Wind turbine loading operation at the DanTysk Wind Farm.

10.1%

The growth of the total wind power capacity in the EU in 2014

WIND ENERGY BAROMETER

A study carried out by EurObserv'ER.

The 2014 global wind energy market surged and set a new record after the previous year's slowdown. More than 52 GW of capacity was installed across the world compared to a little less than 37 GW in 2013. Global wind energy took a 41.4% leap in 2014 to culminate in more than 371 GW of installed capacity.

52.1 GW

Worldwide wind power capacity installed during 2014

12.4 GW

Wind power capacity installed in the EU during 2014

WIND ENERGY BAROMETER – **EUROBSERV'ER** – FEBRUARY 2015

In less than 20 years of research and innovation, wind energy has become one of the most popular technologies for building new electricity generating capacities. Onshore wind power is now regarded as a mature, competitive and reliable technology capable of providing a major share of the world's electricity mix. Similar R&D efforts are now being invested in the offshore wind energy segment and are expected to deliver competitive results within the coming decade.

MORE THAN 52 GW OF WIND TURBINE CAPACITY INSTALLED WORLDWIDE

ASIA HAS 1 OF EVERY 2 MW OF WIND POWER CAPACITY INSTALLED

First estimates put global installed wind energy capacity for 2014 at about 52 129 MW **(table 1 and graph 1)**, which adds up to 371 191 MW of installed capacity to date. Good performances of the Asian and European markets and also the American market's recovery are responsible for this sharp hike in the global market, which was badly hit in 2013 when the USA market took a nosedive as a result of the country's main wind energy incentive system's extremely late extension.
Asia, as in 2013, was the largest wind energy market and is home to more than half (50.2%) of the world's newly installed capacity **(graph 2A)**. Europe still accounts for more than a quarter of the global market (25.8%) followed by the North American market with 13.9%. Capacity build-up in the emerging South American, African and Pacific region countries consolidated in 2014 and they now hold 10.1% of the global market between them. As for total installed capacity to date **(graph 2B)**, Asia has overtaken Europe as the leading wind energy installation region, and now tops Europe's 36.5% share of the world's fleet with 38.3%. North America is still in third place with a 21% share.

CHINA, GERMANY AND THE USA ON THE PODIUM

The top three wind energy markets are also the top economic performers on their continents. The GWEC (Global Wind Energy Council) annual report notes that China single-handedly installed 23 351 MW (provisional figure) that is almost 45% of the global market. Germany is still runner-up. Its Environment Ministry's working group AGEE-Stat has provisionally announced a new installation record of almost 6 187 MW for 2014. The number three market, the USA, found some of its previous form in 2014, despite the eleventh-hour extension of the Production Tax Credit, voted at the end of 2014 applicable retroactively over the previous twelve months. The AWEA (American Wind Energy Association) claims that in 2014 the USA installed 4 854 MW, and of that figure 3 597 MW was installed during the final quarter. The figure is four times more than in 2013, but pales by comparison with its 2012 record of about 13 000 MW. Yet for the first time new renewably-sourced electricity generating capacity outstripped gas-fired power plant capacity thus setting a landmark precedent. The FERC (Federal Energy Regulatory Commission) reports in 2014 that renewable energies accounted for an additional 49.8% of generating power (7 663 MW), compared to 48.7% for gas-fired power plants. The wind farm contribution was more than a quarter of that installed capacity.

EUROPEAN UNION HOLDS ONTO ITS RANKING...

... THANKS TO GERMANY

The European electricity sector's crisis did not prevent the European Union from improving slightly on its 2012 record to set a new wind energy capacity installation record. However the trend does not signal steady sustained increase in capacity installation, which has hovered around the 12 GW mark since 2012. EurObserv'ER puts the newly installed capacity for 2014 at 12 442.9 MW and decommissioned capacity at about 463 MW **(table 2)**. By the end of the year, the EU wind energy fleet had passed the 130 GW mark with 130 389.4 MW.
This apparent market stability conceals sharp country divergences. The German market's surge in 2014 masks the slowdown in certain European markets. Although the DECC (Department of Energy & Climate Change) figures were incomplete in January (see below), the 2014 performance of the UK market, buoyed as it is by offshore wind energy, appears to have slipped. Central Europe's markets, as expected, were fairly flat in 2014. The Polish and Romanian markets that both approached the one-GW threshold in 2013, showed a net turndown by installing about 440 MW each. Italy's market, where a little over 100 MW installed was almost at a standstill, and was hardly better than Spain that installed less than 30 MW. In contrast the Swedish and French markets managed to exceed the one GW threshold, and other good performers were Austria, Ireland and Greece. The per capita wind energy capacity indicator that makes abstraction of a country's size is more representative of the real importance of wind energy. The ranking changed between 2014 and 2013. While Denmark is still in first place with 862 kW/k inhabitants, it is now followed by Sweden (562 kW/k inhab.) and Germany (501 kW/k inhab). Spain (494 kW/k inhab.) has been relegated to fourth place with Ireland and Portugal close at its heels. France is ranked fifteenth in the European Union with 145 kW/k inhabitants on this basis.

NOT LONG TO GO BEFORE THE EU HAS 10 GW INSTALLED OFFSHORE

Did offshore wind energy break its installation record in 2014? The answer depends on the indicators, and on whether you take into account installed wind turbines ready to work or those that are hooked up to the grid. The gap between them has widened now that a major part of Germany's offshore wind turbine fleet

Methodology note

It should be pointed out that the sources used to create the indicators of this theme-based barometer (listed at the end of the survey) may differ from those used in our recent publication: *The state of renewable energies In Europe, 2014 edition*. EurObserv'ER prefers to use the same source for the two years it is presenting in the interests of statistical consistency and to chart market trends more accurately. This choice may explain the slight differences from the indicators previously published sourced from official bodies that will become available later on in the year.

Tabl. n° 1

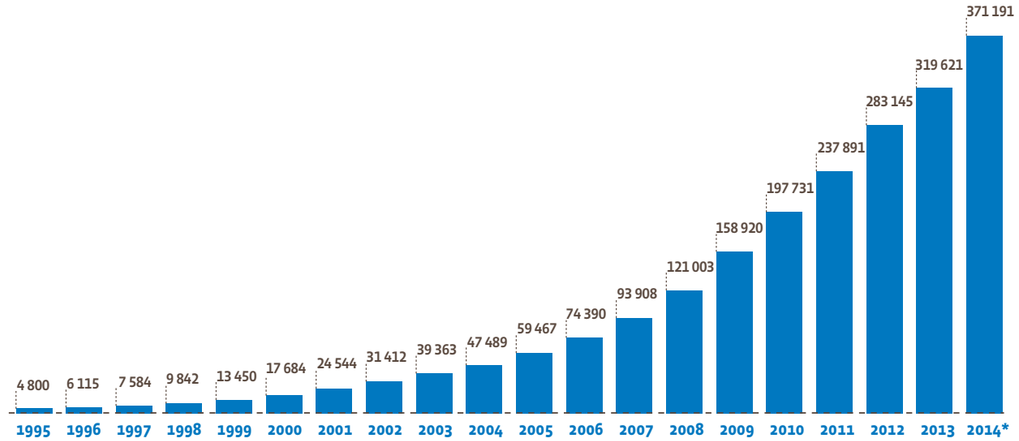
Worldwide installed wind power capacity at the end of 2014* (MW)

	2013	2014	Capacity installed in 2014	Decommissioning in 2014
European Union	118 409.5	130 389.4	12 442.9	463.0
Rest of Europe	4 188.6	5 216.8	1 028.2	0.0
Total Europe	122 598.1	135 606.2	13 471.1	463.0
United States	61 110.0	65 879.0	4 854.0	85.0
Canada	7 823.0	9 694.0	1 871.0	0.0
Mexico	1 859.0	2 381.0	522.0	0.0
Total North America	70 792.0	77 954.0	7 247.0	85.0
China	91 412.0	114 763.0	23 351.0	0.0
India	20 150.0	22 465.0	2 315.0	0.0
Japan	2 669.0	2 789.0	130.0	10.0
Other Asian countries	1 737.0	2 102.0	365.0	0.0
Total Asia	115 968.0	142 119.0	26 161,0	10.0
Africa & Middle East	1 612.0	2 545.0	934.0	1.0
Latin America	4 777.0	8 526.0	3 749.0	0.0
Pacific region	3 874.0	4 441.0	567,.0	0.0
Total world	319 621.1	371 191.2	52 129.1	559.0

*Estimate. **Sources: EurObserv'ER 2015 (European Union figures)/AWEA 2015 for United-States, GWEC 2015 (others)***

Graph. n° 1

Total cumulative wind power capacity installed worldwide since 1995 (MW)



*Estimate. **Source: EurObserv'ER 2015***

WIND ENERGY BAROMETER – **EUROBSERV'ER** – FEBRUARY 2015

In 2014, the UK connected the entire West of Duddon Sands offshore Wind Farm to the grid.

is awaiting connection because of delays in setting up the connection infrastructures. EurObserv'ER has included this capacity awaiting hook-up in its statistics in the interest of representing the market fairly. On this basis the European Union year-on-year offshore wind energy installation increase was at least 2 250 MW in 2014, compared to the 1 817 MW year-on-year increase in 2013. This would put the EU's installed offshore capacity to date at 9 243 MW by the end of 2014, which equates to 7.1% of its total wind energy capacity.

Only three EU countries – Germany, the UK and Belgium – added to their offshore wind energy capacity in 2014. Germany had the highest installation figure, while the UK hooked up the greatest amount of offshore capacity over the twelve months. According to AGEE-Stat's provisional figures, Germany's offshore installation effort increased by 1 437 MW to take the country's fleet to 2 340 MW. The EWEA report entitled "The European Offshore Wind Industry", published in January 2015, distinguishes the wind farms that only installed wind turbines from those that went on-grid. Germany has now fully connected two wind farms – Meerwind Süd/Ost – and partly connected the turbines of the DanTysk, Global Tech 1 and Nordsee Ost wind farms. It has installed the Baltic 2, Borkum Riffgrund I, Butendiek and Trianel Windpark Borkum wind turbines that are awaiting connection.

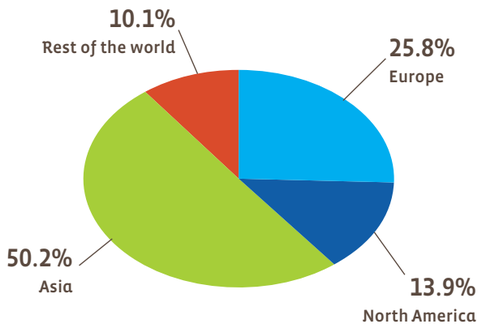
In the case of the UK, the official data published by DECC (Department of Energy & Climate Change) is still incomplete as it only covers the first three quarters of 2014. It reports 724 MW of additional offshore capacity, which takes the total to 4 420 MW. For its part the EWEA report puts total UK capacity hooked up to the grid in 2014 at 4 494.4 MW. The UK has completed connection of the West of Duddon Sands and Methil Demo offshore wind farms, and has partly connected the Gwent y Môr and Westermost wind farms. The third and last country to have installed offshore wind turbines in 2014, Belgium, has completed connection of the Northwind wind farm taking its total offshore capacity to 712 MW.

THE EUROPEAN UNION'S WIND TURBINES GENERATED 247 TWH OF POWER IN 2014

The increase in the EU's installed capacity naturally led to a rise in wind power output. The data available to EurObserv'ER indicates that output only rose by 5.3% in 2014 to 247 TWh. This is a much

Graph. n° 2A

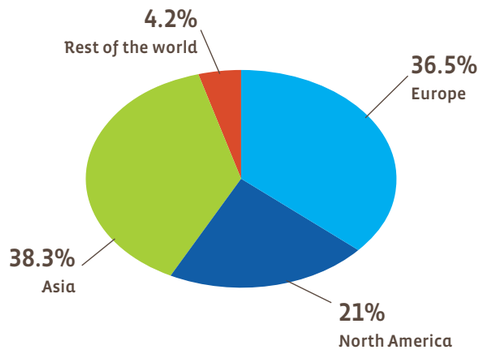
World wind turbine market breakdown for 2014*



*Estimate. **Source: EurObserv'ER 2015**

Graph. n° 2B

Cumulative breakdown as the end of 2014*



*Estimate. **Source: EurObserv'ER 2015**

Tabl. n° 2

Installed wind power capacity in the European Union at the end of 2014* (MW)

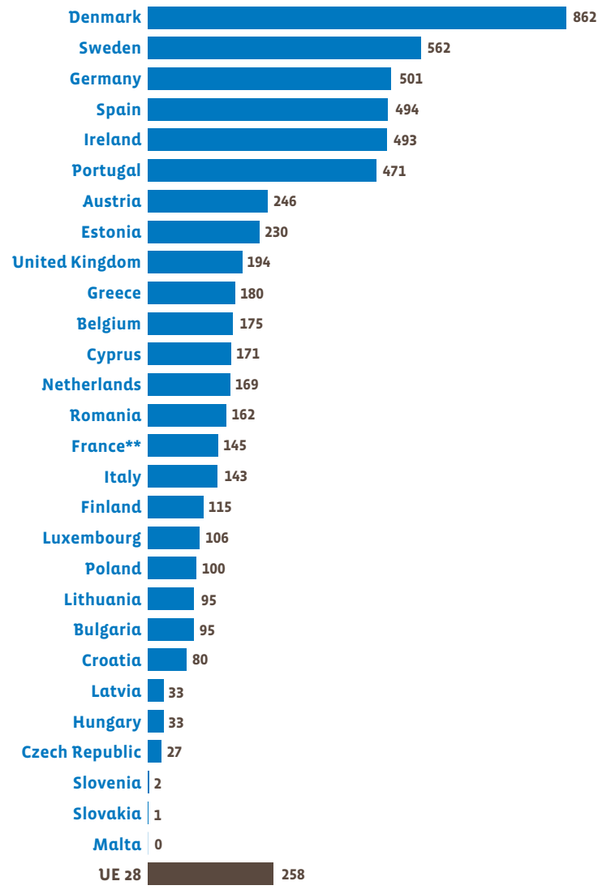
	Cumulative capacity at the end of 2013	Cumulative capacity at the end of 2014*	Capacity installed in 2014*	Decommissionned in 2014*
Germany	34 660.0	40 456.0	6 187.0	391.0
Spain	22 959.0	22 986.5	55.0	27.5
United Kingdom**	11 209.0	12 474.5	1 265.5	0.0
France***	8 243.0	9 285.0	1 042.0	0.0
Italy	8 557.4	8 662.4	107.5	2.6
Sweden	4 381.9	5 425.1	1 050.2	7.0
Portugal	4 731.0	4 914.4	183.4	0.0
Denmark	4 810.0	4 849.0	68.0	29.0
Poland	3 389.5	3 834.0	444.5	0.0
Romania	2 783.0	3 221.0	438.0	0,0
Netherlands	2 713.0	2 852.0	139.0	0.0
Ireland	2 049.3	2 271.7	222.4	0.0
Austria	1 684.0	2 095.0	411.0	0.0
Greece	1 809.0	1 979.8	170.8	0.0
Belgium	1 653.0	1 959.0	306.0	0.0
Bulgaria	676.7	686.8	10.1	0.0
Finland	449.0	627.0	184.0	6.0
Croatia	254.5	340.2	85.8	0.0
Hungary	329.0	329.0	0.0	0.0
Estonia	248.0	302.7	54.7	0.0
Lithuania	278.8	279.3	0.5	0.0
Czech Republic	262.0	278.6	16.6	0.0
Cyprus	146.7	146.7	0.0	0.0
Latvia	67.0	67.0	0.0	0.0
Luxembourg	58.3	58.3	0.0	0.0
Slovakia	5.0	5.0	0.0	0.0
Slovenia	2.4	3.4	1.0	0.0
Malta	0.0	0.0	0.0	0.0
Total EU 28	**118 409.5**	**130 389.4**	**12 442.9**	**463.0**

*Estimate. **Provisional figures in Q3 2014. ***Overseas departments not included for France. **Source: EurObserv'ER 2015**

WIND ENERGY BAROMETER – **EUROBSERV'ER** – FEBRUARY 2015

Graph. n° 3

Wind power capacity per 1,000 inhabitants in the EU in 2014* (kW/1,000 inhab.)



Estimate. **Overseas departments not included for France.* ***Source: EurObserv'ER 2015*

slower pace than the previous year, when the wind conditions across Southern Europe were much more favourable.
Nonetheless wind energy's share of the EU electricity mix increased and should stand at 7.5% of electricity consumption compared to 7.1% in 2013. The leading wind energy producers are Germany (56 TWh), Spain (51.1 TWh) and the UK (31.5 TWh).

NEWS FROM AROUND THE COUNTRIES

Germany's Energiewende enters a new phase

Wind energy expanded in Germany to make a new record. According to AGEE-Stat, 6 187 MW of capacity was installed during 2014, including 1 437 MW off-shore. If we take into account the decommissioned capacity (put at 391 MW), the German fleet's total capacity now stands at 40 456 MW. No doubt the reason for this strong build-up, which we observed in 2013, is that developers wanted to install as many wind turbines as possible before the roll-out of the renewable energy law reform which took effect on 1 August 2014. The guaranteed Feed-in Tariff for >500 kW installations has been abolished and the direct sales plus market premium system that had been optional since 2012, is now all-embracing. The new law also restricts the future development of the onshore wind energy sector by setting up an annual installation corridor of 2 400-2 600 MW. Furthermore the law has downscaled its offshore installation targets to 6 500 MW by 2020 and 15 000 MW by 2030.

The direct market sales system aims to ease renewable energy integration into the electricity-generating market while boosting the competitiveness of the production means. The producers are encouraged to adopt virtuous behaviour by meeting the system's needs, by improving the accuracy of their forecasts and incorporating technical installation management systems to ensure more flexible grid injection. Under the terms of this mechanism, wind energy producers (or their electricity sales representative) take responsibility for selling the output. To maintain the balance, they are obliged to guarantee their production forecasts one day in advance and contribute towards the costs arising from electricity market supply and demand adjustment measures. In the event of failure to fulfil obligations, the grid manager invoices the energy producer for the required adjustment.
In addition to selling electricity on the market, renewable electricity sellers are reimbursed the difference between the installation-specific Feed-in Tariff and the mean monthly price on the EPEX SPOT exchange, by means of a market premium. An additional management premium reimburses the costs incurred by direct sales (forecasts, marketing costs, etc.).
The new EEG law introduces other elements such as the provision to initiate a tendering system in Germany no later than 2017, with the possibility of trialling tenders before that date. The country plans to open its support mechanisms to other countries of Europe (via tendering procedures), thereby opening up to 5% of its annual capacities to the external market.

French wind energy bounces back

After four successive years of decline, the capacity of installations hooked up to the grid during 2014 took a great leap and passed the one-gigawatt mark. According to France Énergie Éolienne (FEE), which represents French wind energy interests, it reached 1 042 MW, which equates to a total of 9 285 MW capacity connected to date. The association ascribes this progress to more positive policies. Several key measures have been adopted, such as securing the statutory Feed-in Tariff and adopting the Brottes Law (2013), which abolished the wind development zones (ZDE) and the 5-mast threshold for wind farm construction. These legal simplifications have been quick to pay off.
While the political will to support wind energy is abundantly clear, the French sector is anxious about its government's plan to abandon the guaranteed Feed-in Tariff system for a market sales based system on 1 January 2016. The FEE claims that to guarantee investors' confidence and encourage further development it is essential that the FiT is maintained. The actors are aware that the electricity market's architecture and the roles of its players are bound to change dramatically because of on-going harmonization of renewable energy incentive mechanisms decided by the European Commission, and also because France harbours ambitious aims for wind power. However if the new system is to operate properly, the FEE reckons that the electricity market should first be reformed, and that will take time.

Contracts for Difference budget rising

If the UK manages to hold onto its No. 2 wind energy market ranking in the EU, its performance will have to improve on that of 2013, when 2 314 MW went on grid. DECC's partial figures published at the end of January (data for the first three quarters of 2014), show it had connected 1 266 MW (541 MW onshore and 725 MW offshore). In Q3 offshore installations overtook onshore installations.
The new Contracts for Difference (CfD) incentive system is being introduced in stages. The first new contract allocation round to benefit from the system was presented at the end of January 2015. The potentially successful companies have been named and can now submit bids for this month's tenders. The total budget for these tenders has been raised to £ 325 million (€ 439 million) as the UK government has decided to increase the envelope allocated to "less mature" technologies, such as offshore wind energy to £ 260 million, i.e. £ 25 million more than planned. Mature technologies such as onshore wind energy and solar photovoltaic will have a £ 65 million envelope. This is the second time that the UK government has increased the budget allotted to CfD tenders. Last October DECC raised the budget from £ 205 million to £ 300 million. The guaranteed prices for wind energy will be £ 95/MWh for onshore and £ 155/MWh for offshore. These guaranteed prices will gradually fall to £ 90/MWh and £ 140/MWh from the beginning of the 2018-2019 tax year.

Tabl. n° 3

Installed offshore wind power capacities in European Union at the end of 2014* (MW)

	2013	2014*
United Kingdom**	3 696.0	4 420.0
Germany	903.0	2 340.0
Denmark	1 271.1	1 271.1
Belgium	625.2	712.0
Netherlands	228.0	228.0
Sweden	211.7	211.7
Finland	26.0	28.0
Ireland	25.2	25.2
Espagne	5.0	5.0
Portugal	2.0	2.0
Total EU 28	6 993.2	9 243.0

Estimate. **Provisional figures in Q3 2014.* ***Source: EurObserv'ER 2015*

WIND ENERGY BAROMETER – **EUROBSERV'ER** – FEBRUARY 2015

The capacity of French installations hooked up to the grid during 2014 took a great leap and passed the one-gigawatt mark after four successive years of decline.

Tabl. n° 4

Electricity production from wind power in European Union in 2013 and 2014* (TWh)

	2 013	2 014*
Germany	51.700	55.969
Spain	53.903	51.138
United Kingdom	28.434	31.450
France**	16.034	17.000
Italy	14.897	15.080
Portugal	12.015	12.300
Denmark	11.123	11.628
Sweden	9.842	10.500
Poland	6.077	7.200
Netherlands	5.603	5.806
Romania	4.047	5.724
Ireland	4.542	4.900
Belgium	3.635	4.800
Greece	4.139	4.500
Austria	3.151	3.033
Bulgaria	1.240	1.304
Finland	0.777	1.110
Croatia	0.517	0.704
Hungary	0.717	0.690
Estonia	0.529	0.600
Lithuania	0.600	0.600
Czech Republic	0.481	0,498
Cyprus	0.231	0,230
Latvia	0.120	0.120
Luxembourg	0.081	0.080
Slovakia	0.006	0.006
Slovenia	0.004	0.004
Malta	0.000	0.000
UE 28	**234.444**	**246.974**

*Estimate. **Overseas department not included. **Source: EurObserv'ER 2015**

Is Italy following in Spain's footsteps?

The Italian market has literally collapsed in just two years. ANEV (the Italian wind energy association), says that while more than 1 200 MW of capacity was installed in 2012, the market effort fell to 450 MW in 2013 and further to 107.5 MW in 2014. The Italian government's decision to curb growth in wind energy is responsible for this drop. Its tactic was to set up a tendering system at the end of 2012 at the same time capping annual installations of onshore wind energy at 500 MW until 2015 for >5-MW projects. Thus the 2014 results really dashed the sector's expectations. Now the industry players are even more concerned because in the middle of January 2015 they were still awaiting publication of the decree due to set the annual quotas for 2016–2020. This abrupt slowdown of Italy's wind energy activity is highly reminiscent of the Spanish government's January 2012 decision to curtail incentives for renewable electricity production.

OFFSHORE – THE EUROPEAN INDUSTRY'S WARHORSE

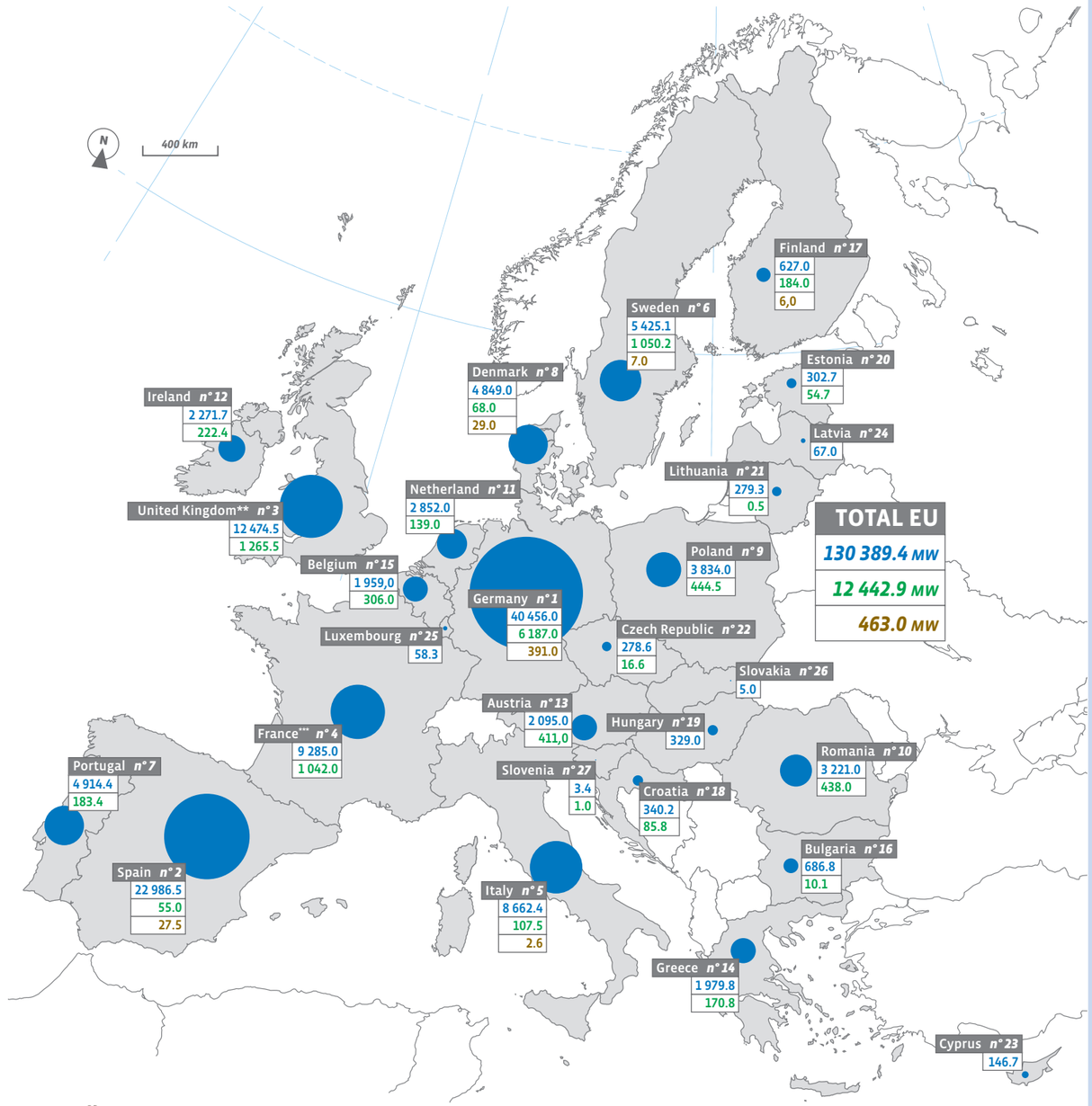
THE WIND ENERGY INDUSTRY IS CAUGHT UP IN A COST WAR

New approaches to the costs of producing a kilowatt-hour of electricity

Granted the backdrop of a generally crisis-bound electricity-generating sector, a number of energy operators who

↘

Installed wind power capacity in European Union at the end of 2014* (MW)



Key

130 389.4 Installed capacity to date in the countries of the European Union at the end of 2014 (MW)

12 442.9 Capacity installed in the countries of the European Union 2014 (MW)

463.0 Capacities decommissioned during 2014 (MW)

*Estimate. **Provisional figures in Q3 2014. ***Overseas departments not included for France. **Source: EurObserv'ER 2015**

are facing lower profitability from their conventional production facilities (gas, coal and nuclear) view the continued rise in renewable electricity output, wind power in particular with increasing alarm. All the parties in this standoff are trying to curry favour with the policymakers. Wind turbine manufacturers, especially in the offshore segment, have seen their growth prospects dwindle in recent years as a result of this lobbying.

The wind energy industry contests the relevance of the indicators currently used to compare the various sectors' electricity production costs. The EWEA that has based its case on a study published by Ecofys in December 2014, "Subsidies and costs of EU Energy", commissioned by the European Commission, is trying to demonstrate that the electricity generated by onshore wind turbines is by far the most competitively priced when external factors including as air quality, climate change, human toxicity and others are taken into account. From its analyses of this report, the EWEA concludes that onshore wind energy is the cheapest electricity generated whose approximate "full" cost is € 105/MWh, which is much lower than that of gas (€ 164/MWh), coal (whose cost ranges from € 163 to € 233/MWh) or nuclear power (€ 133/MWh). The cost of offshore wind energy is put at € 186/MWh, but there are very good prospects of bring this down dramatically. Ironically if all the external factors are taken into account, coal, the main fuel used in Europe for generating electricity, turns out to be one of the most costly. This debate on the implementation of a new approach to costs is also being championed by Siemens, the European and world leader for offshore wind energy. According to Siemens, the use of the Levelized Cost Of Electricity (LCOE), that claims to compare the production costs of the various sectors, does not reflect the cost-benefit ratio of the various sectors on a macro-economic scale. The company considers it more relevant to use a new comparison indicator, the Society's Cost of Electricity (SCOE), when selecting the production technologies for the ideal energy mix. The LCOE represents the system costs in terms of the expected useful life of a power station. It corresponds to the system cost (actualized investment + operating costs) divided by the electricity output (the number of kWh) that it will achieve over its lifetime. The SCOE, the new indicator proposed by Siemens, takes into account all the macro-economic criteria such as the effect of a technology on employment, its environmental impact, its subsidy level, the grid infrastructures required for it to develop, the geo-political impact arising from securing procurement costs, cost fluctuations over time and the social aspects. Taking the UK as an example, the Siemens model demonstrates that Society's Cost of Electricity (SCOE) to the 2025 timeline for wind power, irrespective of whether the source is onshore or offshore, is much lower than the SCOE costs of conventional or nuclear power. Siemens' published calculations are € 61/MWh for offshore wind power, € 60/MWh for onshore wind power, € 78/MWh for solar photovoltaic, € 89/MWh for gas, € 110/MWh for coal and € 107/MWh for nuclear power. These figures are far removed from the current LCOE costs, calculated in 2013 for the United Kingdom of € 140/MWh for offshore wind power, € 81/MWh for onshore wind power, € 143/MWh for solar photovoltaic, € 60/MWh for gas, € 63/MWh for coal and € 79/MWh for nuclear power. It should be pointed out that this study is based on the UK's – the main offshore wind power market – specific electricity production costs.

Tabl. n° 5

Mains developpers involved in the wind power sector in 2014

Name of company	Country	Wind capacity (including offshore) commissionned at the end of 2014*	Annual turnover 2014 (M€)	Employees 2014
Iberdrola Renewables	Spain	14 543*	1 585*	28 150**
EDP Renováveis	Portugal	8 600*	930*	905
Acciona Energy	Spain	7 042*	1 526*	2 267
Gamesa	Spain	6 400	1 620	n.a.
Alstom Renewable Power	France	6 366	1 830*	96 000**
EDF énergies nouvelles	France	6 255*	1 294	3 050
Enel Green Power	Italy	5 714*	2 084*	3 609
E.ON Climate Renewables	Germany	4 799	1 809*	62 000**
WPD AG	Germany	2 800	n.a.	960
Dong Energy	Denmark	2 500	1 300	2 080
RWE Innogy	Germany	2 266	403*	1 482
Vattenfall	Sweden	1 806	12 425*	31 800**

Large energy companies are well represented in this ranking because of their size and their ability to raise capital, but outside of this type of player, there are a large number of specialized in renewable energy private developers with substantial portfolios near or above the GW. Certain wind manufacturers like Gamesa, Enercon or Nordex also chosen to develop projects with their own machines.

The most updated data available. This may include 9 Month/2014 data and forecasts, and not the full financial year. **Entire group.* ***Source: EurObserv'ER 2015*

Greater profitability from more powerful wind turbines

While the manufacturers try to get the offshore wind power LCOE cost level into perspective, government and developer pressure has become extremely hard. Most of the countries involved in offshore wind power development, like the UK, Germany and the Netherlands, have already announced major reductions in their incentive programmes. Slashing costs fast is thus a matter of survival for the offshore industry and installing increasingly more powerful turbines is the main stratagem for achieving this. As a foundation and an underwater cable are required to connect each mast up to the grid, the production cost of the kilowatt-hour generated by very high capacity turbines (class 6, 7 or 8 MW) is potentially lower than multiple 3-MW or 3.6-MW wind turbines with similar combined capacity. Turbine manufacturers are currently developing much more powerful machines in response to the demand for lower costs, some of which are already in test phase and will soon be ready to be launched onto the market. Others are still in development but have already attracted firm orders.

The Vestas V164 8 MW, whose first prototype was installed in the Danish Osterild test centre in January 2014, is the highest-capacity offshore wind turbine installed to date. It was developed by MHI Vestas Offshore Wind, a joint subsidiary formed by Vestas and Mitsubishi Heavy Industries Ltd that have amalgamated part of their offshore businesses. Another 8-MW wind turbine, the Areva 8 MW, is being developed by the Areva-Gamesa tandem. Commercial production of this turbine is planned for 2018. It will equip the wind farms off the French coasts of Tréport (500 MW) and the islands of Yeu and Noirmoutier (500 MW) in 2021.

Other 6 or 7 MW turbines for the offshore segment are being tested and are ready to go on sale. Examples are the 7-MW Samsung S7.0 171, whose blades are the world's longest, about 85 metres long, which was installed on Scotland's Fife Energy Park site last October. Mitsubishi Heavy Industries has also developed a 7-MW offshore wind turbine on its own, outside its association with Vestas, the MWT 167H/7.0, formerly known as the Sea Angel 7 MW. The wind turbine was installed at the end of December 2014 on the Scottish Hunterston test site. It is due to be commissioned in April 2015. In the 6 MW category, we note the Repower 6 M series which was the highest capacity deep sea wind turbine to be installed in 2014, the Siemens SWT-6.0 150 whose first turbine was installed last August in the Westermost Rough offshore wind farm in the North Sea, and two others installed onshore (for testing purposes) at the end of 2014 near the German port of Wilhelmshaven. To complete this round-up, we should

The Vestas V164 8 MW offshore turbine.

FRANK BOUTRUP SCHMIDT / VESTAS A/S

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Installing Alstom's 6-MW Haliade 150 offshore turbine (Belwind Wind Farm, Belgium).

also mention the Sinovel SL6000, currently the highest capacity wind turbine tested in China, and the Alstom Haliade, the first 6-MW wind turbine to be tested in France on the Carnet site in Loire-Atlantique.

Dong Energy is banking on innovation

The biggest offshore wind farm developer, Dong Energy, can lay claim to being a precursor by being one of the first to back 6 MW and higher-capacity wind turbines. It has clearly set its sights on reducing the production costs of its wind farms to € 100/MWh by 2020, compared to the current € 125-140/MWh of the most profitable wind farms. It order to do this, it entered into a framework agreement with Siemens in July 2012 for the delivery of 300 SWT-6.0 150 wind turbines over the period 2014-2017, thus setting a new tone for the offshore wind power industry. The 6-MW turbine will equip the Westermost Rough wind farm off the UK coast (35 x 6 MW) and Gode Wind (97 x 6 MW) wind farm off the German coast currently under construction.

In August 2014, Dong Energy entered a new phase by signing a contract for the delivery of 32 V164-8 MW wind turbines. They are earmarked for the Burbo Bank wind farm extension, whose construction should kick off in 2016.

Lastly, in February 2015, the Danish company bought out all the remaining development property rights (66%) of the Hornsea Project One offshore wind farm from its partner Smart Wind (a joint subsidiary owned by Siemens Financial Service and Mainstream Renewable Power). This purchase gives it the opportunity to use higher capacity wind turbines than originally planned. This wind farm will be the first to be sited far off from the UK coasts to exceed one gigawatt in capacity (about 1 200 MW environ) and is due to deliver its first kilowatt-hours in 2020.

Senvion, sold for 1 billion euros

The restructuring of the wind power industry, marked last year by the offshore activity mergers of Vestas and Mitsubishi as well as Areva and Gamesa, continued at the start of 2015. On 22 January 2015, Suzlon announced it had signed a binding agreement to sell its 100% shareholding sale of Senvion SE to an American private investment company, Centerbridge Partners LP. The value of the transaction is about 1 billion euros (7200 Rs Crores). Under the terms of the agreement Senvion is awarding an operating licence to Suzlon for its offshore technology on the Indian market, and in exchange Suzlon is awarding an operating licence to Senvion for its S11-2.1 MW wind turbine for the US market.

The transaction has yet to be accepted by the regulatory authorities. Suzlon cites its determination to reduce its debt and concentrate on its national market as the grounds for this move and additionally the high growth of the American and emerging country markets (China, Brazil, South Africa, Turkey and Mexico).

NEW SCENARIOS FOR 2020

The protracted recession in the European Union and the regulatory instability of several key wind energy producer countries have hit the European market's growth rate. Consequently the manufacturers have been forced to take stock and are contemplating novel growth scenarios.

First assertion: the current electricity consumption trend is much weaker than was forecast some years ago. This lower consumption has benefited the renewable share, which is increasing faster, but also means that less capacity will be required from the sector by the 2020 timeline. The wind power capacity scenarios in the European Union are intimately related to the Member States' commitments, expressed as a percentage. Lower power consumption expected in 2020 will result in a lower requirement for wind energy capacity to fulfil the countries' targets.

Second assertion: market momentum is also related to development-friendly conditions for wind energy, be that at regulatory level, market conditions or even investments in electricity infrastructures and grids to integrate capacity.

Third and final assertion: retroactive changes to legislation weaken the profitability of investments made and undermine investors' confidence.

This new economic reality prompted the EWEA to propose three new scenarios for 2020 in July 2014.

The "low" or least optimistic scenario, anticipates much lower than expected market growth of 165.6 GW of installed capacity by 2020. This assumes offshore growth will be limited to 19.5 GW, which is just over double the current installed capacity. Total wind power output would rise to 378.9 TWh (307 TWh onshore and 71.9 TWh offshore), to cover 12.8% of Europe's electricity consumption. The underlying assumptions

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are lingering recession affecting the demand for power, pressure on public expenditure continuing through to the last years of the decade, and unstable national regulatory frameworks affecting both mature and emerging markets.

This instability will undermine project investments and offshore projects in particular. The last assumption is that European and international climate and energy policies will be unambitious and low-key.

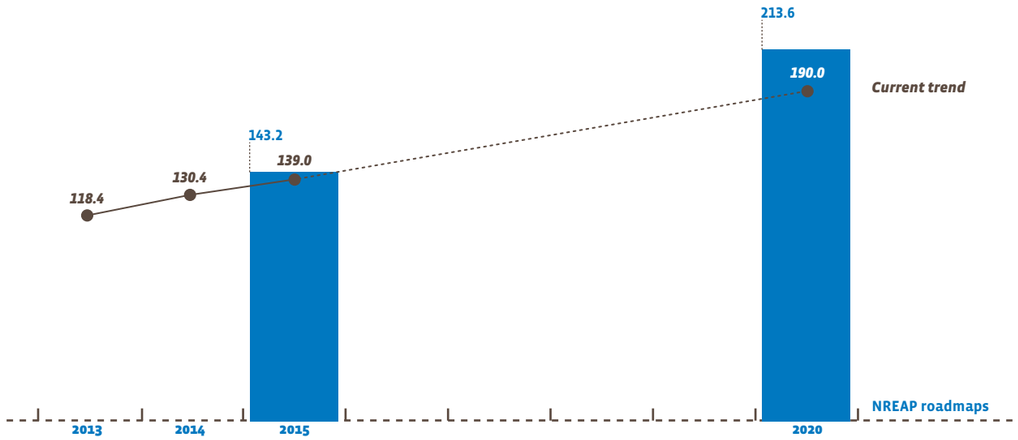
The "central" scenario puts total installed capacity across the EU at 192.5 GW in 2020, including 23.5 GW of offshore capacity. Forecast combined output is put at 441.7 TWh (355.2 TWh onshore and 86.4 TWh offshore), which would cover 14.9% of Europe's expected 2 956 TWh power consumption. The underlying assumptions are that regulatory stability will not be fully achieved, but that policy reforms in the key onshore wind energy markets – Germany, France, the UK and Poland will be completed and that the new regulatory framework will be conducive to growth. Offshore wind energy development will pick up pace, boosted by confidence and support in the UK and faster development in France and the Netherlands.

The "high" scenario reckons that EU-wide wind energy capacity will be as much as 217 GW, including 28 GW offshore. It forecasts output at 500 TWh (397.8 TWh of onshore and 102.2 TWh of offshore), equating to 17% of European electricity demand. This scenario – that we could describe as responsible – is dependent on a return to a stable regulatory framework in most European markets. It is also based on the European Union's adoption of an ambitious climate and energy package that sets GHG reductions at 40% by 2030 (reference year 1990) and a 30% renewable energy share. These targets would give impetus to the key wind energy markets, namely Germany, France, Italy and the UK. An alternative assumption is that the recession's effects peter out and the countries such as Spain, whose wind energy markets have stalled, start to show signs of growth. This scenario also implies slightly stronger offshore sector growth than anticipated in Belgium, Ireland, the UK and Germany.

It has to be admitted now that, six months after, these scenarios were published that the decisions taken by Europe's institutions and by a number of Member States, do not hold out much cause for optimism. Although the "high" scenario is the closest to the National Renewable Energy Action Plan commitments, it looks much less plausible today. The growth thrust that could have been buoyed by a new thoroughgoing and ambitious climate-energy package at the end of the decade will not happen. On 24 October 2014, the European Council, which gathers heads of state and governments, adopted the new climate-energy package. It set only one binding target in its targets for 2030 – a 40% reduction in GHG emissions compared to 1990 levels. Its 27% renewable energy target has not been made binding across the EU. It will be achieved through Member States' contributions, guided by the need to achieve the European Union target collectively. The European Council's compromise will be no light matter to put in place because many countries are now bent on reducing their renewable energy incentives. EurObserv'ER feels that the "low" scenario is now being played out. If we take into account Europe's current austerity policies, slashed incentives and politicians' readiness to pitch renewable energies against market mechanisms without adequate preparations on the ground for their entry, the European wind energy market could be in the doldrums for a long time. A more optimistic scenario is still on the cards, but will have to be carried by much more assertive political determination. Some of the uncertainties surrounding the future wind energy market could be lifted as a result of policy decisions to be made during the forthcoming Paris Climate Conference from 30 November–11 December 2015. This is a crucial event. It must result in the adoption of the first initial universal and binding climate agreement to keep global temperature warming below 2°C. If responsible decisions are taken for the planet, they would encourage European policy to be more incisive, give the wind energy market new prospects and speed up energy transition across Europe. In the interim, EurObserv'ER has revised its forecasts for 2020 downwards **(graph 4)**. □

Graph. n° 4

Comparison of the current trend against the NREAP (National Renewable Energy Action Plans) roadmaps (GW)



Source: EurObserv'ER 2015

Sources: *IG Windkraft (Austria), Apere (Belgium), APEE (Bulgaria), FER (Croatia), Cera (Cyprus), Ministry of Industry and Trade (Czech Republic), ENS (Denmark), Tuuleenergia (Estonia), VTT (Finland), FEE (France), AGEE Stat (Germany), HWEA (Greece), University of Miskolc (Hungary), IWEA (Ireland Republic), ANEV (Italy), CSB (Latvia), STATEC (Luxembourg), CBS (Netherlands), Econet Romania, ECB (Slovakia), IJS (Slovenia), IEO (Poland), REE (Spain), Svensk Vindenergi (Sweden), DECC (United Kingdom), EWEA.*

The topic of the next barometer will be photovoltaic

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EurObserv'ER is posting an interactive database of the barometer indicators on the www.energies-renouvelables.org (French-language) and www.eurobserv-er.org (English-language) sites. Click the "Interactive EurObserv'ER Database" banner to download the barometer data in spreadsheet format.

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Caisse des Dépôts

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