EWEA
THE EUROPEAN WIND ENERGY ASSOCIATION

Wind energy scenarios for 2030

A report by the European Wind Energy Association - August 2015

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Executive summary

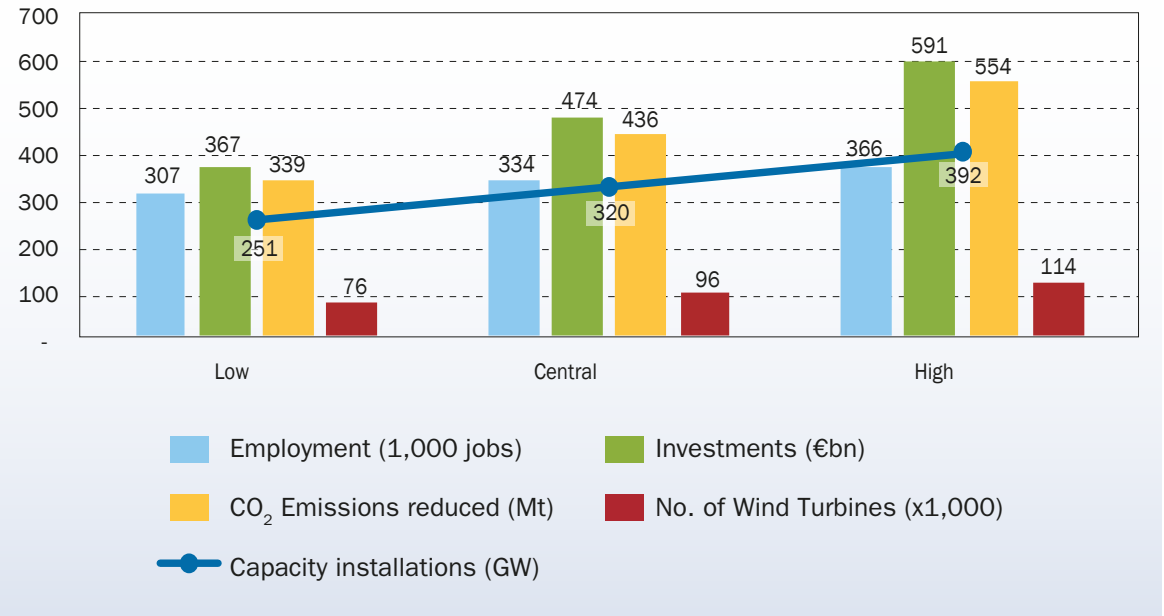
Recent regulatory and economic developments in the EU have significantly changed the wind energy perspective for the next 15 years. In light of uncertain governance towards achieving EU climate and energy binding targets, EWEA updated the European wind energy industry's vision to 2030.

EWEA's new Central Scenario expects 320 GW of wind energy capacity to be installed in the EU in 2030, 254 GW of onshore wind and 66 GW of offshore wind. That would be more than twice as much as the installed capacity in 2014 (129 GW) and an increase of two thirds from the expected capacity installed in 2020 (192 GW). Wind energy will produce 778 TWh of electricity, equal to 24.4% of the EU's electricity demand. The wind energy industry will provide over 334,000 direct and indirect jobs in the EU and wind energy installations in 2030 will be worth €474 bn. The 96,000 wind turbines installed on land and in the sea will avoid the emission of 436 million of tonnes (Mt) of CO_2.

EWEA's Low Scenario only foresees 251 GW of wind energy installations, 22% lower than in the Central Scenario, equal to meet 19% of EU electricity demand in 2030. Such level of installations would mean 307,000 jobs in the wind energy sector, €367 bn worth of investments, 339 Mt of CO_2 emissions avoided and 76,000 wind turbines installed and connected to the grid in 2030.

The High Scenario expects 392 GW installed in 2030, 23% higher than in the Central Scenario, equal to meet 31% of EU electricity demand. 366,000 jobs will be generated, as well as €591 bn of investments, 554 Mt of CO_2 emissions would be avoided and 114,000 wind turbines generating electricity in the EU would be installed.

FIGURE 1: EWEA CAPACITY SCENARIOS AND MACRO-ECONOMIC BENEFITS



Introduction

In 2014, the European Union set a legally binding target to 2030 of at least 27% renewable energy in final energy consumption at European level. Unlike the 2009 Renewable Energy Directive, the agreed target explicitly ruled out binding national renewable energy targets raising questions on how Member States will meet such a EU-wide target and the role of the European Commission in overseeing its achievement.

27% renewables in final energy consumption translates into 46%-49% electricity generated by renewables according to the European Commission. Wind energy is poised to take the lion's share of this electricity with at least 21%[1]. However, the uncertainty related to the governance and breakdown of wind power installations in each Member State remains.

With this report, EWEA puts forward the updated European wind energy industry's vision on how wind power can contribute to the achievement of the EU's 2030 climate and energy ambitions.

In 2011, EWEA published *Pure Power*[2] showing that wind energy could cover 28.5% of EU electricity demand in 2030. At that time, the industry forecasted 400 GW of wind energy capacity operating in the EU, 250 GW onshore and 150 GW offshore, generating 1,154 TWh of electricity. In light of the economic and regulatory developments outlined below, EWEA has now revised these figures.

Recent EU economic and regulatory developments

Wind energy's potential to 2030 will depend to a large extent on recent policy developments in the major EU climate and energy priorities: the governance of the Energy Union, a new European power market design and the Emission Trading System reform.

In February 2015, the European Commission set its vision for an Energy Union grounded on energy security, the internal energy market, the decarbonisation of the economy, research and innovation and an effective and transparent governance[3]. While the level of ambition of this initiative is laudable, clarity on implementation details is yet to emerge in the coming 18 to 24 months. In the meantime, the European Commission has laid down a proposed plan of actions starting already in 2015.

In July 2015, the European Commission published a consultative communication for a new energy market design[4] that can accommodate an increasing share of variable renewable energy into electricity grids in the post-2020 period. The Commission has recognised in this communication the need to make European power markets "fit for renewables" by not only reforming current market rules and operation of the electricity system, but also by finding sustainable solutions to Europe's generation overcapacity and other market failures that have yielded a low appetite for investments and stressed the need to modernise the electricity system.

The Commission has also presented its ETS reform proposals[5] which provide for cutting off the overall quantity of market allowances by increasing the annual rate of reduction (also known as linear factor) from 1.74% to 2.2%. The carbon market reform also envisages the establishment of an innovation fund (NER400) in 2021, financed through the monetisation of up to 450 million allowances that will redirect funding towards low-carbon technologies. Now that the legislative amendments are tabled, a final deal between the European Parliament and Member States could come by 2017 the earliest.

Governance will be a high priority on the European energy policy agenda as it lays the ground for the efficient implementation of the Energy Union and the achievement of the 2030 climate and energy

1 European Commission. (2013). Impact assessment for a 2030 climate and energy policy framework, p.38
2 EWEA. (2011). Pure Power, Wind energy targets for 2020 and 2030.
3 European Commission. (2015). Energy Union package: A Framework Strategy for a Resilient Energy Union with a Forward-Looking Climate.
4 European Commission. (2015). Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on Launching the public consultation process on a new energy market design.
5 European Commission. (2015). Proposal for a Directive of the European Parliament and of the Council amending Directive 2003/87/EC to enhance cost-effective emission reductions and low-carbon investments.

objectives, notably the 27% binding EU-wide renewable energy target. In November 2015, the European Council is expected to adopt conclusions containing political guidance for the governance regime which will allow the Commission to proceed with concrete legislative proposals.

The publication of the European Commission's State Aid Guidelines[6] in 2014 set a trend towards more market oriented national support mechanisms for renewables. As a consequence, several Member States have modified or are in the process of modifying their support schemes for wind energy towards feed-in premium mechanisms granted through a competitive bidding process (tenders)[7]. Such support mechanisms take into account the increased maturity of wind energy in several EU markets and its increased competitiveness as regards other conventional and renewable energies[8]. However, the design and implementation of new support schemes during the 2015-2016 transition period increases investors and owners' uncertainty.

Long-term visibility and stable frameworks, therefore, remain crucial for wind energy deployment. The lack of such stability would mean that Europe will not tap wind energy's full potential as it has been witnessed in the stalled growth of certain emerging markets.

For instance, Bulgaria installed its record of over 280 MW in 2010 while only 9 MW were installed in 2014. A similar trend has been observed in Romania where installations decreased by 62% between 2012 and 2014, from 923 MW to 354 MW[9]. In both countries, but also in Spain, retroactive legislative changes in support schemes have undermined investors' appetite for wind energy and depressed markets. Annual installations in Spain in 2014 were 84% less than the previous year and reported a 46% decrease in compound annual growth rate in 2007-2014, compared to 3.5% growth in the same period in the EU[10]. In the first half of 2015, no wind energy capacity was installed in the country[11].

Adding to regulatory uncertainty, the economic reality of a slow recovery in Europe also has impacted investment plans and decisions, new orders and financial health of existing assets.

EWEA's position on EU energy and climate priorities:

Governance: With no national renewable energy targets defined for the post-2020 period, the European Commission should play a coordinating role in ensuring that Member States deliver the 27% target collectively. To this end, the Commission must define a clear timeline for Member States to declare their renewable energy contributions and propose a mechanism to monitor progress and intervene in case Member States deviate from their 2030 national pledges. Regional cooperation could help Member States to develop and clarify such national contributions which, aggregated, must meet at least the EU-wide objective.

Market design: Price signals should drive supply choices in a well-functioning power market in order to make it capable of accommodating a higher renewable energies penetration while securing system reliability. It will therefore be crucial to reward those energy technologies, such as wind energy, able to provide flexibility services to reduce system operation costs. Improved cross-border electricity trading in all time frames will be necessary to ensure cheap electricity from wind and other renewable energy is transported where it is most needed across the EU.

Renewable Energy Directive: The post-2020 Renewables Directive will be the key policy instrument to deliver the binding EU renewable energy target for 2030. It should provide a robust legal basis for the renewable energy governance and cover key enablers for renewable energy deployment in particular market design upgrades, streamlining administrative procedures and enhancing regional cooperation.

ETS: A fundamentally reformed Emission Trading System, whereby surplus permits and free allocation are eliminated, would provide an incentive for investments in renewable energies such as onshore wind, which represents an optimal balance between economic competitiveness and decarbonisation of the energy sector.

6 European Commission. (2014). Communication on Guidelines on State aid for environmental protection and energy 2014-2020.
7 For instance Germany, Poland and the UK have put in place or are putting in place tender schemes for renewable energies support.
8 In particular, Ecofys' 2014 study on behalf of the European Commission on Subsidies and costs of EU energy reports onshore wind Levelised Cost of Energy between €52/MWh and €110/MWh. (Ecofys, 2014)
9 EWEA. (2015). Wind in power: 2014 European statistics.
10 EWEA. (2015). Wind in power: 2014 European statistics.
11 AEE, "El sector eólico no ha instalado ni un solo megavatio en España en el primer semestre", 27 July 2015.

Member States developments to 2030

The 2015 European Commission report on renewable energy progress to 2020 shows that although the EU is on track to meet its 2020 renewable energy targets, interim targets will become more challenging in the next years and Member States will have to intensify their efforts to reach their 2020 targets. Five countries[12] are currently lagging behind their targets and three of them[13] have not met their 2013/2014 interim targets[14].

In the absence of a clear breakdown per Member State of renewable energy generation after 2020, national energy policies guiding energy mixes will be a critical factor for wind energy deployment in the next 15 years. In particular, nuclear and conventional power decommissioning rates to 2030 in some Member States will impact the amount of wind power needed to replace such generation technologies.

A survey amongst National Wind Energy Associations in EU Member States also highlighted other critical sources of uncertainty:

- The degree of implementation of regional cooperation mechanisms in terms of cross-border renewable energy projects and renewable energy purchases from other Member States will be crucial for some countries to reach their 2020 targets. The European Commission will need to further develop and detail such mechanisms paving the way to 2030. As a consequence, efficient and improved power interconnections between Member States will represent a mandatory condition of target completion.
- The outcome of the 2015 UNFCCC conference in Paris (COP 21) will aim to achieve a legally binding and universal agreement on climate, with the aim of keeping global warming below 2°C. A positive outcome of the negotiations will help promoting renewable energies as a cost efficient tool to fight climate change. Wind energy in Europe potentially stands to benefit greatly as one of the most efficient renewable energy technologies and the extensive expertise of European companies investing in global markets.
- Finally, legislations on spatial planning regulating the availability of land and good wind resources sites will also be crucial to grant efficient electricity production from wind energy.

12 France, Luxembourg, Malta, the Netherlands and the UK.
13 Luxembourg, the Netherlands and the UK.
14 European Commission. (2015). Report from the European Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on Renewable energies progress report.

Description of 2030 wind energy capacity scenarios

EWEA's updated scenarios and their underlining assumptions are presented below:

Central Scenario

A clear 2030 governance structure with reporting mechanisms on Member States' progress to 2030 is implemented and effective regional cooperation mechanisms are established. As a result, the EU meets its 27% target. A better-functioning power market allowing for higher penetration of wind and other renewable energies is implemented and power interconnection infrastructures are strengthened to allow the EU to reach the 15% interconnection target[15]. The new market design recognises the potential of wind energy to provide flexibility services. The Emission Trading System is reformed in a more efficient way and is able to give meaningful price signals to investors. All of this allows for the abatement of costs and raising overall wind energy power plants efficiency. Offshore wind cost reduction objectives in 2020 are met and costs are further reduced to 2030.

In this scenario wind energy installations amount to over 320 GW in 2030, comprising 254 GW of onshore wind and 66 GW of offshore wind. Wind energy installed capacity grows almost two and half times (or 148%) compared to 2014 levels[16] and two thirds (or 66%) compared to the expected capacity in 2020[17]. Onshore wind energy will generate 533 TWh in 2030, covering 16.7% of EU electricity demand and offshore wind will produce 245 TWh, covering 7.7%. In total, wind energy will produce 778 TWh of electricity in 2030, equal to 24.4% of EU electricity demand[18].

Low Scenario

An efficient 2030 governance is not fully implemented and the EU-wide 27% renewable energy target does not materialise. The new market design is not able to guarantee increased renewable energy penetration and system costs are therefore not reduced. No significant progress in electricity interconnections amongst Member States occurs and grid congestion continues to distort market prices. The ETS reform does not succeed in effectively reducing carbon emissions in an economic and sustainable way. In addition, offshore cost reduction objectives by 2020 are not met.

In this scenario 251 GW of wind energy are installed in the EU, of which 206 GW of onshore wind and 45 GW of offshore wind. Total wind energy installations are 22% lower than in the Central Scenario. Wind installations increase by 95% from 2014 and by 30% from 2020 expected installed capacity. Wind energy produces a total of 604 TWh in 2030, equal to 19% of EU electricity demand, of which 13.8% is coming from onshore wind and 5.2% from offshore wind. Total electricity production from wind energy is 22% lower than in the Central Scenario.

High Scenario

An efficient 2030 governance system is in place enabling Member states to exceed the EU-wide target of at least 27% renewable energy in final energy consumption. The EU-wide power transmission network is further developed beyond the European Commission's 15% target. Both the new market design and the reformed ETS system contribute to phasing out inefficient and uneconomical fossil fuels power plants and pave the way to a sustained development of renewable energies, which help achieving the EU energy security objectives and improving the EU macro-economic outlook. Growth in all wind markets takes place, leading to pan-European efficient operations and maintenance strategies for onshore wind and the industrialisation of offshore wind.

In this scenario, total wind energy installations in the EU grow to over 392 GW in 2030, of which 294 GW of onshore wind and 98 GW of offshore wind. Total wind energy capacity is 23% higher than in the Central Scenario. Wind installations increase more than threefold (or 204%) from 2014 and more than double (or 104%) from the 2020 expected capacity. Wind energy produces a total of 988 TWh in 2030, equal to 31% of EU electricity demand, of which 19.7% is coming from onshore wind and 11.3% from offshore wind. Total electricity production by wind energy is 27% higher than in the Central Scenario.

15 In October 2014 Heads of State in the European Council agreed on the European Commission's proposal of a 15% interconnection target by 2030 (European Council, 2014).
16 128.7 GW at the end of 2014. EWEA. (2015). Wind in Power, 2014 European Statistics
17 Central scenario. EWEA. (2014). Wind energy scenarios for 2020
18 According to the European Commission Reference Scenario, in 2030 EU energy demand for electricity will be 3,187 TWh (European Commission, 2014).

FIGURE 2: MEMBER STATES 2030 CAPACITY AND ELECTRICITY PRODUCTION ACCORDING TO CENTRAL SCENARIO

	Capacity Installed (MW)			Electricity Produced (GWh)		
	2030 Central	2030 Low	2030 High	2030 Central	2030 Low	2030 High
Austria	5,800	5,000	6,650	12,194	10,670	14,192
Belgium	6,300	4,850	7,800	17,976	13,750	22,517
Bulgaria	1,220	1,000	1,440	2,565	2,134	3,073
Croatia	1,800	1,600	2,000	3,784	3,415	4,268
Cyprus	483	447	581	1,016	953	1,240
Czech Republic	2,200	1,040	4,320	4,625	2,219	9,219
Denmark	8,130	5,950	11,320	22,659	16,792	32,378
Estonia	1,183	365	2,000	3,669	779	6,586
Finland	8,526	5,026	12,026	17,966	10,766	25,705
France	35,250	25,000	43,000	88,301	62,623	114,942
Germany	80,000	75,000	87,500	195,786	183,232	221,497
Greece	9,000	8,000	12,500	18,922	17,073	27,448
Hungary	973	925	1,051	2,045	1,975	2,244
Ireland	7,692	5,525	9,590	17,433	11,829	22,320
Italy	13,600	10,768	17,268	28,593	22,980	37,624
Latvia	308	234	430	647	500	918
Lithuania	1,110.2	878	2,200	2,334	1,874	6,240
Luxembourg	141	123	169	296	263	362

	Capacity Installed (MW)			Electricity Produced (GWh)		
	2030 Central	2030 Low	2030 High	2030 Central	2030 Low	2030 High
Malta	49	30	80	102	64	171
Netherlands	12,567	11,872	13,391	36,670	34,606	39,394
Poland	13,150	8,400	15,700	29,775	18,699	36,904
Portugal	6,400	5,951	7,039	13,498	12,742	15,063
Romania	5,000	4,500	6,000	10,512	9,603	12,804
Slovakia	331	300	486	696	640	1,036
Slovenia	49	33	75	103	71	159
Spain	44,505	35,005	52,500	93,575	74,711	112,811
Sweden	14,300	8,802	20,000	31,641	19,096	45,772
UK	40,000	24,300	55,000	120,362	70,399	171,453
Total	320,066	250,926	392,116	777,744	604,460	988,340

TABLE 1: EWEA 2030 SCENARIOS: CAPACITY INSTALLED, POWER GENERATION AND PERCENTAGE OF EU ELECTRICITY DEMAND MET

	Installations (GW)			Generation (TWh)			EU electricity demand met by wind energy (%)		
	Onshore	Offshore	Total	Onshore	Offshore	Total	Onshore	Offshore	Total
Low Scenario	206.3	44.6	250.9	440.2	164.2	604.5	13.8%	5.2%	19%
Central Scenario	253.6	66.5	320.1	533.1	244.5	777.7	16.7%	7.7%	24.4%
High Scenario	294.0	98.1	392.1	627.5	360.8	988.3	19.7%	11.3%	31%

Scenarios analysis

FIGURE 3: 2030 SCENARIOS COMPARISON

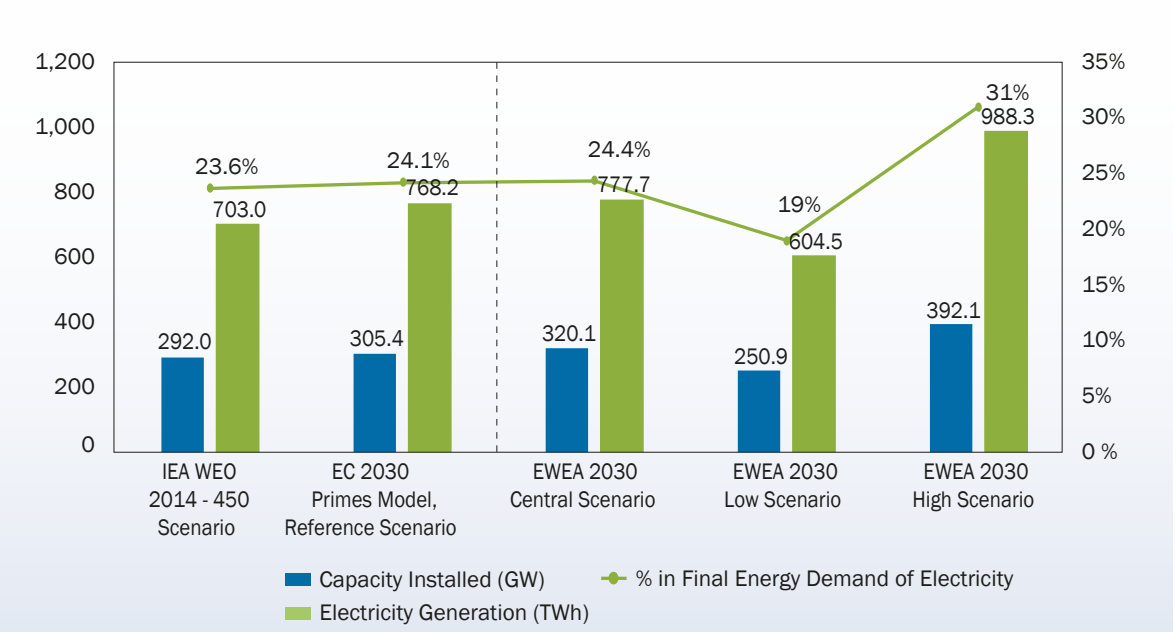


Figure 3 compares EWEA's scenarios against two of the most referenced energy scenarios: IEA 450 Scenario[19] and the European Commission's (EC) most updated Trends to 2050 Reference Scenario[20].

IEA 450 Scenario

The 2014 version of the IEA 450 Scenario assumes all policy developments needed to limit the increase in global temperature to 2°C. The scenario expects that no huge concerted international policy action is taken on climate change before 2020. Nonetheless, the IEA assumes other policies limiting the construction of inefficient coal power plants and the promotion of partially phasing out of subsidies for fossil fuels consumption in the EU. The scenario factors in more ambitious policies such as a meaningful CO_2 price and the removal of all fossil fuels subsidies, at first in OECD countries and then extended globally.

All of this results in 292 GW of cumulative wind energy capacity installed in 2030 in the European Union, 163 GW (or 1.3 times) more than the capacity installed at end 2014.

European Commission Trends to 2050 Reference Scenario

The European Commission 2013 Reference Scenario assumes the EU economy grows steadily to 2030 after having overcome the recent economic crisis. No outstanding international climate change deal is reached at COP21 and, in the EU, no further action is taken other than the already agreed carbon emissions reduction, renewable energies and energy efficiency 2030 targets. Member States fully meet the 2020 targets and cross border cooperation helps abating renewable energies costs.

The European Commission expects 305 GW of cumulative wind energy capacity installed in 2030, 176 GW (or more than 1.3 times) more than at the end of 2014.

EWEA Central Scenario

EWEA's Central Scenario predicts 320 GW of wind energy installed capacity in 2030, which is 28 GW (or 10%) more than the IEA estimates and 15 GW (5%) more than the EC. In terms of electricity production, EWEA's Central Scenario displays 778 TWh of wind generated electricity in 2030, 10% more than the IEA's projections and 1% more than the EC's Reference Scenario. The 778 TWh of wind energy generated electricity in 2030 account for 24.4% of the EU's electricity demand in 2030.

The difference between EWEA's Central Scenario and the IEA's and EC's scenarios can be attributed to more positive expectations in onshore capacity installed in Western and Central Europe together with a recovery of wind energy markets in Spain and in some Eastern European countries. In Central and Eastern Europe the key factor will be the decommissioning of a high share of conventional power plants, in particular in Germany and France[21], which could be replaced by wind power. In the Iberian Peninsula the improvement in interconnections with continental Europe through France and a partial recovery from the economic downturn will bolster wind energy installations, in particular in Spain.

EWEA Low and High Scenarios

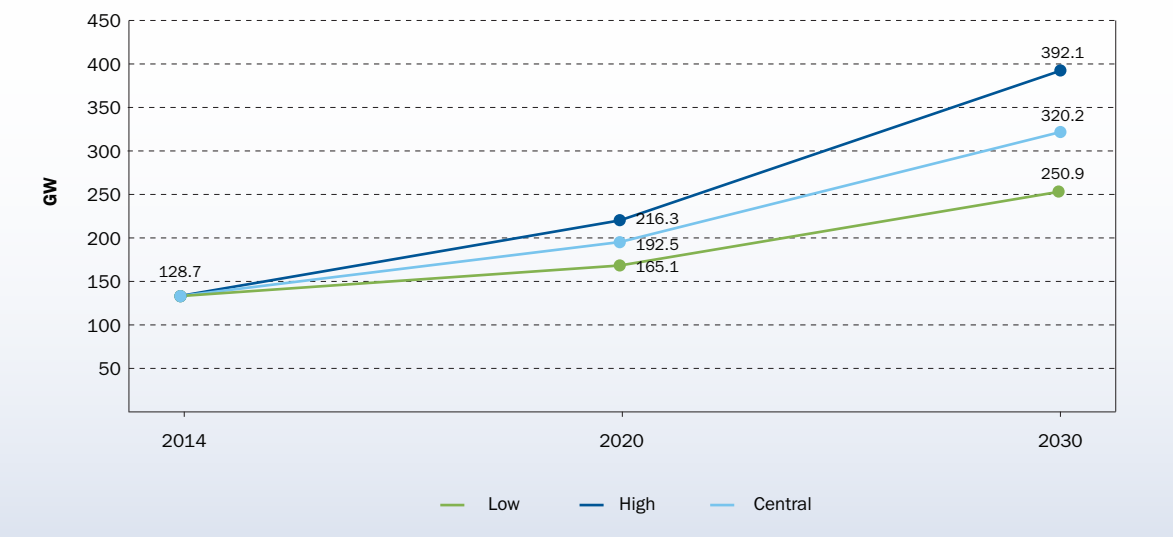
EWEA's Low Scenario foresees 14% less capacity than the IEA and 18% less than the EC. In this scenario, electricity produced by wind energy is 14% lower than the IEA estimates and 21% lower than the EC's expectations.

Finally, EWEA High Scenario shows that, if all optimal conditions allowing a consistent development of wind energy are in place, the EU could have 34% and 28% higher wind power capacity in 2030 than what the IEA and the EC project respectively. In this scenario, electricity generated by wind energy would meet 31% of EU power demand.

19 International Energy Agency. (2014). World Energy Outlook 2014.
20 European Commission. (2013). EU energy, transport and GHG emission trends to 2050. http://ec.europa.eu/transport/media/publications/doc/trends-to-2050-update-2013.pdf
21 In Germany the Renewable Energy Act (Erneuerbare-Energien-Gesetz, EEG) was passed in 2014 and sets a path for renewable energies' to meet 40% to 45% of gross electricity consumption by 2025 and 55% to 60% by 2035. In July 2015 the French parliament passed the Energy Bill according to which renewable energies will account for 32% of the electricity production by 2025, rising to 40% by 2030. At the same time nuclear energy output will be lowered to 50% of the country's electrical output by 2025, from the present 75%.

Macro-economic and social implications of different scenarios

FIGURE 4: EWEA 2020 AND 2030 SCENARIOS



The 320 GW of wind energy installed capacity in EWEA Central Scenario will benefit the EU in terms of employment, investments and CO_2 emissions reduction. The industry will provide over 334,000 jobs and wind energy installations in 2030 will be worth €474 bn. The over 95,000 wind turbines installed on land and in the sea will avoid the emission of 436 Mt of CO_2.

The Low Scenario has 25% less wind turbines operating in 2030 than the Central Scenario, and as a consequence the industry would bring 9% less jobs to the EU or a total of 307,000 jobs. Similarly, this would represent 29% less investments with a total of €367 bn and 29% more Mt of CO_2 will be emitted.

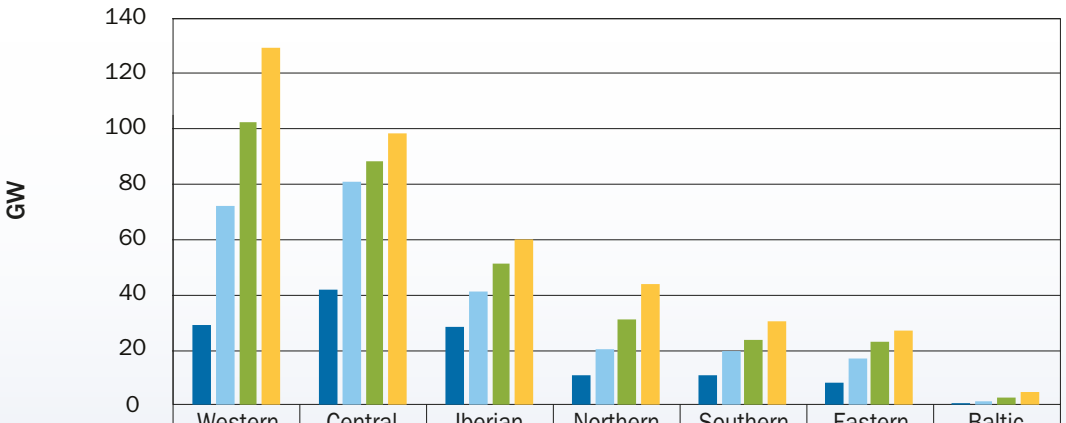
However, realisation of the High Scenario will yield installations of 19,000 more wind turbines, 32,000 more jobs created or 9% increase and an investment worth €117 bn equivalent to 20% more than in the Central Scenario. A total of 554 Mt of CO_2 will also be avoided or 21% more than the Central Scenario.

TABLE 2: MACRO-ECONOMIC IMPLICATIONS OF 2030 SCENARIOS

	Installations			Employment (1,000 jobs)			Investments (€bn)			CO_2 Emissions reduced (Mt)			No. of Wind Turbines		
	2014	2020	2030	Onshore	Offshore	Total	Onshore	Offshore	Total	Onshore	Offshore	Total	Onshore	Offshore	Total
Low Scenario	129	165	251	136	170	307	279	88	367	92	247	339	68,764	7,439	76,203
Central Scenario	129	192	320	150	184	334	343	131	474	299	137	436	84,526	11,081	95,607
High Scenario	129	216	392	162	204	366	398	193	591	202	351	554	98,014	16,346	114,360

Regional and national development of wind energy to 2030

FIGURE 5: 2030 INSTALLED CAPACITY PER REGION

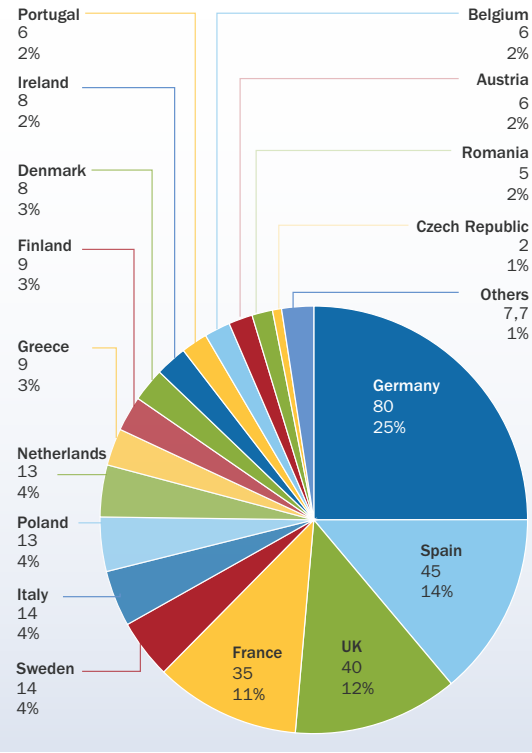


	Western Europe	Central Europe	Iberian Peninsula	Northern Europe	Southern Europe	Eastern Europe	Baltic
2014	28.8	41.5	27.9	10.9	10.8	8.2	0.6
Low	71.7	81	41	19.8	19.2	16.8	1.5
Central	101.9	88	50.9	31	23.1	22.5	2.7
High	129	98.5	59.5	43.3	30.4	26.8	4.6

By the end 2014 Central Europe[22] and the Iberian Peninsula[23] were the regions with the most installed capacity. According to the Central Scenario new capacity installed between present and 2030 will be concentrated in Western[24] (73 GW) and Central Europe (46 GW) while the Iberian Peninsula will see 23 GW of new capacity added. Over 20 GW of capacity will be installed in Northern Europe[25] between end 2014 and 2030 while 14 GW will be installed in Eastern Europe[26], 12 GW in Southern Europe[27] and 2 GW in the Baltic countries[28].

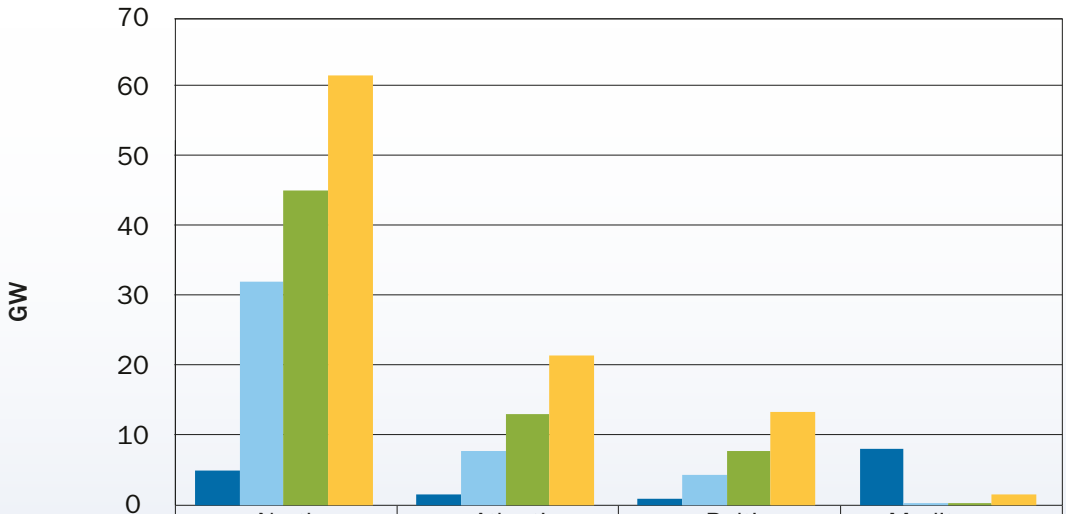
The outlook does not change in the High Scenario as the majority of new installations are still concentrated in Western and Central Europe, while in the Low Scenario it is Central Europe that will see the majority of installed capacity, followed by Western Europe.

FIGURE 6: 2030 WIND ENERGY INSTALLED CAPACITY BY COUNTRY ACCORDING TO CENTRAL SCENARIO (GW)



22 Austria, Czech Republic and Germany.
23 Portugal and Spain.
24 Belgium, France, Ireland, Luxembourg, the Netherlands and the UK.
25 Denmark, Finland and Sweden.
26 Bulgaria, Croatia, Hungary, Poland, Romania, Slovakia and Slovenia.
27 Cyprus, Greece, Italy and Malta.
28 Estonia, Latvia and Lithuania.

FIGURE 7: OFFSHORE WIND INSTALLATIONS PER SEA BASIN

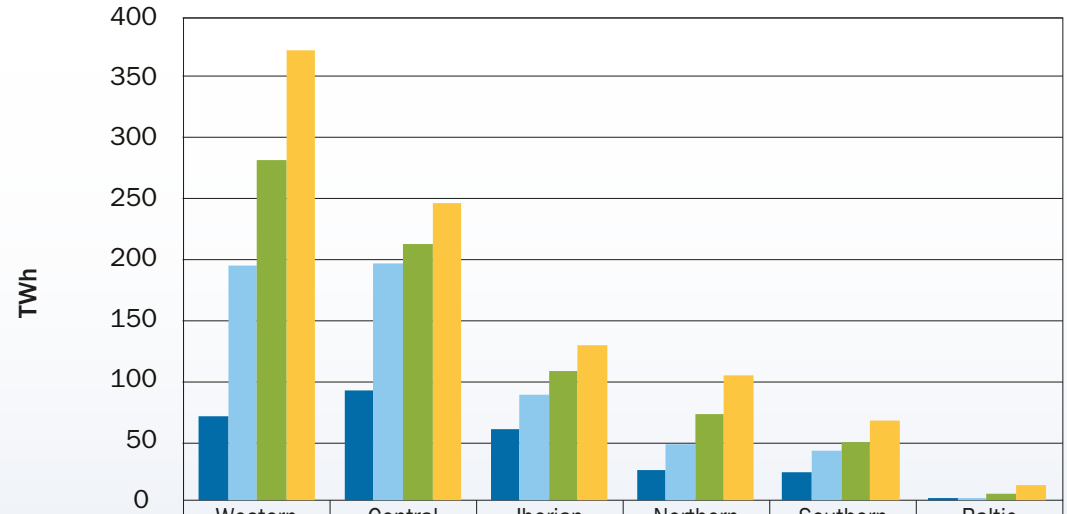


	North	Atlantic	Baltic	Mediterrean
2015*	5.1	1.8	1.1	0
Low	32.1	7.9	4.6	0.02
Central	45.2	13.3	7.9	0.02
High	61.5	21.5	13.5	1.5

*Figures current as of July 2015, EWEA. (2015). The European offshore wind industry - key trends and statistics 1st half 2015.

The North Sea sees the majority of offshore wind installations in 2030 with 45 GW according to the Central Scenario. The Atlantic Ocean and the Baltic Sea follow at well maintained distance with 13 GW and 8 GW respectively. 23 MW are going to be installed in the Mediterranean Sea in 2030. The majority of installations are to be seen in the North Sea according also to the Low and High Scenarios.

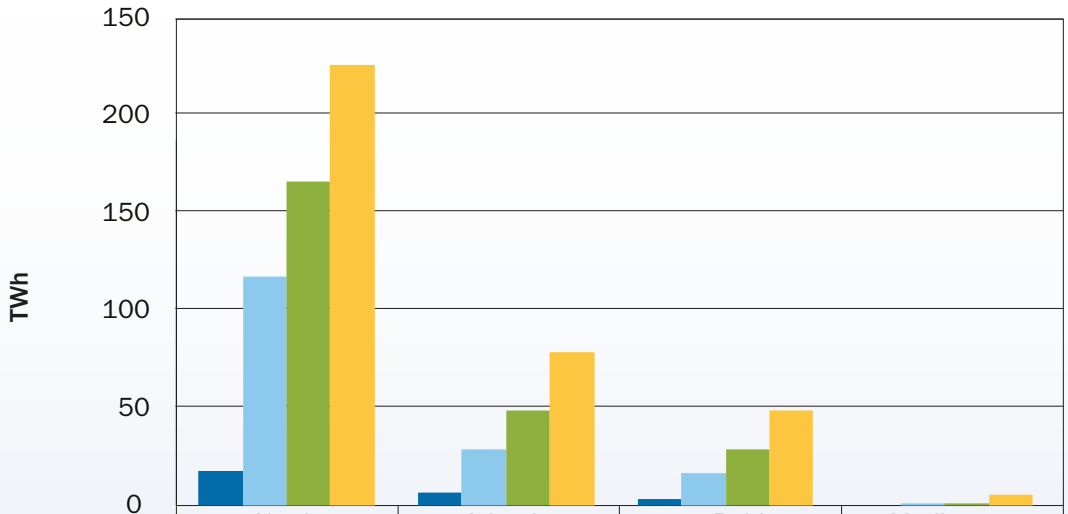
FIGURE 8: 2030 ELECTRICITY PRODUCTION PER REGION



	Western Europe	Central Europe	Iberian Peninsula	Northern Europe	Southern Europe	Baltic
2014	70	90.8	59.6	25.7	23	1.4
Low	193.5	196.1	87.5	46.7	41.1	3.2
Central	281	212.6	107.1	72.3	48.6	6.6
High	371	244.9	127.9	103.9	66.5	13.7

Naturally, the geographical distribution of power generation follows the distribution of capacity installed and, as a consequence, according to the Central Scenario most of the wind generated electricity in the EU will come from Western Europe with 281 TWh (meeting 9% of EU demand). Central Europe will be in the second place with 212 TWh (6.7% of EU demand). Similarly in the High Scenario Western Europe will provide 11.6% of overall demand for electricity, or 371 TWh and Central Europe 7.7% or 245 TWh. In the Low Scenario Central Europe supplies the majority of wind generated electricity with 196 TWh or 6.2% of EU power demand, closely followed by Western Europe with 193 TWh or 6.1% of EU power demand.

FIGURE 9: OFFSHORE WIND ELECTRICITY PRODUCTION PER SEA BASIN



	North	Atlantic	Baltic	Mediterrean
2015*	18.7	6.6	4.2	0
Low	118.4	28.9	16.9	0.06
Central	166.4	48.9	29.3	0.08
High	226.3	79.1	49.8	5.6

*Figures current as of July 2015, EWEA. (2015). The European offshore wind industry - key trends and statistics 1st half 2015.

Offshore wind will see 166 TWh, equal to 5.2% of overall EU electricity demand, coming from the North Sea in 2030 according to the Central Scenario, while 49 TWh and 29 TWh will come from capacity installed in the Atlantic Ocean and the Baltic Sea respectively. In this scenario, offshore wind in the Mediterranean Sea will generate up to 0.08 TWh.

Also in the High and Low Scenarios the majority of offshore wind generated electricity will come from the North Sea, followed by the Atlantic Ocean and the Baltic Sea.

ANNEX 1: CAPACITY SCENARIOS PER COUNTRY (MW)

	2014			2020 Target (Central scenario)			Low 2030 scenario			Central 2030 scenario			High 2030 scenario		
	Onshore	Offshore	Total	Onshore	Offshore	Total	Onshore	Offshore	Total	Onshore	Offshore	Total	Onshore	Offshore	Total
Austria	2,095	-	2,095	3,400	-	3,400	5,000	-	5,000	5,800	-	5,800	6,650	-	6,650
Belgium	1,247	713	1,959	3,000	1,500	4,500	2,650	2,200	4,850	3,300	3,000	6,300	4,000	3,800	7,800
Bulgaria	690	-	690	1,500	-	1,500	1,000	-	1,000	1,220	-	1,220	1,440	-	1,440
Croatia	347	-	347	600	-	600	1,600	-	1,600	1,800	-	1,800	2,000	-	2,000
Cyprus	147	-	147	300	-	300	447	-	447	483	-	483	581	-	581
Czech Republic	282	-	281	1,000	-	1,000	1,040	-	1,040	2,200	-	2,200	4,320	-	4,320
Denmark	3,603	1,271	4,845	3,700	2,800	6,500	3,300	2,650	5,950	4,600	3,530	8,130	6,000	5,320	11,320
Estonia	303	-	303	700	-	700	365	-	365	433	750	1,183	500	1,500	2,000
Finland	607	26	627	2,500	26	2,526	5,000	26	5,026	8,500	26	8,526	12,000	26	12,026
France	9,285	-	9,285	18,500	1,500	20,000	19,000	6,000	25,000	26,250	9,000	35,250	28,000	15,000	43,000
Germany	38,369	1,049	39,165	45,000	6,500	51,500	60,000	15,000	75,000	62,500	17,500	80,000	65,000	22,500	87,500
Greece	1,980	-	1,980	4,500	-	4,500	8,000	-	8,000	9,000	-	9,000	12,000	500	12,500
Hungary	329	-	329	600	-	600	925	-	925	973	-	973	1,051	-	1,051
Ireland	2,246	25	2,272	4,000	25	4,025	5,500	25	5,525	6,892	800	7,692	8,390	1,200	9,590
Italy	8,665	-	8,663	12,000	-	12,000	10,768	-	10,768	13,600	-	13,600	16,768	500	17,268
Latvia	62	-	62	200	-	200	234	-	234	308	-	308	430	-	430
Lithuania	279	-	279	600	-	600	878	-	878	1,110	-	1,110	1,200	1,000	2,200
Luxembourg	58	-	58	100	-	100	123	-	123	141	-	141	169	-	169
Malta	-	-	-	30	-	30	30	-	30	49	-	49	80	-	80
Netherlands	2,565	247	2,805	4,000	1,400	5,400	5,872	6,000	11,872	6,067	6,500	12,567	6,391	7,000	13,391
Poland	3,834	-	3,834	10,000	-	10,000	7,900	500	8,400	11,800	1,350	13,150	13,500	2,200	15,700
Portugal	4,913	2	4,915	5,700	25	5,725	5,924	27	5,951	6,373	27	6,400	7,012	27	7,039
Romania	2,954	-	2,954	3,200	-	3,200	4,500	-	4,500	5,000	-	5,000	6,000	-	6,000
Slovakia	3	-	3	300	-	300	300	-	300	331	-	331	486	-	486
Slovenia	3	-	3	30	-	30	33	-	33	49	-	49	75	-	75
Spain	22,982	5	22,987	26,000	5	26,005	35,000	5	35,005	44,500	5	44,505	52,000	500	52,500
Sweden	5,220	212	5,425	6,000	212	6,212	8,600	202	8,802	13,300	1,000	14,300	18,000	2,000	20,000
UK	7,953	4,494	12,440	11,500	9,500	21,000	12,300	12,000	24,300	17,000	23,000	40,000	20,000	35,000	55,000
Total	121,021	8,044	128,744	168,960	23,493	192,453	206,291	44,635	250,926	253,578	66,488	320,066	294,043	98,073	392,116

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About EWEA

EWEA is the voice of the wind industry, actively promoting wind power in Europe and worldwide. It has over 600 members, which are active in over 50 countries, including wind turbine manufacturers with a leading share of the world wind power market, component suppliers, research institutes, national wind and renewables associations, developers, contractors, electricity providers, finance and insurance companies, and consultants. This combined strength makes EWEA the world's largest and most powerful wind energy network.

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