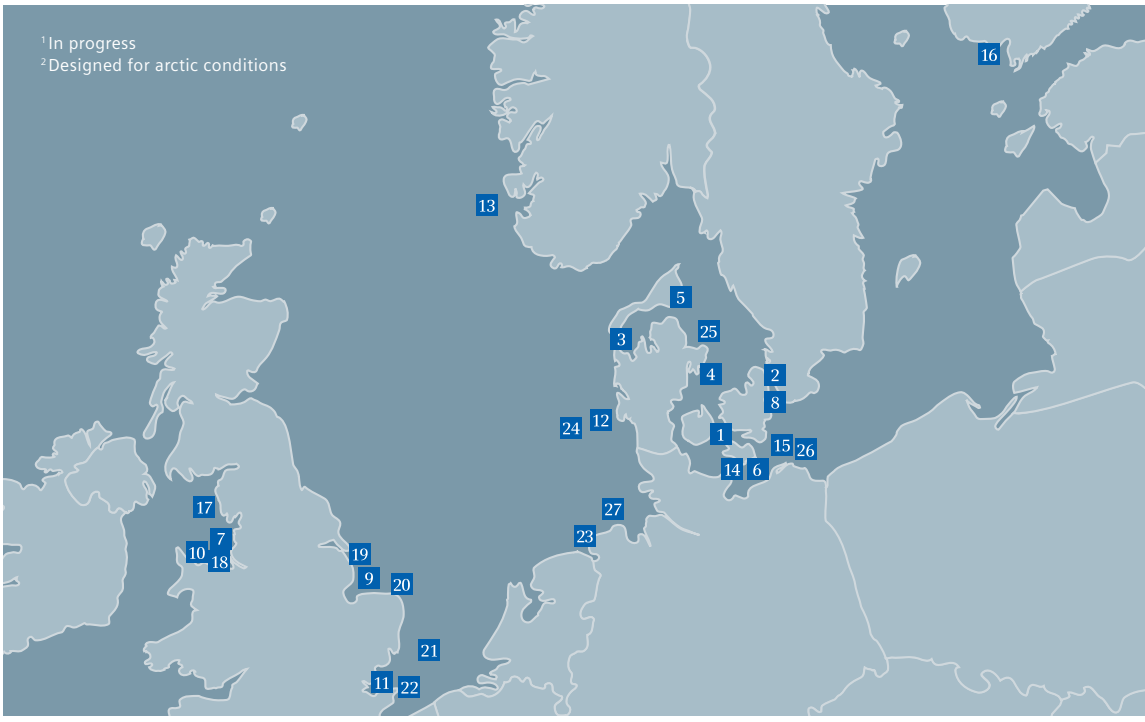
23 **Borkum Riffgat, DE**[1]
30x SWT-3.6-107

24 **Dan-Tysk, DE**[1]
80x SWT-3.6-120

25 **Anholt, DK**[1]
111x SWT-3.6-120

26 **Baltic II, DE**[1]
80x SWT-3.6-120

27 **Borkum Riffgrund I, DE**[1]
77x SWT-3.6-120



When it comes to offshore wind power, no supplier can match Siemens in experience and stability, with more than 650 offshore wind turbines already installed. Siemens has a proven and unique offshore track record, ranging from the world's first offshore wind farm 20 years ago to today's largest offshore projects. All projects have been delivered on time and on budget, and have recorded high availability. Furthermore, all turbines are still in operation. Optimized processes across the complete project life cycle make Siemens a stable, reliable, and trustworthy business partner.

Siemens has not only supplied the world's first but also the world's largest offshore projects. The 165-MW Nysted offshore wind farm held the record as the largest offshore project for several years. This record was broken again when the 200-MW Horns Rev II project was commissioned.

The 500-MW Greater Gabbard project, currently in progress in the UK, will raise the bar again. And the world's first 1-GW wind turbine project, London Array, would represent yet another stride toward large-scale green energy supply. All record-breaking projects – and all featuring Siemens wind turbines.

Total Siemens Offshore Capacity

Installed*: 1,962.6 MW

Turbine types	Installed*
450 kW	5 MW
2.0 MW	40 MW
SWT-2.3	780 MW
SWT-3.6	1,137.6 MW

* as of June 2011

Projects in progress

Borkum Riffgat, Germany
Location: Northwest coast of Germany, North Sea
Installed capacity: 108 MW
Scope of supply: 30x SWT-3.6-107
Distance to shore: 29 km
Water depth: 18–23 m
Operator: EWE

Baltic II, Germany
Location: North coast of Germany, Baltic Sea
Installed capacity: 288 MW
Scope of supply: 80x SWT-3.6-120
Distance to shore: 31 km
Water depth: 20–42 m
Operator: EnBW

Lincs, UK
Location: East coast of England, North Sea
Installed capacity: 248.4 MW
Scope of supply: 75x SWT-3.6-120
Distance to shore: 9 km
Water depth: 8–18 m
Operator: Centrica, DONG Energy

Borkum Riffgrund I, Germany
Location: Northwest coast of Germany, North Sea
Installed capacity: 277.2 MW
Scope of supply: 77x SWT-3.6-120
Distance to shore: 55 km
Water depth: 23–29 m
Operator: DONG Energy

Gwynt y Môr, UK
Location: North Wales, Irish Sea
Installed capacity: 576 MW
Scope of supply: 160x SWT-3.6-107
Distance to shore: 13 km
Water depth: 12–33 m
Operator: RWE npower renewables

Anholt, Denmark
Location: Near Anholt, Kattegat
Installed capacity: 400 MW
Scope of supply: 111x SWT-3.6-120
Distance to shore: 21 km
Water depth: 14–17 m
Operator: DONG Energy

Sheringham Shoal, UK
Location: East coast of North Norfolk, England in the UK
Installed capacity: 317 MW
Scope of supply: 88x SWT-3.6-107
Distance to shore: 17 km
Water depth: 14–20 m
Operator: Statoil, Statkraft

Walney, UK
Location: Walney Island, Northeastern coast of England, Irish Sea
Installed capacity: 367.2 MW
Scope of supply: 51x SWT-3.6-107 and 51x SWT-3.6-120
Distance to shore: 14 km
Water depth: 19–24 m
Operator: DONG Energy

London Array, UK (phase 1)
Location: Outer Thames Estuary, North Sea
Installed capacity: 630 MW
Scope of supply: 175 turbines
Distance to shore: 20 km
Water depth: 2–23 m
Operator: DONG Energy, E.ON, and Masdar

Greater Gabbard, UK
Location: Thames Estuary, North Sea
Installed capacity: 504 MW
Scope of supply: 140x SWT-3.6-107
Distance to shore: 25 km
Water depth: 8 m
Operator: Scottish and Southern Energy, RWE npower renewables

Dan-Tysk, Germany
Location: Northwest coast of Germany, North Sea
Installed capacity: 288 MW
Scope of supply: 80x SWT-3.6-120
Distance to shore: 70 km
Water depth: 30 m
Operator: Vattenfall

References

1991
Vindeby, Denmark
Location: near Lolland, Baltic Sea
Installed capacity: 4.95 MW
Scope of supply: 11x 450
Distance to shore: 1.5 km
Water depth: 3–7 m
Operator: DONG Energy

The world's first offshore wind power plant was constructed 1.5 km off the Danish coast, near the port of Vindeby ("windy city" in Danish). To protect against corrosion, the turbines were built with airtight towers and nacelles, and are cooled by heat exchangers.

2000
Middelgrunden, Denmark
Location: near Copenhagen, Øresund
Installed capacity: 40 MW
Scope of supply: 20x 2.0
Distance to shore: 3.5 km
Water depth: 2–6 m
Operator: DONG Energy, Middelgrundens Vindmøllelaug

Middelgrunden was established in the autumn of 2000 on a natural reef with 3–8 meters water depth, 3.5 km outside Copenhagen harbor. This offshore wind farm is one of the largest in the world based on cooperative ownership.

2002
Samsø, Denmark
Location: near Samsø, Kattegat
Installed capacity: 23 MW
Scope of supply: 10x SWT-2.3-82
Distance to shore: 3.5 km
Water depth: 12–18 m
Operator: Samsø Havvind A/S

The Danish island of Samsø has produced renewable energy far in excess of the local energy consumption. The key reason for that remarkable fact is the locally owned offshore wind farm installed by Siemens.

2003
Rødsand I (Nysted), Denmark
Location: Southern Denmark, Baltic Sea
Installed capacity: 165.6 MW
Scope of supply: 72x SWT-2.3-82
Distance to shore: 6–10 km
Water depth: 6–9 m
Operator: DONG Energy, E.ON Sweden

The wind farm itself is made up of eight rows of nine turbines each. The 72 wind turbines annually have generated enough power to supply 145,000 homes with environmentally friendly energy.

2007
Burbo Bank, UK
Location: Liverpool Bay, Irish Sea
Installed capacity: 90 MW
Scope of supply: 25x SWT-3.6-107
Distance to shore: 7–12 km
Water depth: 7–12 m
Operator: DONG Energy

Burbo Bank is exposed to the full force of the wind from the west. The Irish Sea and its shifting sands were once feared by sailing ships, whereas today these winds and shallow waters make it an ideal location for offshore wind turbines.

Lillgrund, Sweden
Location: near Malmö, Øresund
Installed capacity: 110 MW
Scope of supply: 48x SWT-2.3-93
Distance to shore: 6–7 km
Water depth: 4–13 m
Operator: Vattenfall

The Lillgrund wind farm began operation in June 2008. It is located off the coast of southern Sweden, just south of the Øresund Bridge. With its 48 wind turbines, Lillgrund is Sweden's largest offshore wind farm and one of the largest in the world. The wind farm has generated 0.33 TWh of power annually.

2008
Lynn/Inner Dowsing, UK
Location: East coast of England, North Sea
Installed capacity: 194.4 MW
Scope of supply: 54x SWT-3.6-107
Distance to shore: 5–6 km
Water depth: 6–13 m
Operator: Centrica

Lynn and Inner Dowsing are two adjacent wind farms constructed five kilometers off the Lincolnshire coast east of Skegness. Together they have an installed capacity of 194 MW and are expected to provide enough power to meet the annual demand of more than 130,000 homes.

2009
Hywind, Norway
Location: North Sea, Norway
Installed capacity: 2.3 MW
Scope of supply: 1x SWT-2.3-82
Distance to shore: 12 km
Water depth: 220 m
Operator: Statoil-Hydro

Hywind is the world's first full-scale floating wind turbine.

2009
Horns Rev II, Denmark
Location: Blåvandshuk, North Sea
Installed capacity: 209.3 MW
Scope of supply: 91x SWT-2.3-93
Distance to shore: 27–35 km
Water depth: 9–17 m
Operator: DONG Energy

Gunfleet Sands, UK
Location: Thames Estuary, North Sea
Installed capacity: 172.8 MW
Scope of supply: 48x SWT-3.6-107
Distance to shore: 7–9 km
Water depth: 0.4–11 m
Operator: DONG Energy

Rhyl Flats, UK
Location: North Wales, Irish Sea
Installed capacity: 90 MW
Scope of supply: 25x SWT-3.6-107
Distance to shore: 8–10 km
Water depth: 6.5–12 m
Operator: RWE npower renewables

2010
Rødsand II, Denmark
Location: Southeast Denmark, Baltic Sea
Installed capacity: 207 MW
Scope of supply: 90x SWT-2.3-93
Distance to shore: 25 km
Water depth: 5.5–12 m
Operator: E.ON Sweden

Pori, Finland
Location: West coast of Finland, Baltic Sea
Installed capacity: 2.3 MW
Scope of supply: 1x SWT-2.3-101, designed for arctic conditions
Distance to shore: 1.5 km
Water depth: 10 m
Operator: Suomen Hyötytuuli Oy

Baltic I, Germany
Location: Northeast Germany, Baltic Sea
Installed capacity: 48.3 MW
Scope of supply: 21x SWT-2.3-93
Distance to shore: 7 km
Water depth: 16–19 m
Operator: EnBW

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Renewable Energy Division
Order No. E50001-W310-A135-V2-4A00
Printed in Germany
Dispo 34804, c4bs No. 7491
fb 4083 WÜ WS 06112.5

Printed on elementary chlorine-free
bleached paper.

www.siemens.com/energy