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THE EUROPEAN WIND ENERGY ASSOCIATION

Green Growth

The impact of wind energy on jobs and the economy

A report by the European Wind Energy Association - April 2012

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“Wind energy is a pivotal element in the necessary transition to a green growth economy. The way I see it, decarbonisation is a prerequisite to growth. Investments in energy system transformation will drive growth and employment in a wide range of sectors. Every euro spent on the green transition is an investment in European jobs.”

Danish Energy and Climate Minister Martin Lidegaard in Wind Directions magazine, April 2012

Content

Photo: Siemenns

EXECUTIVE SUMMARY

The wind energy industry: a driver for economic growth

The wind energy industry is a proven recession-busting industry and investment in the wind power sector should be seen as a way to restore Europe's economy to health. Putting in place stable legislative frameworks which encourage the building, installing and operating of wind turbines has resulted in economic growth since the financial and economic crisis, and will continue to lead to economic growth.

Governments and the European Commission should therefore see wind energy as not only a solution to climate change and a way to improve energy security, but also a way to boost economic growth and competitiveness. As such, investment in the wind industry should be seen as a strategy to deliver economic growth, and stable legislative frameworks to promote the development of the wind industry should be maintained and enhanced, even in times of austerity.

In 2010 the wind energy sector – both directly and indirectly – contributed €32.43 billion (bn) to the EU's GDP, 0.26% of the EU's total GDP for that year. The contribution of the wind energy sector is higher than the contribution of the footwear industry (0.21%). Wind energy's contribution can also be compared to the furniture sector, which contributed 0.99% of EU GDP in 2010, to the civil aviation sector, which contributed 1.5% of EU GDP in 2010, to the automotive industry at 6.5% and to construction at 9.9%.

In 2010 the increase in the wind industry's contribution to GDP, at 4.1%, was twice as high as the growth of GDP itself. Between 2007 and 2010 the wind energy sector increased its contribution to GDP by 33%. The wind industry is growing faster than the EU's economy as a whole and this will remain the case over the next two decades.

As such the wind industry will continue to be a driver for economic growth over the next twenty years. In 10 years' time the wind industry's contribution to GDP will increase almost three-fold, with the sector expected to generate 0.59% of the EU's GDP whilst having doubled employment. In twenty years' time the wind industry's contribution to GDP will increase five-fold to reach €174 bn, almost 1% of total EU GDP, and employment will have increased by a factor of three.

The wind energy industry: a major industrial exporter

€8.8 bn worth of products and services were exported by the European wind industry in 2010, up 4.2% on the previous year and up 33% since 2007. In contrast, the sector imported €3.2 bn worth of products and services in 2010, making it a net exporter of €5.7 bn worth of products and services[1].

The wind energy industry: contributing taxes

Tax payments from companies in the wind energy sector amounted to €3.59 bn in 2010, mostly corporate and income taxes but also regional and local taxes, and property taxes. Taxes paid by the wind industry have increased by over 50% since 2007.

The wind energy industry: avoiding fuel costs

Wind energy displaces electricity generated by fossil fuels, which not only reduces electricity prices and CO_2 emissions, but also avoids the cost of buying those fuels. In 2010 avoided fuel costs (for coal, oil, gas, biomass, waste) from wind power production was €5.71 bn. For the 2007 to 2010 period, wind energy avoided fuel costs totalling €20.18 bn.

The wind energy sector: a motor for other European economic sectors

The wind industry buys and sells products and services from and to other economic sectors. This

[1] €8.831 billion of exports minus €3.171 billion of imports comes to €5.66 billion, rounded up to €5.7 billion.

interdependence between sectors means that the wind industry is a driving force for many other industries – including metals, electric and electronic equipment, IT, construction, transport, and financial services. As a result the growing wind industry has helped other industrial and economic sectors weather the economic crisis.

The wind energy sector: creating jobs in Europe

Employment in the wind energy sector stood at 238,154[2]. Between 2007 and 2010, the number of jobs in the sector grew by nearly 30%, whilst EU unemployment rose by 9.6%[3].

The wind energy sector: maintaining global technology leadership through R&D

The wind industry spent more than 5% of its total turnover on research and development (R&D) in 2010. Since 2007, R&D spending has consistently represented over 5% of the sector's turnover, almost three times higher than the economy-wide average, and well above the EU's objective of 3% of GDP being invested in R&D. Wind turbine manufacturers commit the most to R&D – around 10% of their total turnover – highlighting how well placed European wind power companies are to take on the challenge emerging from China, the US, India, South Korea and Japan.

The wind energy sector: a global leader

Over 48% of European wind energy companies also work outside the EU, employing some 20,000 EU professionals in non-EU countries. Of the 10 biggest wind turbine manufacturers in the world, four are EU-based. Of the ten biggest wind energy developers in the world, five are EU-based.

Policy recommendations

Key elements of maintaining the growth of the European wind power sector and European leadership of the sector are technology development and policies to support the expansion of a European wind industry, that is, policies to promote the continued development of European markets, both onshore and offshore, as well as increased R&D.

Binding 2030 renewable energy target

European leadership of the wind industry is a result of successful European policy frameworks for renewables, centred on renewable energy targets. These were initiated with the 1997 European Commission White Paper on Renewable Sources of Energy and followed up with legislation and targets for 2010 and 2020. EWEA believes that the most effective way to maintain and expand Europe's leadership in wind energy would be a continuation of those policies in the form of a binding 2030 renewable energy target, together with effective national implementation of the existing Renewable Energy Directive.

EU financial commitment to R&D

The EU has already made a political commitment to develop renewable energy and to increase public spending for technological R&D. Now it is crucial for the EU to take action and commit to financing the €6 bn 10 year wind energy R&D programme of the European Wind Initiative (under the EU's SET-Plan). Industry has already committed to contributing 50% of the financing, with research focused on new turbines and components, offshore technology, grid integration, and resource assessment.

Removal of trade and investment barriers

The European Union should take the lead in pursuing an international trade agreement on environmental goods and services (EGSA), focused on renewable energy technologies in order to ensure the removal of all trade barriers, both tariff and non-tariff barriers, including local content requirements. The EU should also give high priority to improving market access for the wind industry in relation to FTA negotiations with the EU's main trading partners.

Development of electricity infrastructure, system operation and markets

The European Commission should continue its development of an interconnected European power system. European wind turbine manufacturers have

[2] The word "jobs" is used in this report refers to "full time equivalents" or "FTEs" – that is, the number of full-time posts the total number of hours worked represents. It may not correspond exactly to the total number of people employed due to some people working part-time.

[3] August 2011. Source: Eurostat.

mastered the technical challenges associated with increasing penetration levels of wind energy by equipping turbines with highly sophisticated grid integration features. Europe is a global leader in R&D on grid infrastructure technologies, including the concept of the offshore super node linking together offshore wind farms, and High Voltage Direct Current (HVDC) power transmission projects, such as those being developed and operated by European companies in China and India (although interestingly not yet in Europe).

Ambitious climate targets

An EU target of 30% domestic greenhouse gas (GHG) reductions by 2020 is crucial to direct investments towards a sector which delivers emissions reductions in Europe. By 2020 wind energy can deliver domestically 31% of the EU's 20% emissions reduction target, or 20% of a potential 30% emissions reduction target.

KEY FINDINGS

Key findings for 2010:

- The wind industry contributed €32.43 bn to EU GDP, an increase of 33% since 2007, with the sector generating 0.26% of the EU's GDP.
- The wind industry paid €3.59 bn in taxes, an increase of over 50% since 2007.
- The wind industry avoided €5.71 bn in fuel costs from coal, oil, gas, biomass and waste.
- The wind energy sector exported €8.8bn worth of products and services, an increase of 33% since 2007.
- The wind industry directly and indirectly employed 238,154 people in the EU, an increase of 30% since 2007.
- The wind industry spent over 5% of its turnover in R&D, three times more than the economy-wide average.
- Over 48% of EU wind energy companies had activities outside of the EU.

Key findings for 2020:

- The wind industry will contribute €94.5 bn to EU GDP, an almost three-fold increase over the next ten years, with the sector generating 0.59% of the EU's GDP: the wind industry will continue to be a driver for economic growth over the next ten years
- The number of jobs will increase to 520,000 by 2020, a rise of more than 200% over the next 10 years.

Key findings for 2030:

- The wind industry will contribute €173 bn to EU GDP, generating almost 1% of the EU's GDP, a five-fold increase over the next 20 years.
- The number of jobs will increase to 794,079, an increase of 233% over 20 years.

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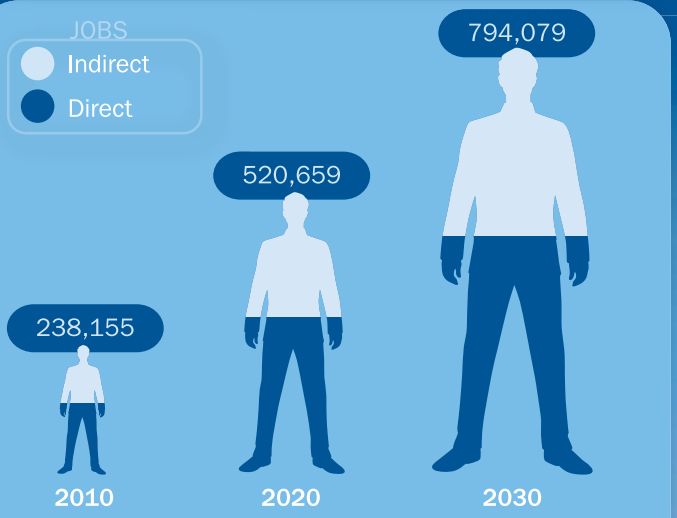
Creating jobs



Evolution of EU wind energy sector direct and indirect employment

EU wind industry exports increased by 33% to €5.7bn in 2010

A net exporter

In 2010, the wind energy sector spent €900 mn on R&D

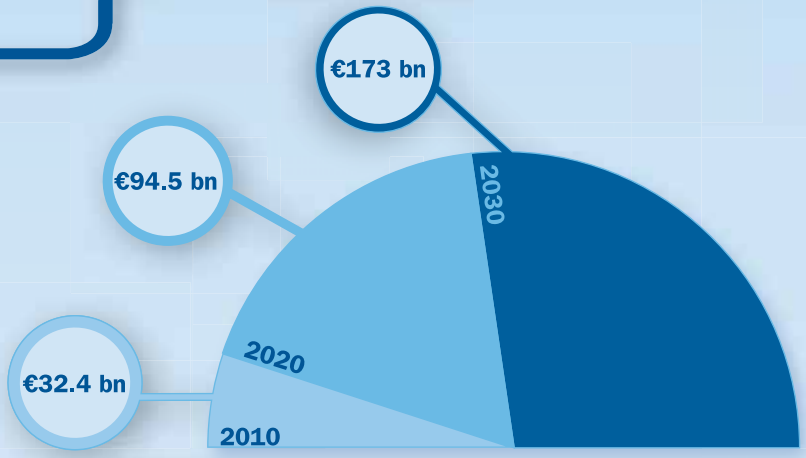
Wind turbine manufacturers commit the most to R&D, around 10% of their turnover

Since 2007, the sector's R&D spending has constantly been 2.5 to 3 times more than economy-wide expenditure

An R&D leader

Avoiding fuel costs

Wind energy avoided fuel cost in 2010



Increasing EU GDP benefit

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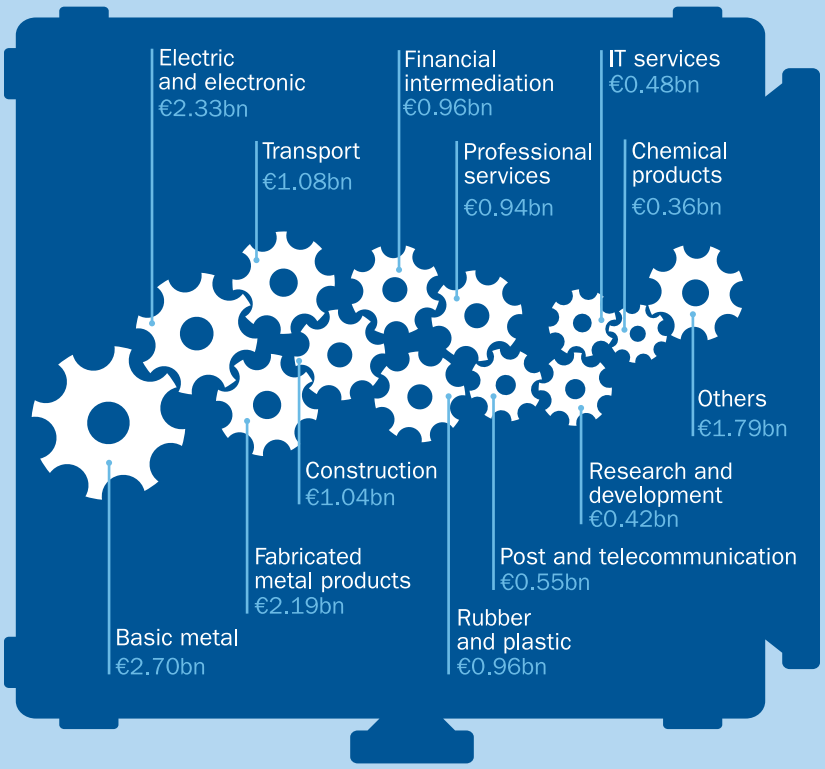
Contribution to EU GDP

EU GDP

Wind energy sector contributed
€32.43 billion
0.26% of total EU GDP in 2010
an increase of 33% since 2007

A motor for the economy



Indirect added value generated

A major sector


Civil aircraft
1.50%


Furniture
0.99%


Clothing
0.62%


Wind energy sector
0.26%


Footwear
0.21%

Share of GDP of five EU economic sectors

Taxes paid

€3.59 bn
in tax paid in 2010
an increase of over 50% since 2007

Photo: Feindate

1 INTRODUCTION

The wind power industry has grown considerably over the past 15 years. In 1997, when the European Commission published its White Paper with a target of 40 GW wind power by 2010, there were 4.8 GW of installed wind power capacity in the EU. By the end of 2011 this figure had risen to 94 GW, able to produce 204 TWh of electricity and meet 6.3% of the EU's total electricity demand.

Wind energy makes a significant contribution to the EU's energy and climate objectives, competitiveness, and energy security. Over the next 20 years, wind energy's growth will continue. The European Wind Energy Association (EWEA) expects 230 GW of installed capacity in 2020 and 400 GW by 2030. Wind power is gearing up to become the main power technology in the EU. The European Commission, in its Energy Roadmap 2050[4], expects wind energy to be the key technology by 2050, supplying more electricity than any other technology and meeting between 31.6% and 48.7% of Europe's electricity production.

Consequently, as an industrial sector, the wind industry has an increasingly important role in Europe's economy, contributing to the creation of value, to gross domestic product (GDP) and job creation, and to the development of other economic sectors[5].

This report evaluates the impact of the wind energy industry on the European economy between 2007 and the end of 2010. Between September and December 2011, 350 companies working in wind energy in the EU were surveyed by Deloitte. Their impact on Europe's economy was evaluated by analysing eight indicators.

- The direct contribution of the sector and its subsectors to the EU's GDP: wind energy developers, wind turbine manufacturers, manufacturers of dedicated equipment and components, and service providers.
- Specification of the wind industry's main turnover components: internal demand, external demand, total revenues, expenses, employee compensation, business cash flow, and so on.
- Contribution to job creation in the different sub-sectors.
- Indirect contribution to other GDP sectors: metallurgy, electronic equipment providers, financial services, professional services, etc.
- Indirect contribution to job creation in other economic sectors.
- Tax balance assessment: corporate tax, local and regional taxes.
- Impact on balance of trade: exports and imports figures.
- Comparison of the wind energy sector's contribution to GDP with that of other economic sectors.

Furthermore, based on the projected growth of wind power over the coming 20 years, the report also calculates the impact the sector will have in 2020 and 2030.

- Direct and indirect contribution to GDP of the sector.
- Direct and indirect contribution to job creation.

Finally, the report evaluates the global importance of the European wind industry.

- Number of European companies among the worldwide leaders.
- Volume of exports.
- Existence of complementary industries and service providers (percentage of supplies from European companies).

[4] http://ec.europa.eu/energy/energy2020/roadmap/index_en.htm

[5] Gross domestic product (GDP) is defined as the market value of all final goods and services produced in a country during a time period. GDP is the sum of final consumption expenditure, gross capital formation (GCF), and net exports (exports minus imports).

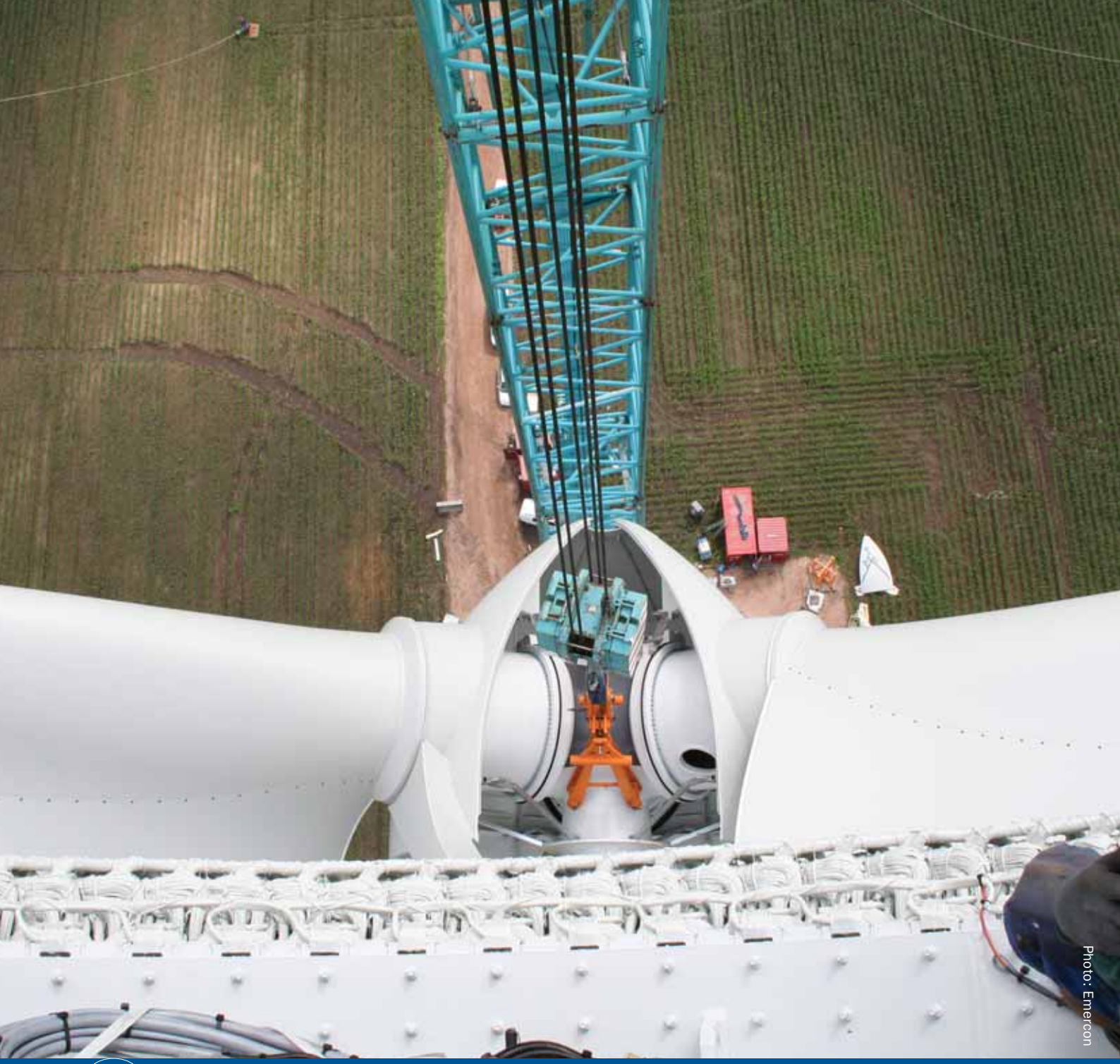


Photo: Emercon

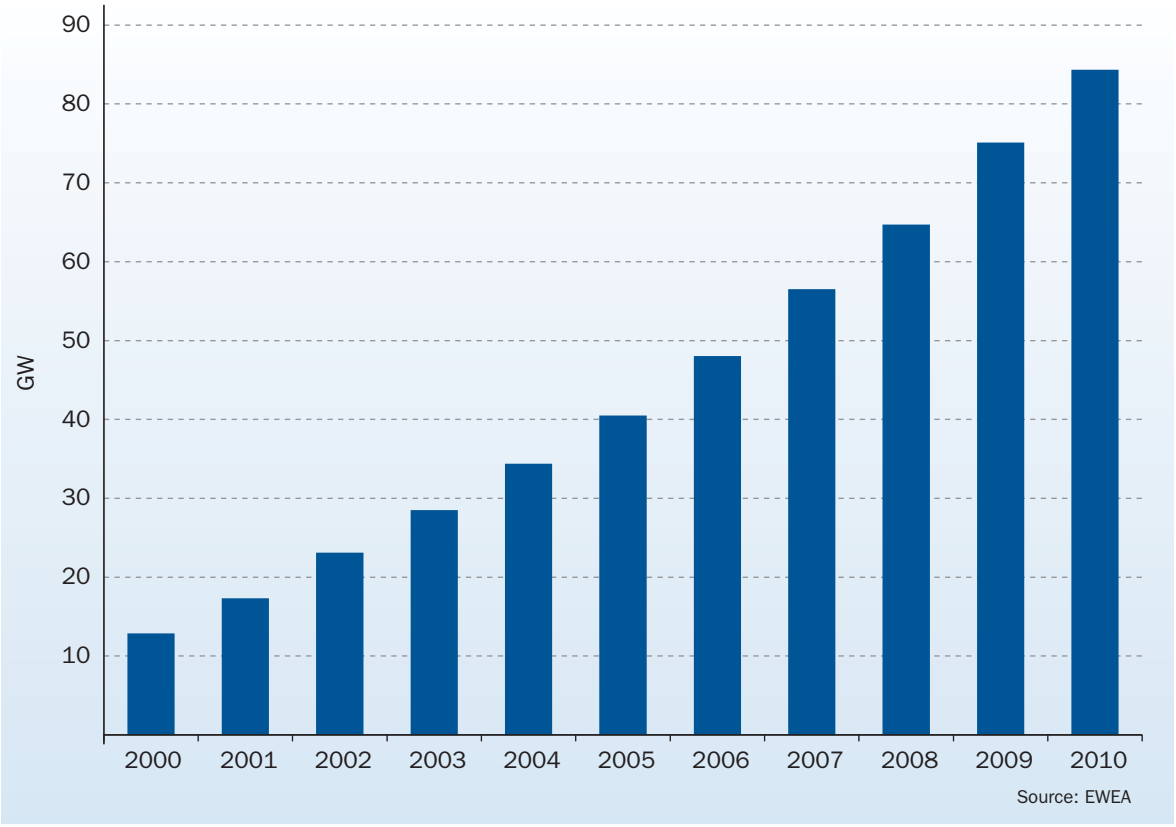
2 CURRENT STATUS OF WIND ENERGY AND GROWTH FORECASTS

In 2010 installed wind energy capacity increased by 9.3 GW to reach a total of 84.3 GW in the EU, a 12.4% increase on the previous year. The largest share of new capacity was installed in Spain (1,516 MW), followed by Germany (1,493 MW), France (1,086 MW), United Kingdom (962 MW) and Italy (948 MW). Germany and Spain each installed 16% of the EU's total new capacity in 2010. Moreover, Germany has 32% and Spain 25% of all installed wind capacity in the EU.

TABLE 2.1 2010 ANNUAL AND CUMULATIVE INSTALLED WIND POWER CAPACITY IN EU MEMBER STATES

	Annual (MW) 2010	Total (MW) 2010	% of total EU capacity
Austria	16	1,011	1.2%
Belgium	350	911	1.1%
Bulgaria	198	375	0.4%
Cyprus	82	82	0.1%
Czech Republic	23	215	0.3%
Denmark	364	3,798	4.5%
Estonia	7	149	0.2%
Finland	52	197	0.2%
France	1,086	5,660	6.7%
Germany	1,493	27,214	32.3%
Greece	123	1,208	1.4%
Hungary	94	295	0.3%
Ireland	118	1,428	1.7%
Italy	948	5,797	6.9%
Latvia	2	31	0%
Lithuania	63	154	0.2%
Luxembourg	7	42	0%
Malta	0	0	0%
Netherlands	32	2,245	2.7%
Poland	382	1,107	1.3%
Portugal	363	3,898	4.6%
Romania	448	462	0.5%
Slovakia	0	3	0%
Slovenia	0	0	0%
Spain	1,516	20,676	24.5%
Sweden	604	2,163	2.6%
United Kingdom	962	5,204	6.2%
European Union	9,332	84,324	

FIGURE 2.1 INSTALLED WIND POWER CAPACITY IN THE EU FROM 2000 TO 2010 (GW)

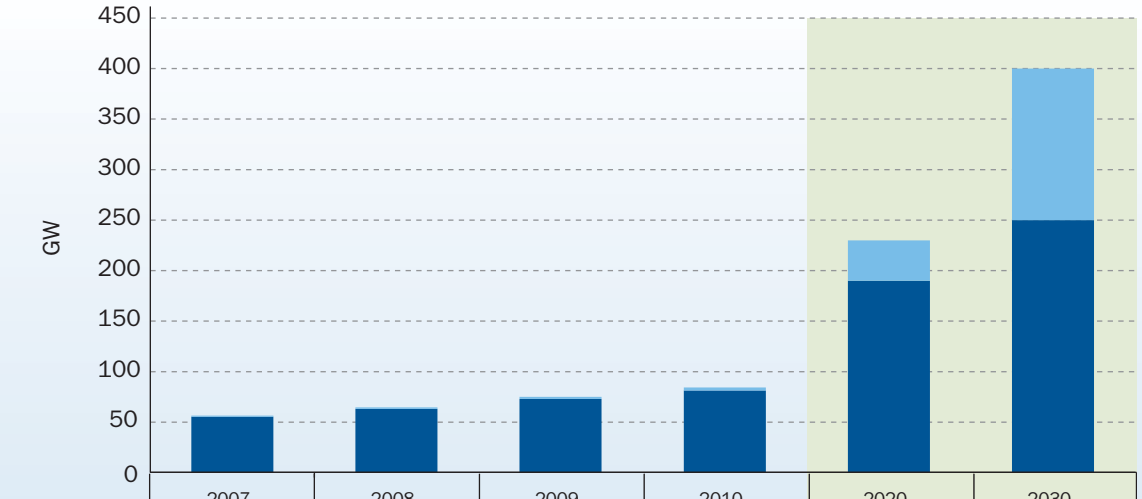


In 2010, 2,965 MW of wind capacity was operational offshore; that is, 3.5% of total installed wind energy capacity. Over the next two decades this share is expected to increase to 17.4% in 2020 (40 GW) and 37.5% in 2030 (150 GW).

The 84 GW of installed capacity at end 2010 generates, in an average wind year, 181 TWh of electricity, enough to meet 5.3% of the EU's gross final electricity consumption. Offshore wind installations at end 2010 produced 10.6 TWh, 5.8% of total wind energy production.

In 2020 and 2030 wind energy will generate 581 TWh and 1,153 TWh respectively, 25.5% and 48.7% of which will be produced offshore.

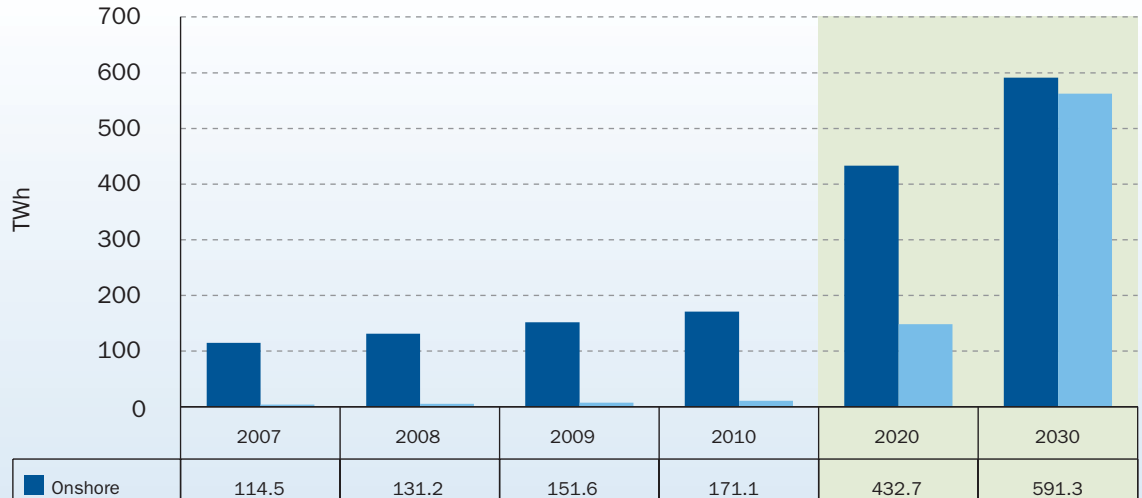
FIGURE 2.2 TOTAL ON- AND OFFSHORE WIND POWER CAPACITY IN THE EU FROM 2007 TO 2010 AND 2020 AND 2030 FORECASTS (GW)



	2007	2008	2009	2010	2020	2030
Onshore	55.4	63.2	73.0	81.4	190.0	250.0
Offshore	1.1	1.5	2.1	2.9	40.0	150.0

Source: EWEA

FIGURE 2.3 ON- AND OFFSHORE WIND GENERATION FROM 2007 TO 2010 AND 2020 AND 2030 FORECASTS (TWh)



	2007	2008	2009	2010	2020	2030
Onshore	114.5	131.2	151.6	171.1	432.7	591.3
Offshore	3.9	5.3	7.4	10.6	148.2	562.4

Source: EWEA

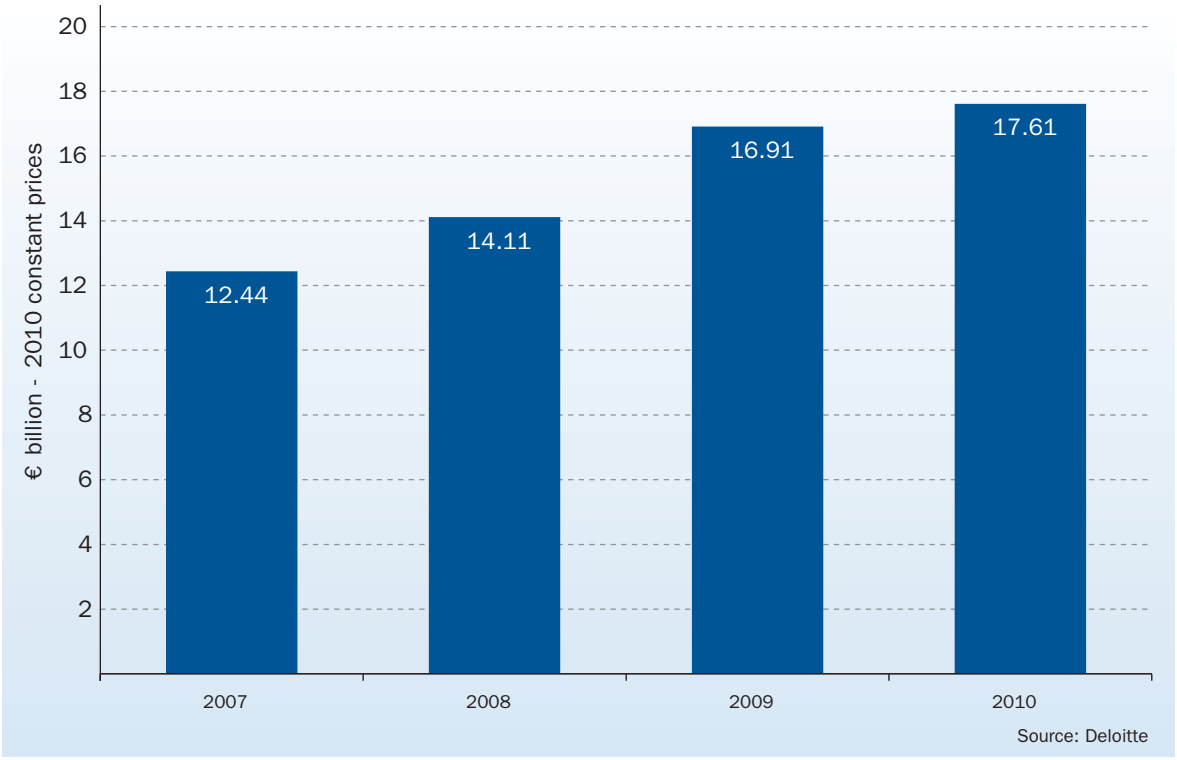
Photo: Benjamen Brolet

3 DIRECT IMPACT OF WIND ENERGY SECTOR ON EU ECONOMY

3.1 Direct contribution to GDP

The direct contribution of the wind energy sector in the EU's GDP was €17.61 bn in 2010. The total direct contribution to GDP between 2007 and 2010 was €61.07 bn[6].

FIGURE 3.1 EU WIND ENERGY SECTOR DIRECT CONTRIBUTION TO GDP FROM 2007 TO 2010 IN CONSTANT PRICES



Source: Deloitte

[6] Constant terms, base 2010.

In 2010 the wind energy sector increased its direct contribution to GDP in real terms by 4.1% compared to 2009. Between 2007 and 2010, direct contribution to GDP grew by 41.5% in real terms. This increase took place across the whole wind energy value chain.

In 2010 the industry's net exports (the difference between exports and imports) were worth €5.66 bn. Total exports reached €8.83 bn. Only 9.9% of total wind energy inputs[7] are imported: in 2010 the wind energy industry's direct total expenditure was €32.10 bn and direct imports €3.17 bn.

TABLE 3.1 WIND ENERGY'S DIRECT CONTRIBUTION TO EU GDP IN CURRENT AND CONSTANT PRICES (BASE 2010)

Direct GDP contribution (billion €)	2007		2008			2009			2010		
	Constant prices	Current prices	Constant prices	% variation previous year	Current prices	Constant prices	% variation previous year	Current prices	Constant prices	% variation previous year	Current prices
Internal demand	8.51	8.05	9.23	9%	9.07	11.66	26%	11.36	11.95	3%	11.95
Wind industry net exports	3.93	3.72	4.88	24%	4.79	5.25	8%	5.12	5.66	8%	5.66
Exports	6.60	6.24	7.84	19%	7.70	8.48	8%	8.26	8.83	4%	8.83
Imports	2.67	2.52	2.96	11%	2.91	3.22	9%	3.14	3.17	-2%	3.17
Expenditure approach	12.44	11.77	14.11	13%	13.86	16.91	20%	16.48	17.61	4%	17.61
Total income	38.69	36.59	43.15	12%	42.38	49.53	15%	48.27	49.71	0%	49.71
Total expenditure	26.25	24.82	29.04	11%	28.52	32.62	12%	31.79	32.10	-2%	32.10
Added value approach	12.44	11.77	14.11	13%	13.86	16.91	20%	16.48	17.61	4%	17.61
Compensation of employees	4.41	4.18	4.94	12%	4.85	5.74	16%	5.59	5.89	3%	5.89
Gross fixed capital consumption	3.73	3.52	4.04	8%	3.96	4.71	17%	4.59	5.17	10%	5.17
Net operating surplus and mixed income	4.30	4.07	5.13	19%	5.04	6.46	26%	6.30	6.56	1%	6.56
Income approach	12.44	11.77	14.11	13%	13.86	16.91	20%	16.48	17.61	4%	17.61

[7] "Inputs" refers to resources such as people, raw materials, energy, information, or finance that are put into a system to obtain a desired output.

FIGURE 3.2 GROWTH OF WIND ENERGY SECTOR DIRECT CONTRIBUTION TO EU GDP

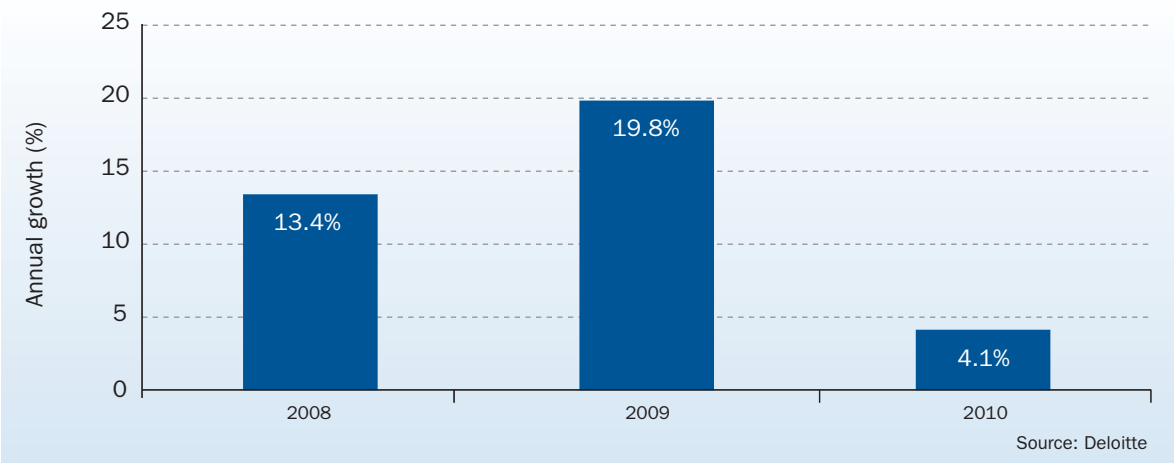
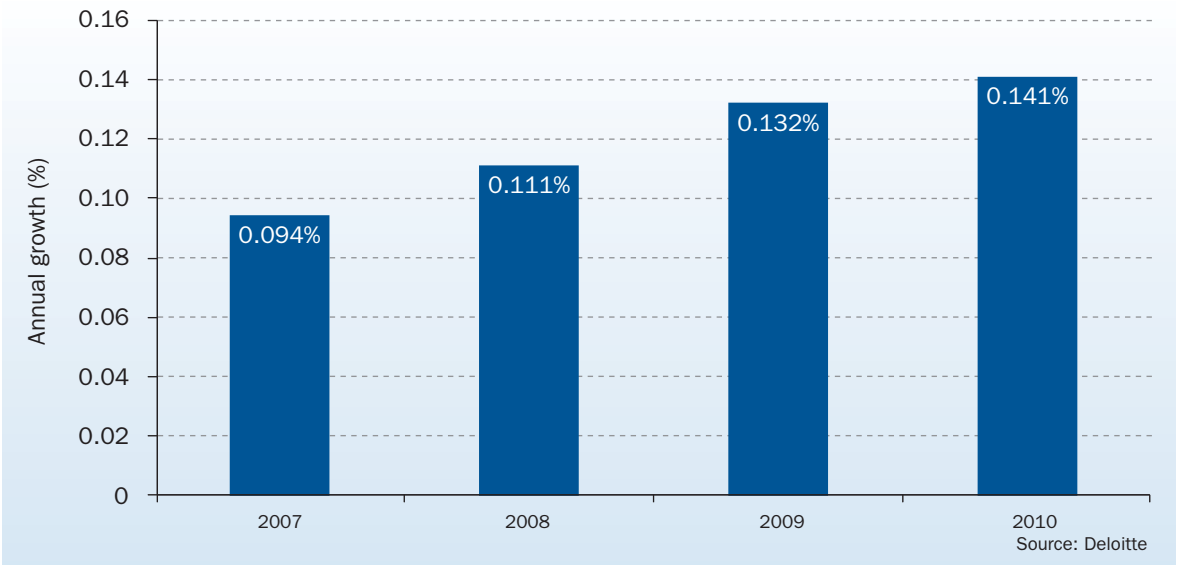


FIGURE 3.3 WIND ENERGY SECTOR'S SHARE OF OVERALL EU GDP

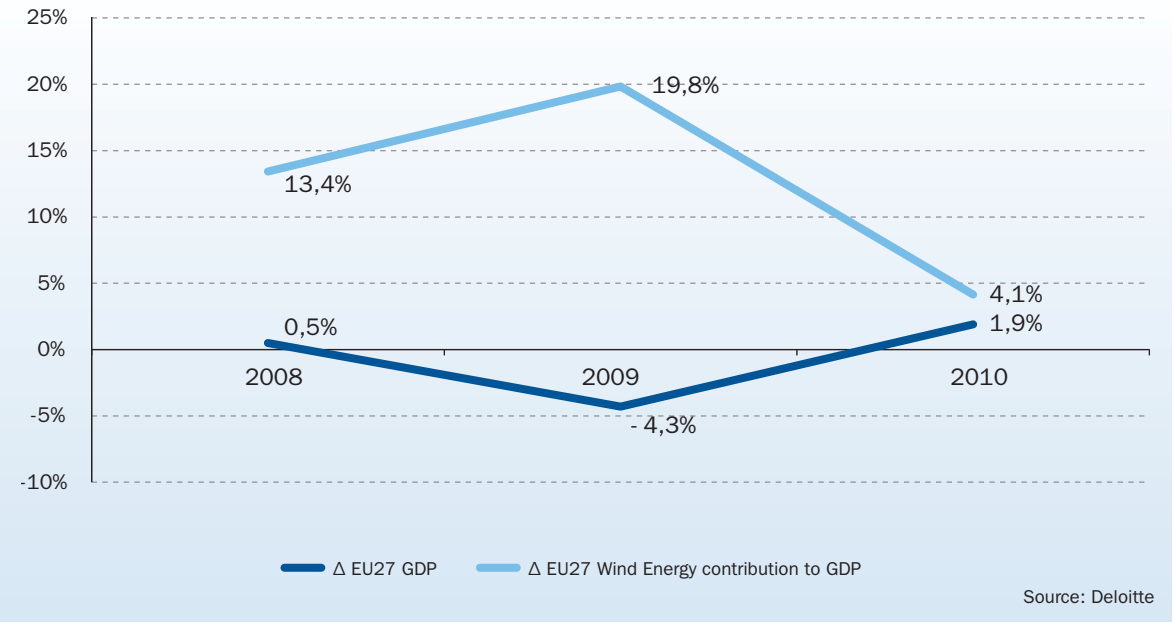


In 2010, the wind industry's direct contribution to GDP was more than 0.14% of the EU's total GDP, while in 2007 it was less than 0.1%.

The growth of the wind industry's contribution to the EU's GDP is greater, over the four year period from 2007 to 2010, than the overall growth of the EU's GDP. The sector, thus, made an important economic contribution to the EU's GDP during this period of slow growth (including a year of economic recession): in 2010 the increase in wind industry's contribution to GDP, at 4.1%, was twice as high as the growth of GDP itself.

[8] Sources of information: International Monetary Fund for GDP, European Central Bank for exchange rates for countries that are not part of the Eurozone.

FIGURE 3.4 WIND ENERGY'S DIRECT CONTRIBUTION TO EU GDP AND EU GDP GROWTH



Source: Deloitte

Due to Europe's move towards a fully decarbonised power system by 2050, the EU's 2020 20% renewable energy target and discussions on 2030 renewable energy targets, the wind industry should continue to increase its contribution to the EU's GDP over the coming decades.

3.2 Wind industry sub-sectors' contribution to direct GDP

The wind energy sector can be divided into four main sub-sectors: service providers, component manufacturers, wind turbine manufacturers and developers.

The different sub-sectors have not evolved identically over the last four years, as their growth depends on different variables. While wind energy developers are dependent on the amount of energy sold and the fluctuation of energy prices, wind turbine and component manufacturers are mainly affected by capacity installations in the short and medium term, production costs, including raw materials, and market evolution. The growth of the services sub-sector – which includes companies supplying to all of the value chain – will vary according to the growth of the component manufacturers, wind turbine manufacturers and developers.

The contribution of all sub-sectors to GDP is listed in figure 3.6. Their relative weight can be seen in figure 3.7.

FIGURE 3.5 WIND INDUSTRY SUPPLY CHAIN

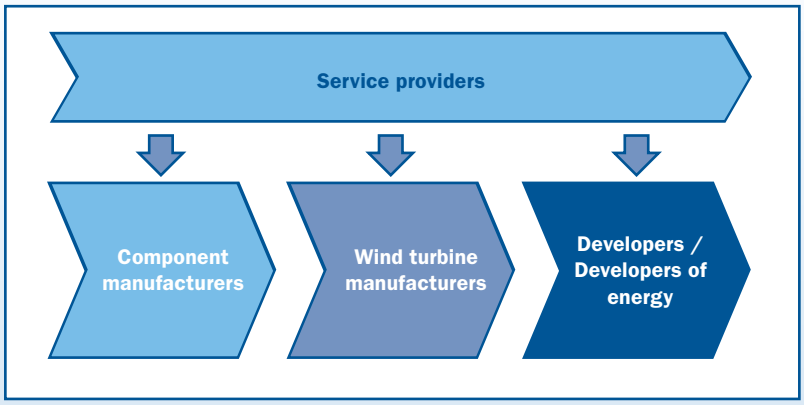
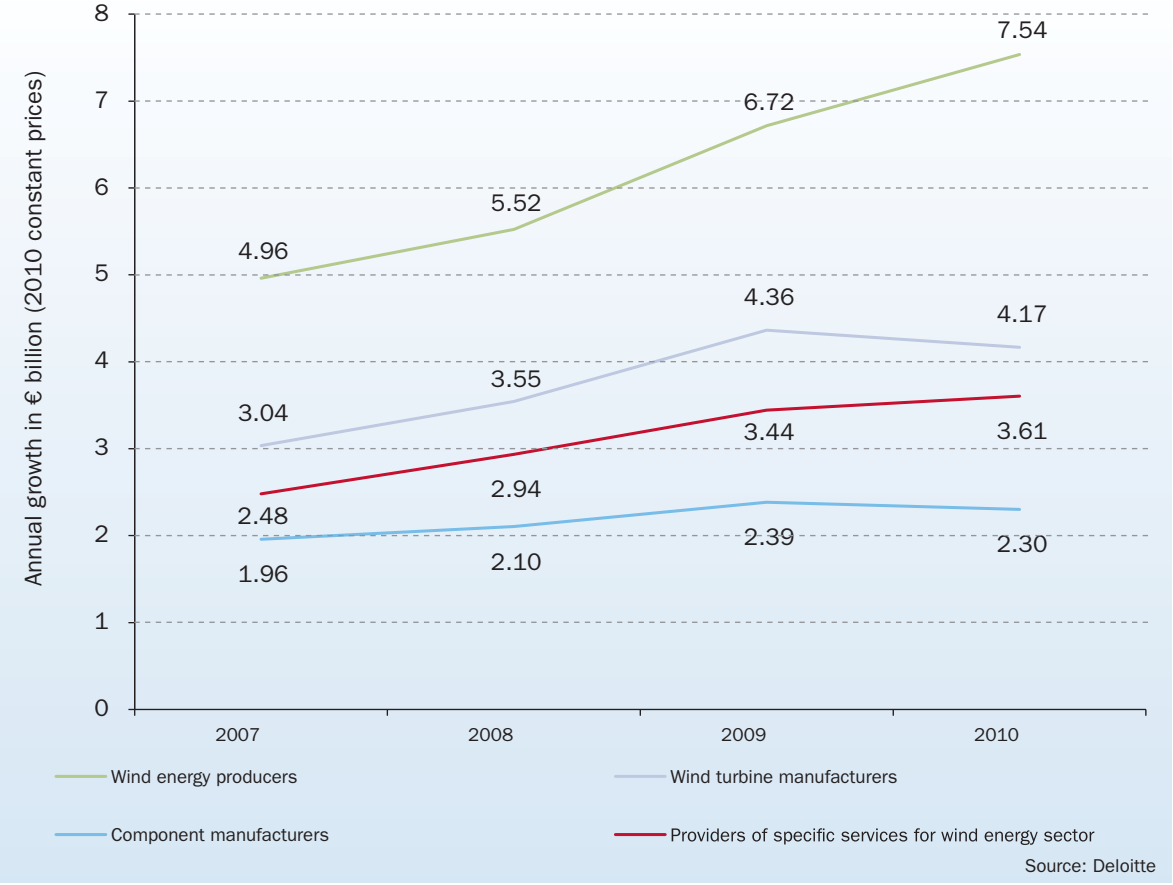


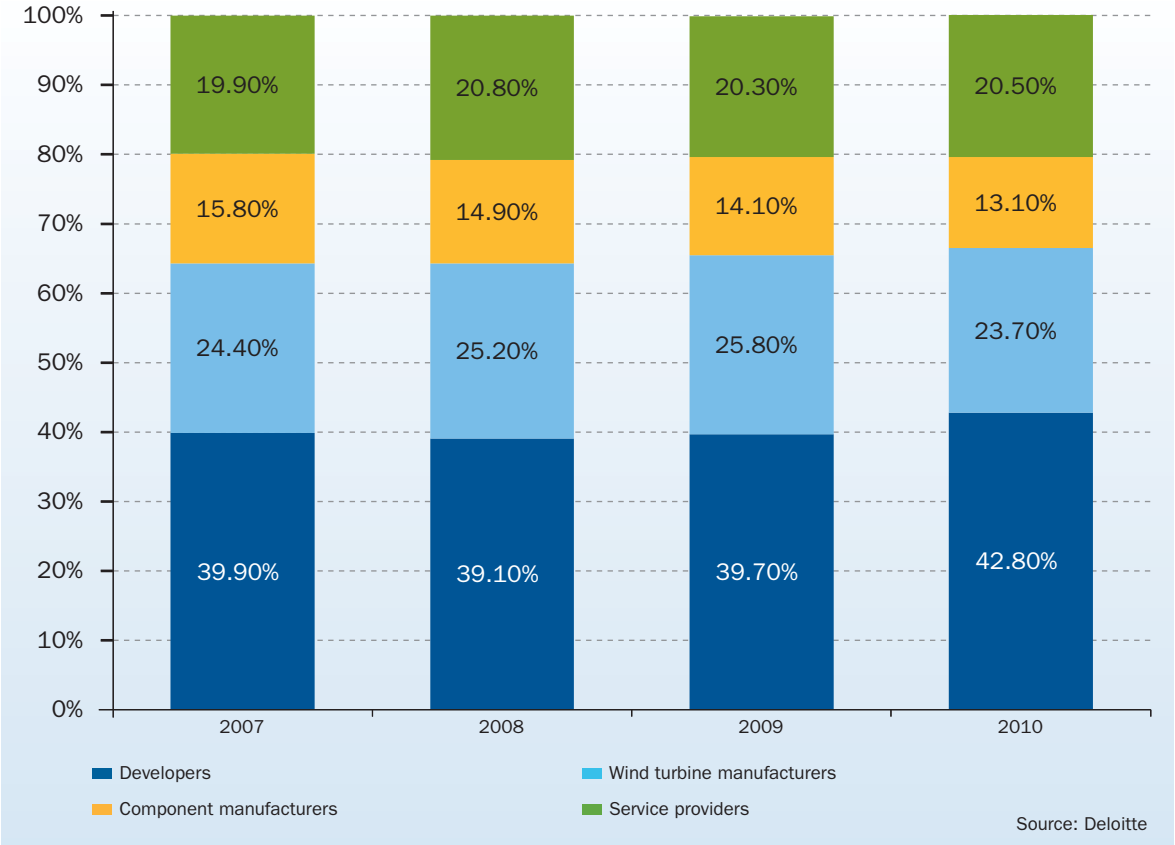
FIGURE 3.6 CONTRIBUTION OF THE WIND INDUSTRY'S SUB-SECTORS TO DIRECT GDP



Source: Deloitte

€bn – constant prices (2010)	2007		2008		2009		2010	
	Contribution	Share	Contribution	Share	Contribution	Share	Contribution	Share
Developers	4.96	39.9%	5.52	39.1%	6.72	39.7%	7.54	42.8%
Wind turbine manufacturers	3.04	24.4%	3.55	25.2%	4.36	25.8%	4.17	23.7%
Component manufacturers	1.96	15.8%	2.10	14.9%	2.39	14.1%	2.30	13.1%
Service providers	2.48	19.9%	2.94	20.8%	3.44	20.3%	3.61	20.5%
Total	12.44	100%	14.11	100%	16.91	100%	17.61	100%

FIGURE 3.7 RELATIVE WEIGHT OF THE WIND INDUSTRY'S SUB-SECTORS IN TERMS OF DIRECT GDP



Source: Deloitte

The cumulative capacity of wind power and the electricity it provided grew over the 2007-2010 period in the EU. Consequently, developers' revenues rose in line with the increase in power sold, resulting in a higher direct contribution to GDP. Developers' share of the sector's total turnover increased from just under 40% in 2007 to almost 43% in 2010.

Wind turbine manufacturers' share of the industry's total turnover fell in 2010 compared to 2009. This reflected the decrease in new installed capacity in 2010 compared to the previous year, as well as increased global competition and lower turbine prices. Nevertheless, this sub-sector continues to account for a large share (23.7%) of the industry's turnover.

The evolution of the component manufacturers' contribution to the industry's GDP is similar to that of the wind turbine manufacturers. Component manufacturers' share of the industry's GDP decreased from 15.8% in 2007 to 13.1% in 2010, whereas its contribution grew over 17% from €1.96 bn in 2007 to €2.3 bn in 2010.

The services sub-sector's share of the industry's GDP remained relatively stable throughout the period, varying between 20% and 20.5%. As for the other sub-sectors, their total contribution increased over the period by more than 45%, from €2.48 bn in 2007 to €3.61 bn in 2010.

3.2.1 Developers

Wind energy developers contribute to GDP by selling the electricity they produce. Figure 3.8 shows the evolution of wind power generation in the EU from 2007 to 2010. Developers also have to buy turbines, components and services from other sub-sectors, meaning their money goes directly back into the wind industry and is counted as part of the other sub-sector's contribution to GDP. Developers' overall contribution can be calculated by adding together sales of turbines, components and services, and electricity sales.

FIGURE 3.8 TOTAL NORMALISED[9] WIND ENERGY PRODUCTION (TWH)

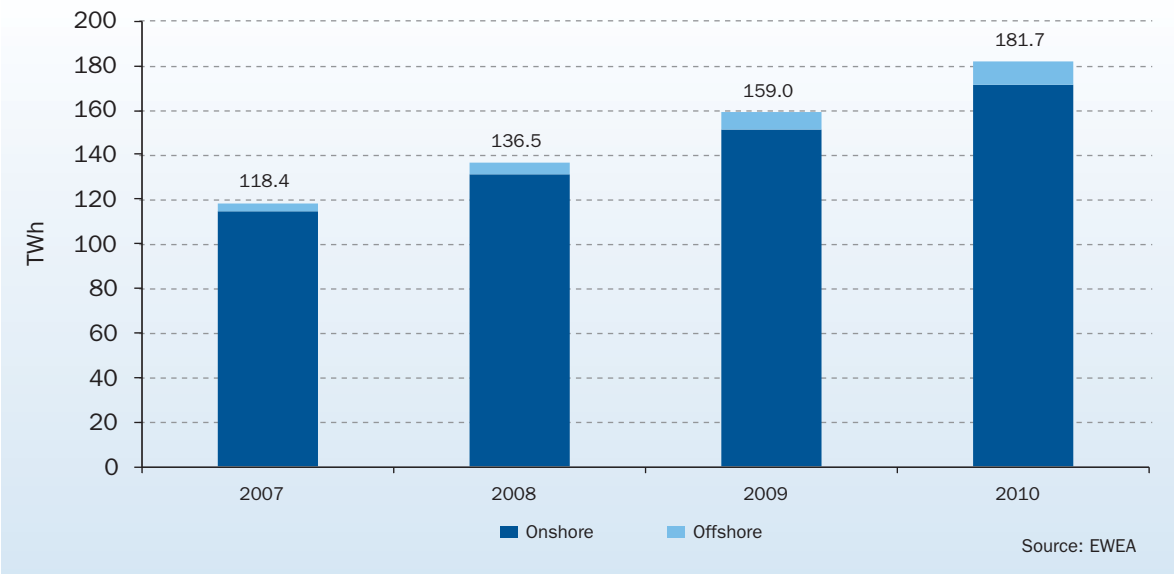


TABLE 3.2 DEVELOPERS' CONTRIBUTION TO GDP (CONSTANT PRICES 2010) [10]

	2007	2008		2009		2010	
	€ billion	€ billion	Increase/ previous year	€ billion	Increase/ previous year	€ billion	Increase/ previous year
Total income	8.72	9.54	9.5%	11.61	21.7%	12.45	7.2%
Total expenditure	3.75	4.02	7.0%	4.90	21.9%	4.91	0.4%
"Production" or Added value approach	4.96	5.52	11.3%	6.72	21.6%	7.54	12.2%
Compensation of employees	0.64	0.68	6.8%	0.79	16.3%	0.82	3.0%
Gross fixed capital consumption	2.44	2.60	6.4%	3.10	19.1%	3.46	11.8%
Net operating surplus and mixed income	1.88	2.24	19.2%	2.82	26.1%	3.26	15.3%
Income approach	4.96	5.52	11.3%	6.72	21.6%	7.54	12.2%

[9] The calculation is based on how much installed capacity at end of a given year would produce under normal wind conditions.
[10] The figures in tables 3.2, 3.3, 3.4, 3.5, 3.6, and 3.7 are rounded up or down; this could lead to some numbers not adding up exactly as represented.

Table 3.2 shows how much developers contributed to GDP between 2007 and 2010. The increase is in the order of 52%, bringing the actual contribution to GDP to €7.54 bn in 2010.

Revenue per MWh has remained stable during the last three years, but the increase in generating capacity over the period has meant that more energy was produced and sold, increasing developers' overall revenue.

Expenses related to employees are lower than in the other sectors. A significant share of wind industry jobs are in manufacturing turbines and components and wind farm construction.

Nevertheless, as installed capacity grows, there is a progressive increase in operation and maintenance jobs. This is highlighted by the growth of expenditure related to employees from €0.64 bn in 2007 to €0.82 bn in 2010.

The wind industry is characterised by high investment costs, low operation costs and no fuel costs. Consequently, a fair portion of wind generated electricity's price is known in advance, reducing volatility in the electricity market.

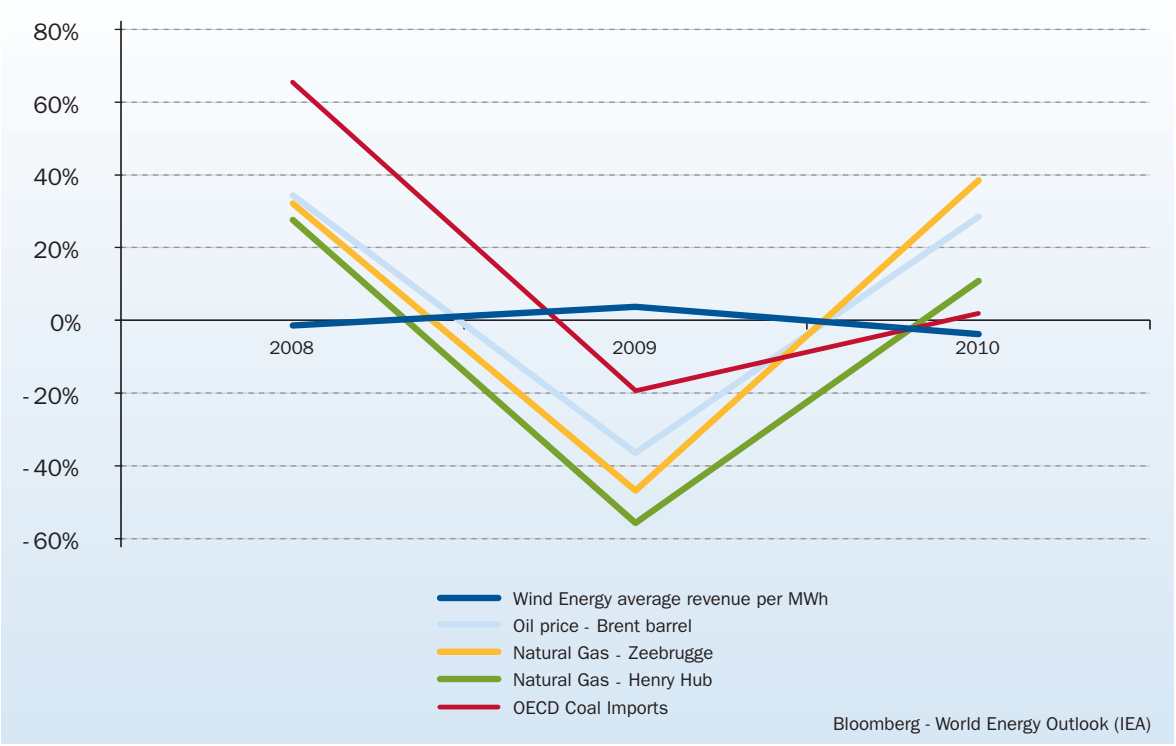
If the total income from the sale of electricity is divided by the total TWh produced, it is possible to obtain an approximate variable for the average price per unit of energy produced.

Figure 3.9 shows that average selling prices are relatively stable over the period. In figure 3.10, this is compared to the evolution of fossil fuel prices in the same time frame.

FIGURE 3.9 TOTAL REVENUE DIVIDED BY TOTAL WIND ENERGY PRODUCTION IN THE EU (APPROXIMATE AVERAGE SELLING PRICE)

Source: Deloitte

FIGURE 3.10 AVERAGE GROWTH OF WIND ENERGY SELLING PRICES COMPARED TO FOSSIL FUEL PRICES



	2008	2009	2010
Wind energy average revenue per MWh	-1.4%	3.7%	-3.7%
Oil price – Brent barrel	34.4%	-36.5%	28.5%
Natural Gas – Zeebrugge	32.1%	46.9%	38.6%
Natural Gas – Henry Hub	27.6%	-55.7%	10.9%
OECD coal import prices	65.6%	-19.3%	2.0%

Source: Bloomberg, IEA World Energy Outlook

While wind energy revenue per MWh remained relatively constant between 2007 and 2010, the volatility of fossil fuel prices was considerable.

3.2.2 Wind turbine manufacturers

European wind turbine manufacturers are among the key wind energy market players worldwide, in terms of technology, market share and quality. Consequently, a significant percentage of the revenue generated by turbine manufacturing comes from exports to countries outside the European Union.

The contribution to GDP of the wind turbine manufacturers climbed to €4.17 bn in 2010, although measured in real terms it decreased by 4.5% compared to 2009.

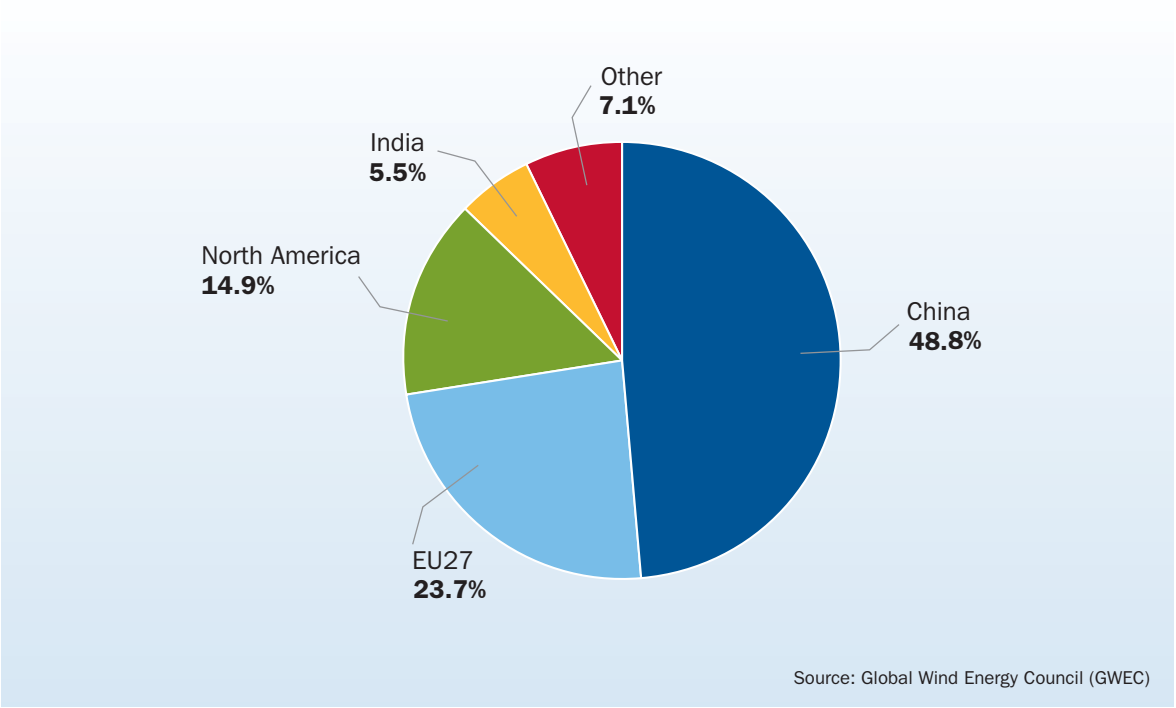
The sub-sector's revenue fell by around 2.3% in constant terms (in current terms it grew by around 0.2%), while expenditure decreased at a lower rate, 1.7%.

This is mainly due to fewer installations in the European Union in 2010 compared to 2009 and increased installations in markets outside the EU where a significant percentage of local content is required. Consequently manufacturing takes place in the non-EU country (figure 3.11). This does not mean, however, that European companies are not present in these markets, but their activity there cannot be counted as EU GDP.

TABLE 3.3 WIND TURBINE MANUFACTURERS' CONTRIBUTION TO GDP (CONSTANT PRICES 2010)

	2007	2008		2009		2010	
	€ billion	€ billion	Increase/ previous year	€ billion	Increase/ previous year	€ billion	Increase/ previous year
Total income	15.0	16.9	12.7%	18.7	10.5%	18.3	-2.3%
Total expenditure	12.0	13.4	11.7%	14.4	7.2%	14.1	-1.7%
"Production" or Added value approach	3.0	3.6	16.8%	4.4	23.1%	4.2	-4.5%
Compensation of employees	1.5	1.6	7.9%	1.8	14.8%	1.9	5.6%
Gross fixed capital consumption	0.4	0.5	8.9%	0.5	18.2%	0.6	16.3%
Net operating surplus and mixed income	1.1	1.5	31.1%	2.0	33.4%	1.6	-19.4%
Income approach	3.0	3.6	16.8%	4.4	23.1%	4.2	-4.5%

FIGURE 3.11 GEOGRAPHICAL DISTRIBUTION OF NEW WIND CAPACITY INSTALLATIONS IN 2010



Source: Global Wind Energy Council (GWEC)

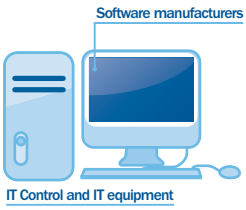
Moreover, the rapid development of wind power in Europe resulted in increased competition, pushing turbine prices down. As a result of this drop, the benefits or net operating surplus of wind turbine manufacturers decreased by 19.4% in 2010 to €1.61 bn. Nevertheless, the money paid out to employees increased by 5.6% to €1.93 bn.

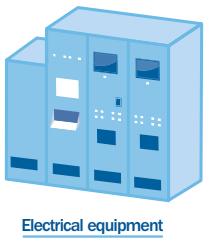
3.2.3 Component manufacturers

The boundaries between wind turbine manufacturing and component manufacturing are not always clearly defined. Many companies produce both components and complete wind turbines and, at the same time, manufacture components for other industries.

For the purpose of this report, the component manufacturers sub-sector includes companies producing goods that are specific to wind energy:

- Towers
- Brakes
- Rotors
- Elevators
- Blades
- Generators
- Electrical equipment
- Control and IT equipment
- Software manufacturers
- Other





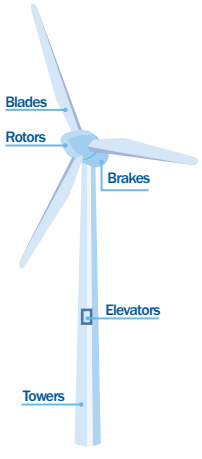


TABLE 3.4 COMPONENT MANUFACTURERS' CONTRIBUTION TO GDP (CONSTANT PRICES 2010)

	2007	2008		2009		2010	
	€ billion	€ billion	Increase/ previous year	€ billion	Increase/ previous year	€ billion	Increase/ previous year
Total income	10.0	11.0	10.3%	12.4	12.1%	11.9	-3.5%
Total expenditure	8.0	8.9	11.0%	9.9	10.9%	9.6	-2.8%
"Production" or Added value approach	2.0	2.1	7.4%	2.5	17.1%	2.3	-6.6%
Compensation of employees	1.1	1.2	11.2%	1.4	14.9%	1.4	-1.6%
Gross fixed capital consumption	0.5	0.6	11.0%	0.6	4.8%	0.6	-2.1%
Net operating surplus and mixed income	0.4	0.33	-9.3%	0.4	23.0%	0.4	-12.3%
Income approach	2.0	2.1	7.4%	2.5	17.1%	2.3	-6.6%

Other components and raw materials for these families of products are also taken into account. However, they are included in the indirect impact of the wind energy sector.

The revenue of the component manufacturers depends on investments in new installed wind capacity, both onshore and offshore, and exports.

The contribution of this sub-sector to GDP decreased in 2010 by 6.6% in real terms, to reach €2.3 bn. This trend follows that of wind turbine manufacturers, though in this case the fall is greater.

The highest contributing component to the sub-sector's GDP was money paid for and to employees, which reached €1.4 bn in 2010 – almost 60% of the whole value added.

Wind turbine and component manufacturing account for 36.7% of the wind energy sector's total contribution to EU GDP.

3.2.4 Services

The services taken into account in this report are specialised services provided to the other three sub-sectors. These include transport of wind energy equipment, maintenance services, providers of monitoring and control technology and solutions, wind energy engineering, consulting companies (resource assessment, location evaluation, etc.), information providers, R&D agents, training providers, specialised insurance services and sector associations.

The evolution of the GDP contribution of this sub-sector is closely linked to the sector's overall growth.

TABLE 3.5 SERVICE PROVIDERS' CONTRIBUTION TO GDP (CONSTANT PRICES 2010)

	2007	2008		2009		2010	
	€ billion	€ billion	Increase/ previous year	€ billion	Increase/ previous year	€ billion	Increase/ previous year
Total income	4.9	5.6	14.1%	6.8	21.3%	7.0	3.1%
Total expenditure	2.5	2.7	9.7%	3.4	24.8%	3.4	2.3%
"Production" or Added value approach	2.5	2.9	18.4%	3.5	18.2%	3.6	3.9%
Compensation of employees	1.2	1.5	20.0%	1.7	18.6%	1.8	2.6%
Gross fixed capital consumption	0.3	0.4	17.2%	0.5	16.3%	0.5	3.7%
Net operating surplus and mixed income	0.9	1.1	16.6%	1.2	15.9%	1.3	8.0%
Income approach	2.5	2.9	18.4%	3.5	16.2%	3.6	3.9%

3.3 Wind energy sector exports and imports

Europe has a world class wind power sector. Offering top quality products and services, the European wind power sector creates value through exports to the rest of the world. Table 3.6 shows the value chain's exports.

Over the four year period between 2007 and 2010, EU wind industry exports increased by 33%.

The share of each sub-sector in the industry's exports is shown in figure 3.12

TABLE 3.6 EU WIND INDUSTRY EXPORTS IN € BILLION (CONSTANT PRICES 2010)

	2007	2008		2009		2010	
	Constant prices (2010)	Constant prices (2010)	Increase/ previous year	Constant prices (2010)	Increase/ previous year	Constant prices (2010)	Increase/ previous year
Developers	0.7	0.9	15.8%	1.0	20.1%	1.1	8.1%
Wind turbine manufacturers	4.5	5.4	22.1%	5.7	4.9%	6.0	5.8%
Component manufacturers	1.2	1.3	9.7%	1.5	12.3%	1.5	-3.9%
Services	0.2	0.2	12.6%	0.2	14.7%	0.2	0.6%
Total	6.6	7.8	18.8%	8.5	8.1%	8.8	4.2%

FIGURE 3.12 SHARE OF SUB-SECTORS IN WIND INDUSTRY EXPORTS

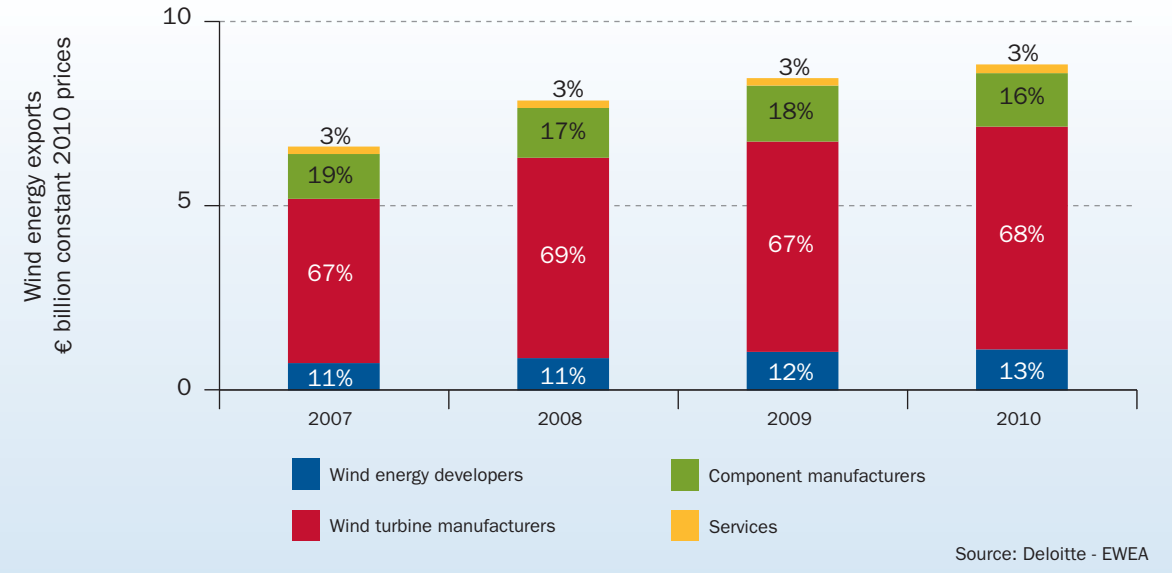


Table 3.7 and figure 3.12 show that wind turbine manufacturers generate the highest share of exports in the wind power sector. Each sub-sector's share remained relatively constant over the period, with component manufacturers having the second largest share, followed by developers and service providers.

Other regions of the world have increasingly been developing wind power over the last few years. As a result, Europe's wind energy sector has been exporting as well as importing. Table 3.7 shows imports for the four different sub-sectors.

Tables 3.6 and 3.7 indicate that from 2007 to 2010, the growth of imports was significantly lower than the growth of exports. During the four year period, exports grew by 33% whereas imports grew by just under 19%. The increase of imports followed a downward trend and this is reflected in the negative growth between 2009 and 2010. Figure 3.13 shows each sub-sector's share of total imports.

TABLE 3.7 EU WIND INDUSTRY IMPORTS IN € BILLION (CONSTANT PRICES 2010)

	2007	2008		2009		2010	
	Constant prices (2010)	Constant prices (2010)	Increase/ previous year	Constant prices (2010)	Increase/ previous year	Constant prices (2010)	Increase/ previous year
Developers	0.1	0.1	-8.0%	0.1	24.3%	0.1	-13.9%
Wind turbine manufacturers	1.6	1.8	12.7%	2.0	10.3%	2.0	-2.3%
Component manufacturers	0.9	0.9	9.9%	1.0	2.0%	1.0	0.4%
Services	0.1	0.1	11.4%	0.1	28.3%	0.2	3.4%
Total	2.7	3.0	11.0%	3.2	8.8%	3.2	-1.6%

EUROPEAN UNION INDUSTRY IMPORTS IN € BILLION

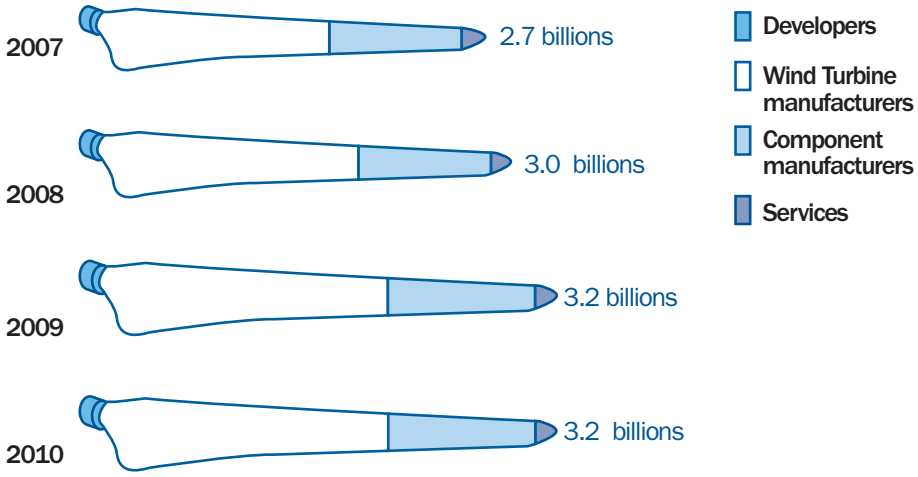


FIGURE 3.13 SHARE OF SUB-SECTORS IN WIND INDUSTRY IMPORTS

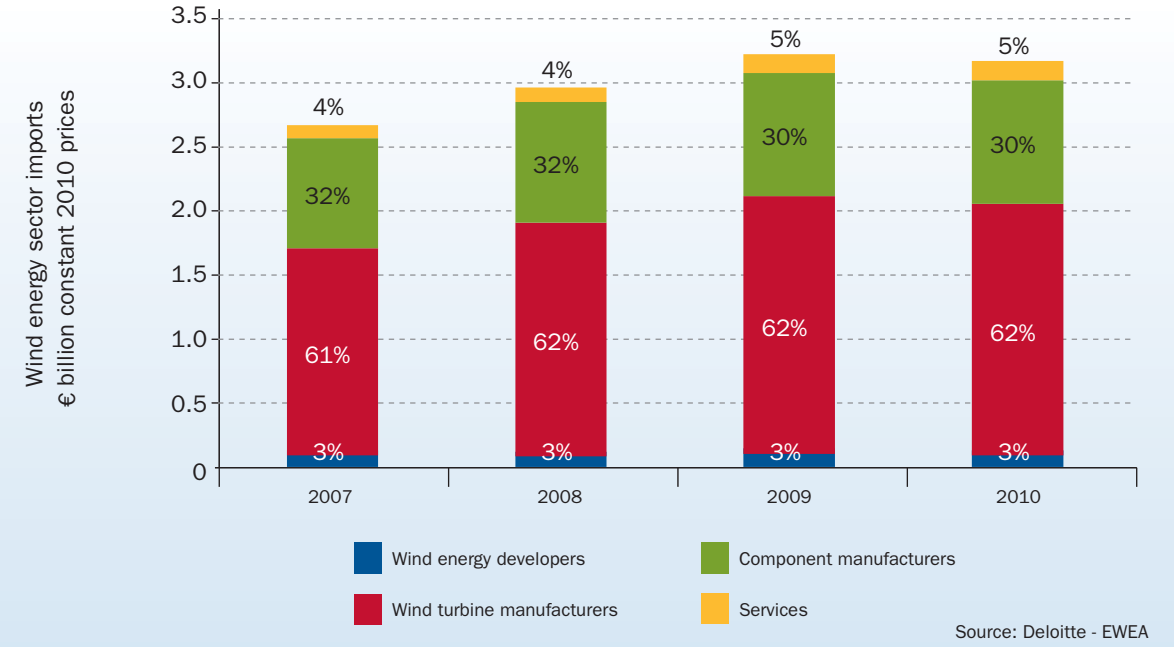


FIGURE 3.14 SHARE OF SUB-SECTORS IN WIND INDUSTRY NET EXPORTS

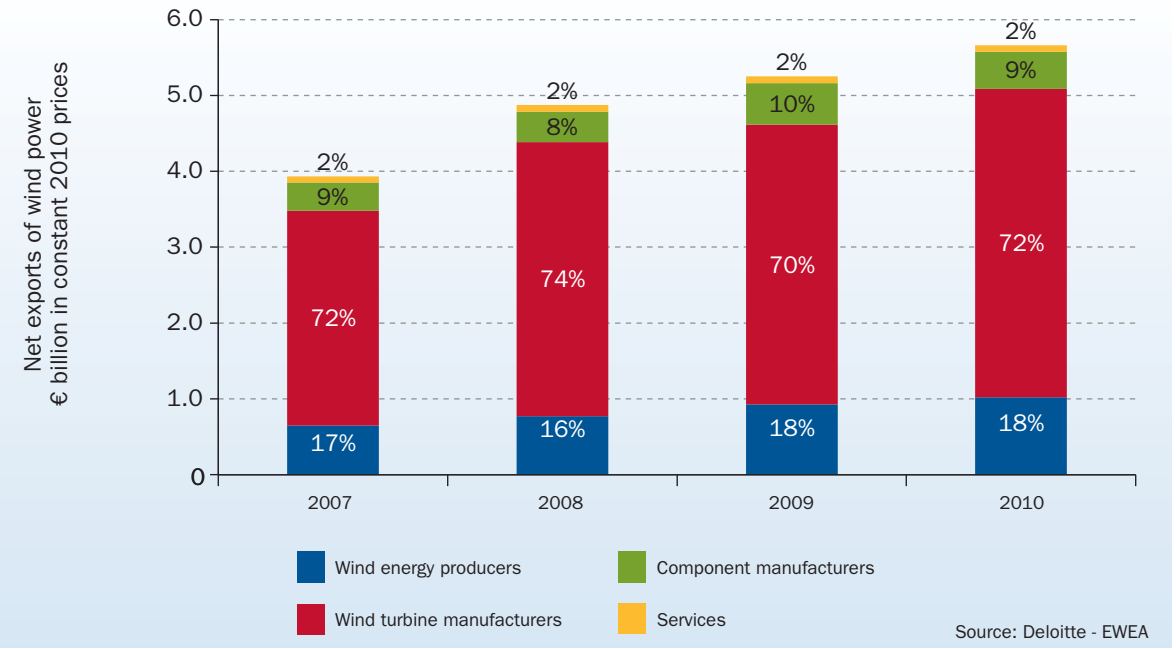


TABLE 3.8 EU WIND INDUSTRY NET EXPORTS IN € BILLION (CONSTANT PRICES 2010)

	2007	2008		2009		2010	
	Constant prices (2010)	Constant prices (2010)	Increase/ previous year	Constant prices (2010)	Increase/ previous year	Constant prices (2010)	Increase/ previous year
Developers	0.7	0.8	19.1%	0.1	19.6%	1.0	10.6%
Wind turbine manufacturers	2.8	3.6	27.4%	3.7	2.2%	4.1	10.2%
Component manufacturers	0.4	0.4	9.2%	0.6	36.3%	0.5	-11.4%
Services	0.1	0.1	14.1%	0.1	-2.3%	0.1	-4.0%
Total	3.9	4.9	24.1%	5.3	7.7%	5.7	7.7%

Wind turbine manufacturers are responsible for the largest share of both imports and exports. Similarly, component manufacturers come second in imports as in exports. Developers and service providers together account for less than 10% of the value of imports.

Moreover, only 9.9% of the industry's total value is imported. In 2010, direct imports were €3.17 bn whilst direct total expenditure was ten times greater (€32.10 bn).

Overall, the EU wind industry exports considerably more than it imports. In 2010, the sector's positive trade balance was €5.7 bn: during the period from 2007 to 2010, net exports increased by 46%. These figures do not account for the substantial amount of products and services sold by European-owned companies and subsidiaries located outside of the EU. Table 3.8 shows the evolution of net exports over the period.

The evolution of net exports is not identical for the four different sub-sectors. Unlike developers and wind turbine manufacturers, component manufacturers and services do not have a clear positive export trend. Turbine manufacturers are the main net exporters and have constantly represented 70% or more of the industry's total net exports (figure 3.14).

European players mainly export added value equipment and services: wind turbines, technology, engineering services, controlling software and hardware, electrical equipment, rotors, transformers and financial services.

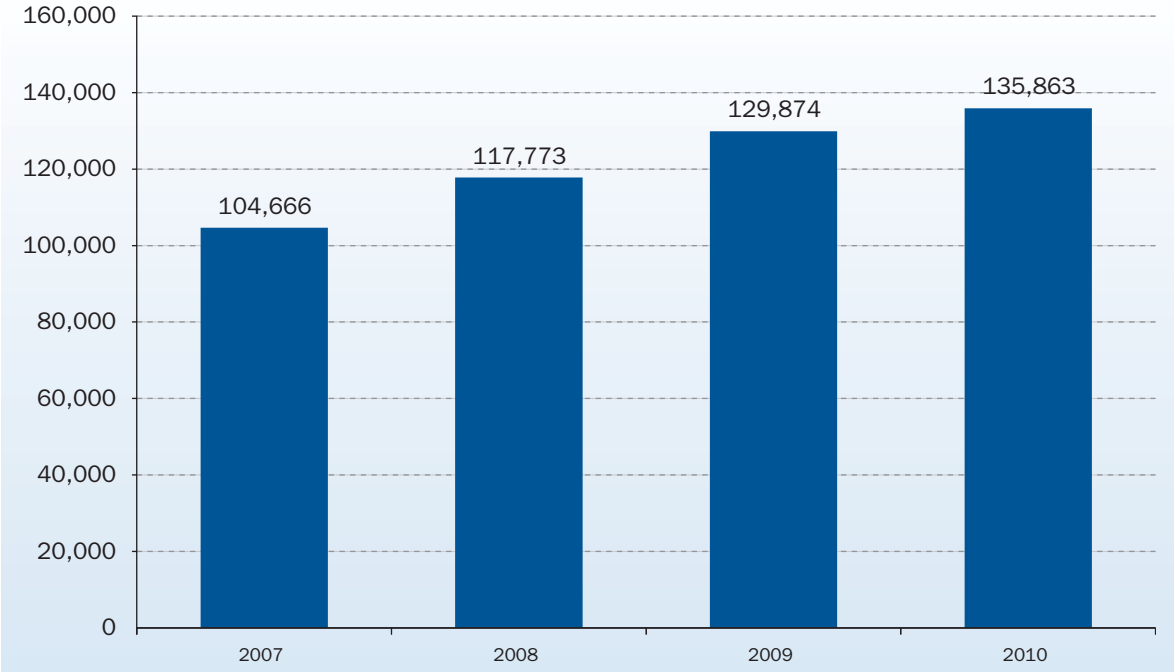
3.4 Direct impact on employment

The growth and consolidation of the wind energy industry in Europe over the last twenty years has had a major impact on employment. This industry has created jobs, not only in turbine manufacturing and electricity production (direct employment) but also in many different economic sectors and activities (indirect employment).

Until recently, wind industry job creation was mainly in the three most developed wind energy markets: Germany, Denmark and Spain. However, as a result of the expansion of wind energy to other large economies and new emerging markets, along with offshore increasing (offshore wind energy is between 2.5 and three times more labour intensive than onshore wind energy), job creation is likely to accelerate throughout the EU.

Direct employment is calculated by adding together the number of jobs reported in each wind energy sector company's financial statement (figure 3.15).

FIGURE 3.15 EVOLUTION OF EU WIND ENERGY SECTOR DIRECT EMPLOYMENT



Source: Deloitte

The wind energy sector represents directly 135,863 full time equivalent (FTE) jobs in 2010[11]. Between 2007 and 2010, the number of jobs in the sector grew by nearly 30% – that is, 31,197 extra posts. Interestingly, this increase occurred whilst EU unemployment rose by 9.6%[12].

However, in 2010 job creation increased more slowly than during the two previous years in both relative and absolute terms (just over 5,900 posts). This slowdown correlates with the decrease in new annual wind power capacity in 2010 compared to the previous year.

Within the industry, wind turbine manufacturers employ the largest number of people: 45,449 FTE. Component manufacturers employ just over 32,051 FTE. In all, industrial activities accounted for more than 77,500 jobs in 2010, just under 60% of the sector's total employment.

As mentioned above, both wind turbine and component manufacturers experienced a deceleration in terms of employment growth, creating only 1,424 and 115 new jobs in 2010 respectively.

The number of jobs in the services sub-sector reached 43,779 in 2010. This figure includes personnel working in the engineering and construction of wind farms, operation and maintenance and research institutions, consultancy firms, universities, financial services and other similar organisations.

Developers accounted for 14,519 posts in 2010. The number of these jobs rises with the growth of cumulative installed wind capacity.

FIGURE 3.16 EVOLUTION OF EU WIND ENERGY SECTOR'S DIRECT EMPLOYMENT BY SUB-SECTOR IN JOBS

	2007	2008	2009	2010
Developers	10,302	11,233	13,482	14,519
Wind turbine manufacturers	35,349	41,106	44,026	45,449
Component manufacturers	27,581	30,793	32,001	32,115
Service providers	31,434	34,641	40,365	43,779
Total	104,666	117,773	129,874	135,863

[11] The words "jobs" or "posts" as used in this report refers to "full time equivalents" or "FTEs" – that is, the number of full time posts the total number of hours worked represents. It may not correspond exactly to the total number of people employed due to some people working part time.
[12] August 2011. Source: Eurostat.

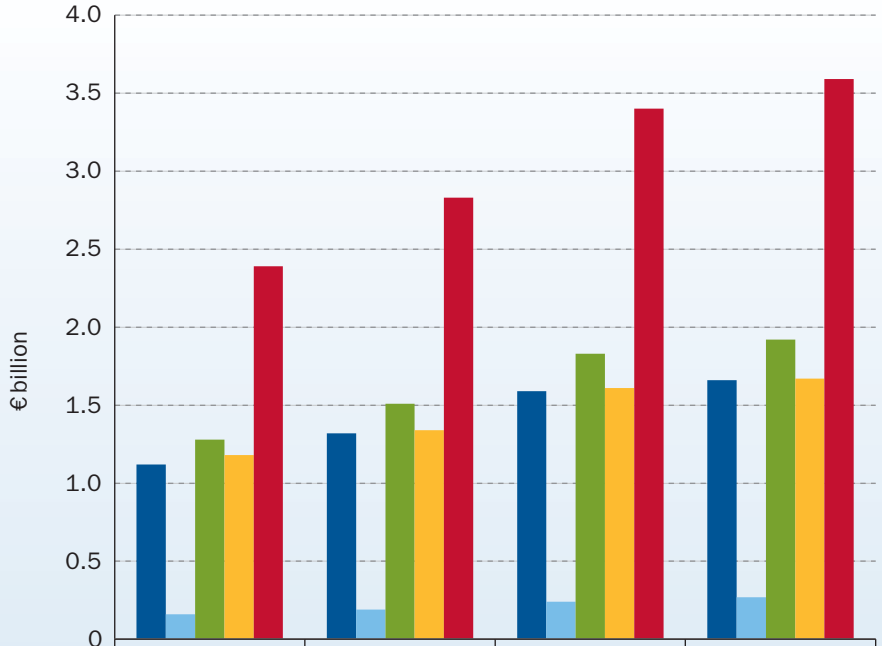
3.5 Tax balance

In 2010, the wind industry paid €3.59 bn in taxes. Of this, €1.66 bn was corporate tax and €0.27 bn was other taxes[13]. Assuming that income taxes are 9.5%[14] of a sector's turnover, people directly employed by the wind industry contributed €1.67 bn.

Company taxes paid by the wind industry increased by 50% from 2007 to 2010, from €1.28 bn to €1.92 bn. Income taxes on wind industry employees increased 41.5% over the same period.

In all, between 2007 and 2010, taxes paid by the wind sector have grown over 50% to reach €3.59 bn.

FIGURE 3.17 TAXES PAID BY EU WIND INDUSTRY



	2007	2008	2009	2010
Corporate tax	1.12	1.32	1.59	1.66
Other taxes (taxes not linked to the corporate profit)	0.16	0.19	0.24	0.27
Total company taxes	1.28	1.51	1.83	1.92
Income tax	1.18	1.34	1.61	1.67
Total taxes	2.39	2.83	3.40	3.59

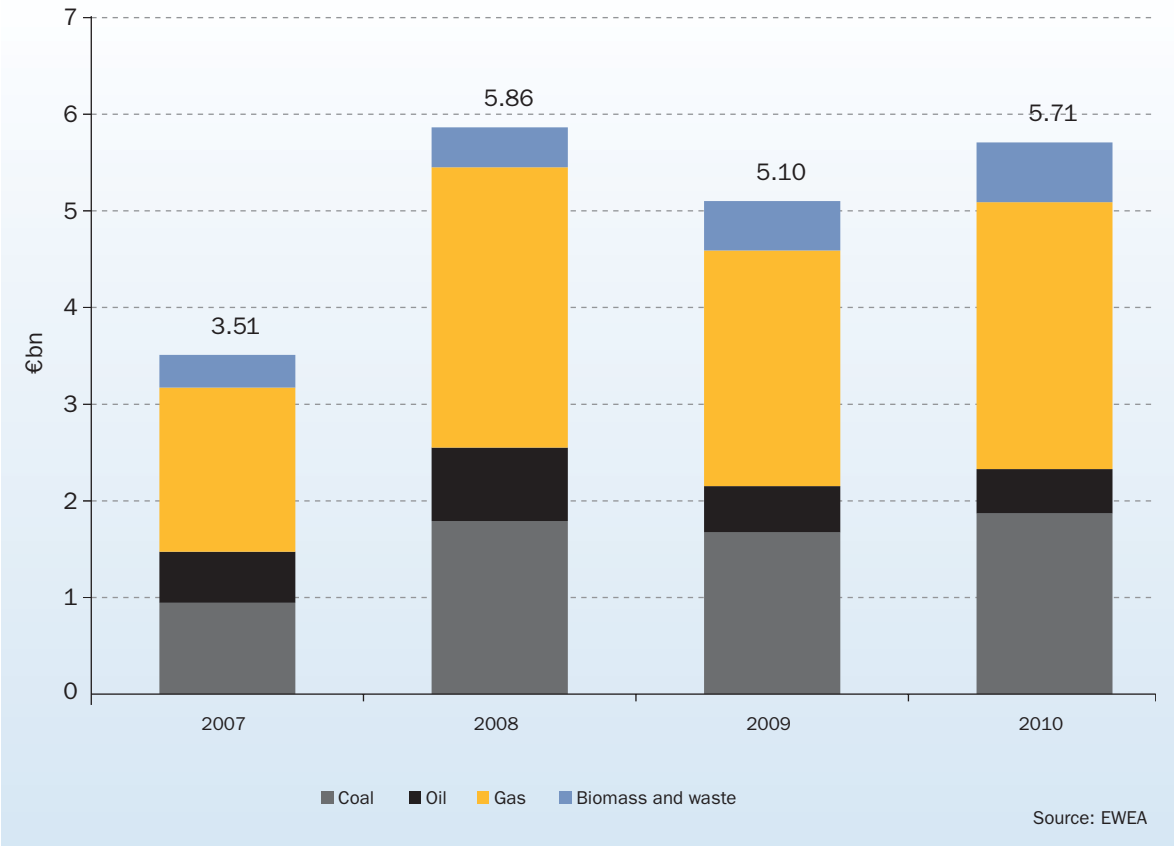
Source: Deloitte

[13] For example regional and local taxes, taxes linked to business activity, taxes on property, taxes linked to vehicles.
[14] Eurostat http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-DU-11-001/EN/KS-DU-11-001-EN.PDF

3.6 Avoided fuel costs

Beyond taxes, the wind industry also contributes to the European economy via the significant fuel costs it avoids. Wind energy displaces electricity generated using fossil fuels with electricity generated by the wind, which is free. For the 2007 to 2010 period, wind energy avoided fuel costs of €20.18 bn. In 2008, European Commission President Barroso said in a speech that "54% of Europe's energy is now imported at a cost of €700 each year for every EU citizen." More wind energy means each European citizen pays less for fuel imports.

FIGURE 3.18 WIND ENERGY AVOIDED FUEL COSTS



KEY FINDINGS

The wind industry's direct contribution to EU GDP has grown by more than 41% over four years to reach €17.6 bn in 2010, meaning it directly provides 0.3% of the EU's GDP. Since 2007, the sector has contributed over €61 bn to EU GDP.

In 2010 the increase in wind industry's contribution to GDP was twice as high as the growth of GDP itself.

Mainly due to the sale of electricity, wind farm developers make the largest contribution to the sector's turnover (43%). Wind turbine manufacturers make up 24% of the contribution, followed by service providers (20%) and component manufacturers (13%).

In 2010, the wind energy sector exported €8.8 bn worth of products and services, up 4.2% on the previous year and 33% since 2007. Wind turbine manufacturers account for almost 70% of exports.

The wind industry imports €3.2 bn worth of products and services, making it a net exporter (€5.7 bn in 2010).

Direct employment in the wind industry represented 135,863 jobs in 2010, up 30% since 2007.

Wind turbine manufacturers employ the largest share of people in the sector (45,449 jobs in 2010). Adding employment in component manufacturing, wind energy industrial activities employ 77,500 people.

The sector paid €3.59 bn in taxes in 2010 – of which €1.66 bn (46.2%) was corporate tax and €1.67 bn (46.5%) income tax.

Wind energy avoided €5.71 bn in fuel costs.

Phot.: Stiftung Offshore Windenergie

4 INDIRECT IMPACT OF THE WIND ENERGY SECTOR ON THE EU ECONOMY

4.1 Indirect contribution to GDP

4.2 Indirect employment

4.1 Indirect contribution to GDP

The wind energy industry interacts with and has an impact on numerous other economic sectors. The relationship between the different economic sectors can be calculated by using an input-output model, such as those used by the EU's statistics office, Eurostat. Based on a survey of wind industry players, the tables were adapted to identify wind energy as an individual area of activity (the methodology is explained in Annexe II).

The indirect impact of the wind sector in Europe was €14.82 bn in 2010, increasing by 24% since 2007. Table 4.1 presents an overview.

The sector's indirect contribution to the economy is significant, reflecting its importance and maturity. Its fast development has created strong industrial activities around Europe and in numerous sub-sectors.

Indirect impact depends mainly on the level of interrelationships among the different economic sectors and on the amount each imports. Any activity that imports 100% of its inputs will not affect the internal market.

The results of the wind industry survey show that the wind industry imports only a small amount of its material from outside the EU.

However, as the developer sub-sector grows in relative terms within the wind sector, its indirect impact/direct impact ratio decreases. Industrial activities have a far larger indirect impact as they have stronger interrelationships with the rest of the economy.

The economic sectors that most benefit from the activities of the industry are:

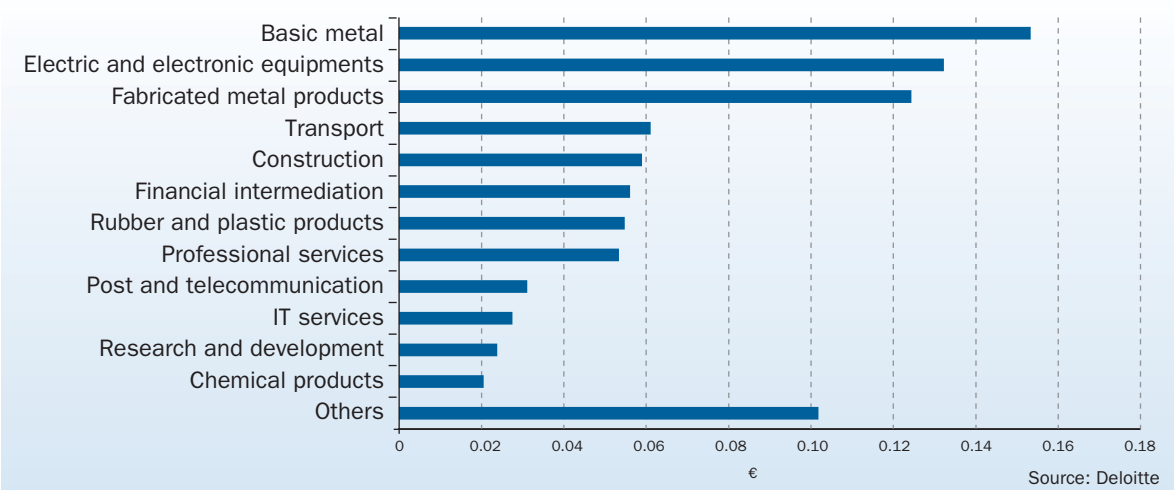
- Basic metal
- Electric and electronic equipment
- Manufactured metal products
- Transport
- Construction
- Financial services

The figures below show the indirect added value generated by the wind industry per unit of directly generated GDP.

TABLE 4.1 EVOLUTION OF INDIRECT IMPACT OF WIND ENERGY SECTOR IN EU (2010 CONSTANT PRICES)

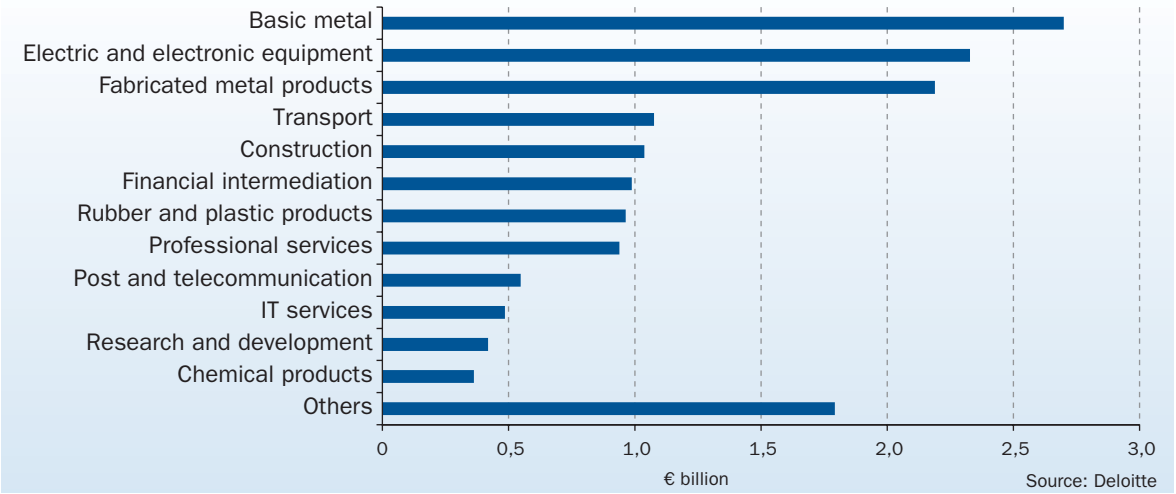
Gross domestic product (billion €) - constant prices (2010)	2007	2008	2009	2010
Total income	25.52	25.50	32.12	31.67
Total expenditures	13.58	13.57	17.09	16.86
Production or value added approach	11.94	11.93	15.03	14.82
Compensation of employees	6.76	6.75	8.51	8.39
Gross fixed capital consumption	0.64	0.64	0.81	0.80
Net operating surplus and mixed income	4.54	4.54	5.71	5.63
Income approach	11.94	11.93	15.03	14.82

FIGURE 4.1 INDIRECT ADDED VALUE GENERATED BY THE WIND INDUSTRY PER UNIT OF DIRECTLY GENERATED GDP: IMPACT OF €1 IN THE REST OF THE ECONOMY



The metal sector (basic and manufactured products) benefits most from investments in the wind energy sector. Every Euro spent in the wind industry generates €0.277 in these two sub-sectors. The sub-sectors producing electric and electronic products are the second biggest beneficiaries (€0.132 per €1 in the wind sector) followed by transport (€0.061) and construction (€0.059).

FIGURE 4.2 INDIRECT ADDED VALUE GENERATED BY THE WIND INDUSTRY IN THE REST OF THE ECONOMY (€ BILLION)



4.2 Indirect employment

Indirectly, the wind industry creates jobs across other sectors of the economy. In 2010, the wind industry accounted for 102,292 jobs indirectly, up almost 31% since 2007 (78,200 jobs).

TABLE 4.2 EVOLUTION OF WIND SECTOR INDIRECT EMPLOYMENT (NUMBER OF FTE JOBS)

Wind sector indirect employment	2007	2008	2009	2010
Jobs	78,200	88,565	101,009	102,292
Percentage increase on previous year	-	+13.3%	+14.1%	+1.3%

KEY FINDINGS

The wind industry's indirect contribution to EU GDP was €14.8 bn in 2010, increasing by 24% since 2007. It now represents 0.12% of total EU GDP.

The metal, electric and electronic sectors benefit the most from investment in the wind industry, followed by transport and construction.

Every Euro generated directly by the wind industry generates around €c90 in other sectors of the economy.

Employment generated by the wind industry in other sectors of the economy was 102,300 posts in 2010 – a 31% increase since 2007.

Photo: vestas

5 OVERALL IMPACT OF THE WIND ENERGY SECTOR ON THE EU ECONOMY

5.1 Total impact on GDP

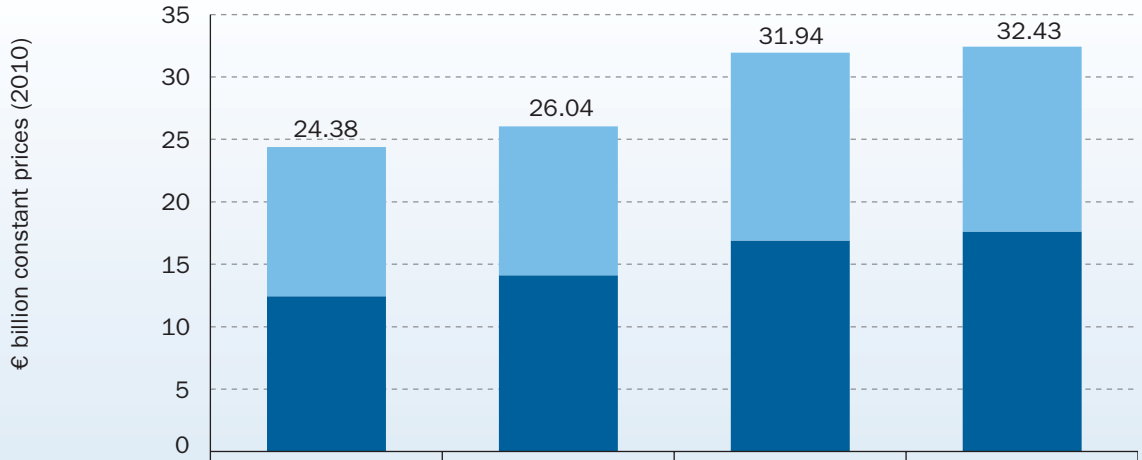
5.2 Total employment

5.1 Total impact on GDP

Taking the wind industry's direct and indirect impacts together, the sector's contribution to EU GDP reached €32.43 bn in 2010, having increased by over €8 bn over the four year period since 2007.

Total contribution to GDP increased consistently during the four year period. It grew by over 33%, from €23 bn in 2007 to over €32 bn in 2010, amounting to 0.26% of total EU GDP.

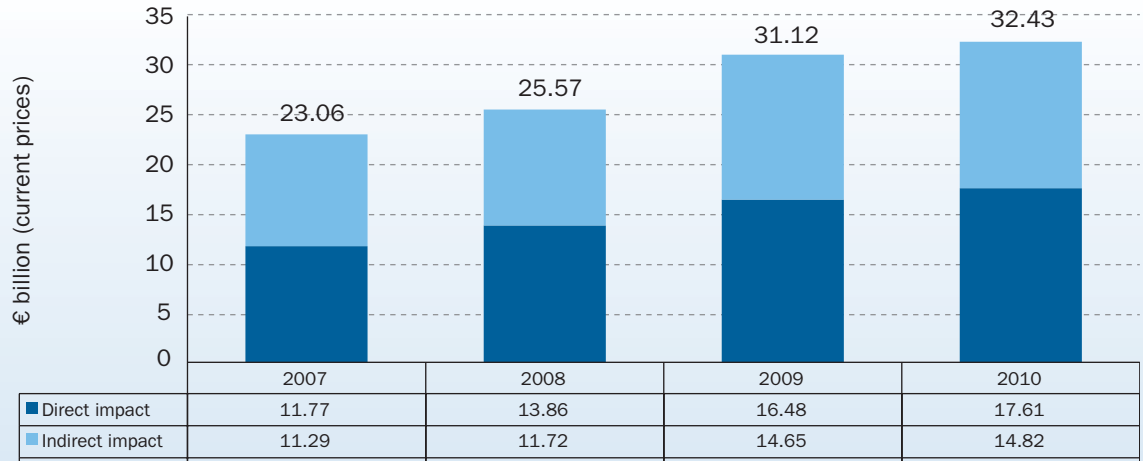
FIGURE 5.1 DIRECT AND INDIRECT IMPACT OF WIND ENERGY ON THE EU ECONOMY (2010 CONSTANT PRICES)



	2007	2008	2009	2010
Direct impact	12.44	14.11	16.91	17.61
Indirect impact	11.94	11.93	15.03	14.82
Total impact	24.38	26.04	31.94	32.43

Source: Deloitte

FIGURE 5.2 DIRECT AND INDIRECT IMPACT OF WIND ENERGY SECTOR ON THE EU'S ECONOMY (CURRENT PRICES)



	2007	2008	2009	2010
Direct impact	11.77	13.86	16.48	17.61
Indirect impact	11.29	11.72	14.65	14.82
Total impact	23.06	25.57	31.12	32.43

Source: Deloitte

FIGURE 5.3 WIND ENERGY SECTOR'S SHARE OF TOTAL EU GDP

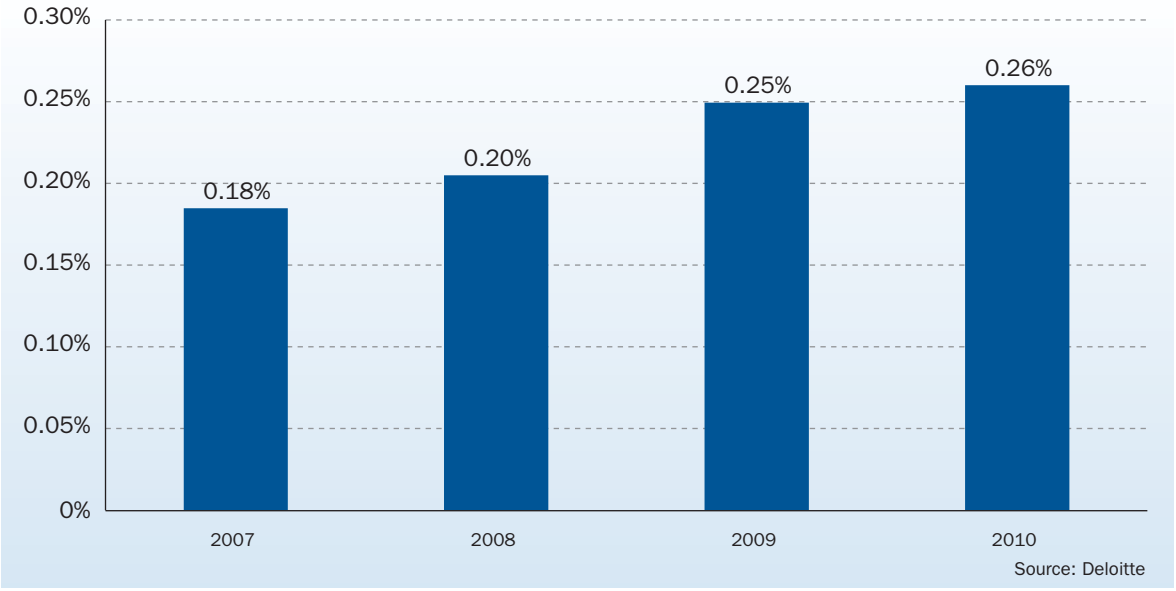
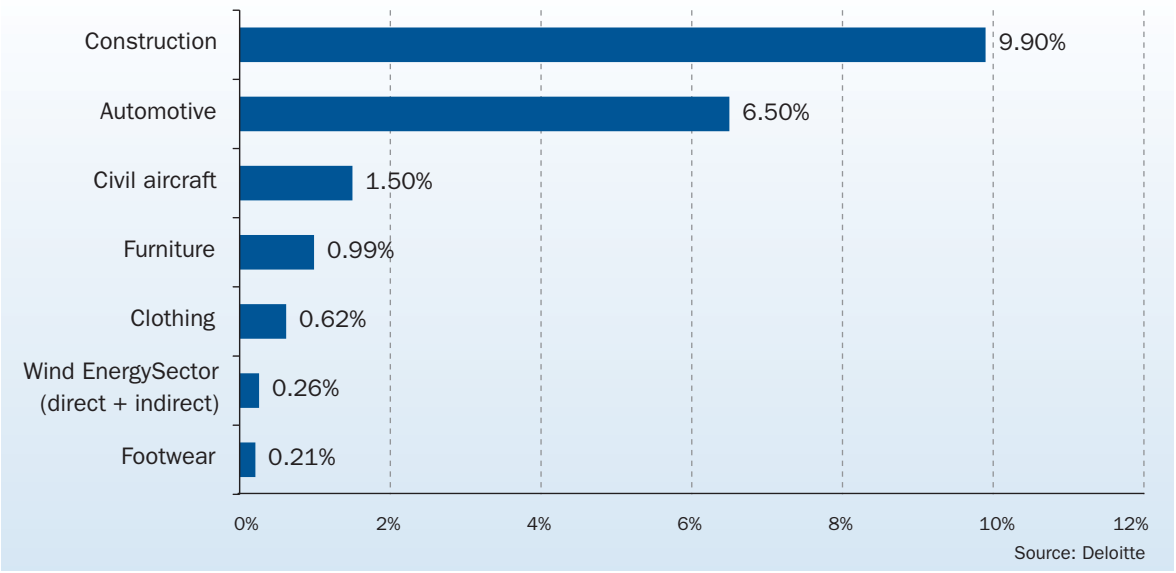


Figure 5.4 compares the contribution of the wind industry with other sectors of the EU's economy.[16]

FIGURE 5.4 SHARE OF GDP OF FIVE LEADING EU ECONOMIC SECTORS



[16] For the contribution of the furniture and footwear sectors 2006 data have been used whereas for the construction, automotive and civil aircraft sectors 2010 data have been used.

TABLE 5.1 WIND ENERGY SECTOR'S TOTAL CONTRIBUTION TO EU GDP IN CURRENT AND CONSTANT (2010) PRICES

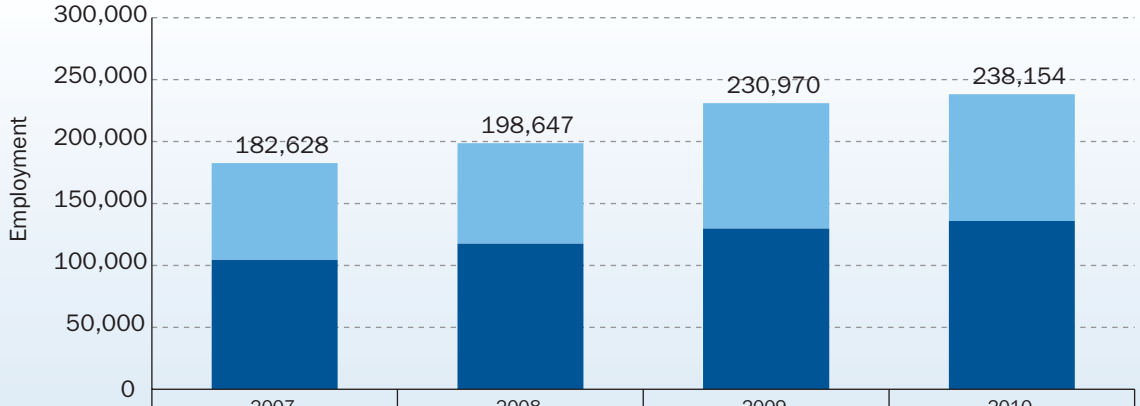
Total GDP contribution (€ billion)	2007		2008			2009			2010		
	Current prices	Constant prices (2010)	Current prices	Increase/ previous year	Constant prices (2010)	Current prices	Increase/ previous year	Constant prices (2010)	Current prices	Increase/ previous year	Constant prices (2010)
Internal demand	19.34	20.45	20.78	3.5%	21.16	26.01	26.1%	26.69	26.77	0.3%	26.77
Gross capital formation (investments)	11.10	11.73	11.41	-1.0%	11.62	14.69	29.7%	15.07	14.32	-5.0%	14.32
Other internal demand	8.24	8.72	9.37	9.5%	9.54	11.32	21.7%	11.61	12.45	7.2%	12.45
Net exports	3.72	3.93	4.79	24.1%	4.88	5.12	7.7%	5.25	5.66	7.7%	5.66
Expenditure approach	23.06	24.38	25.57	6.8%	26.04	31.12	22.7%	31.94	32.43	1.5%	32.43
Total income	60.73	64.21	67.42	6.9%	68.64	79.57	19.0%	81.66	81.38	-0.3%	81.38
Total expenditures	37.67	39.83	41.84	7.0%	42.60	48.45	16.7%	49.72	48.95	-1.5%	48.95
Production or added value approach	23.06	24.38	25.57	6.8%	26.04	31.12	22.7%	31.94	32.43	1.5%	32.43
Compensation of employees	10.57	11.17	11.48	4.6%	11.69	13.88	21.8%	14.25	14.28	0.2%	14.28
Gross fixed capital consumption	4.13	4.37	4.59	7.1%	4.68	5.38	17.9%	5.52	5.96	8.1%	5.96
Net operating surplus and mixed income	8.36	8.84	9.50	9.4%	9.67	11.87	25.9%	12.18	12.19	0.1%	12.19
Income approach	23.06	24.38	25.57	6.8%	26.04	31.12	22.7%	31.94	32.43	1.5%	32.43

5.2 Total employment

In 2010 the wind industry was responsible, directly and indirectly, for 238,154 jobs. Figure 5.10 shows the evolution of direct and indirect job creation since 2007.

In its 2011 *'Pure Power'* publication[17], EWEA estimated – using a different methodology – that the wind industry employed 189,096 people full time in 2010. Figure 5.6 compares the results of the 'Pure Power' study with the current analysis.

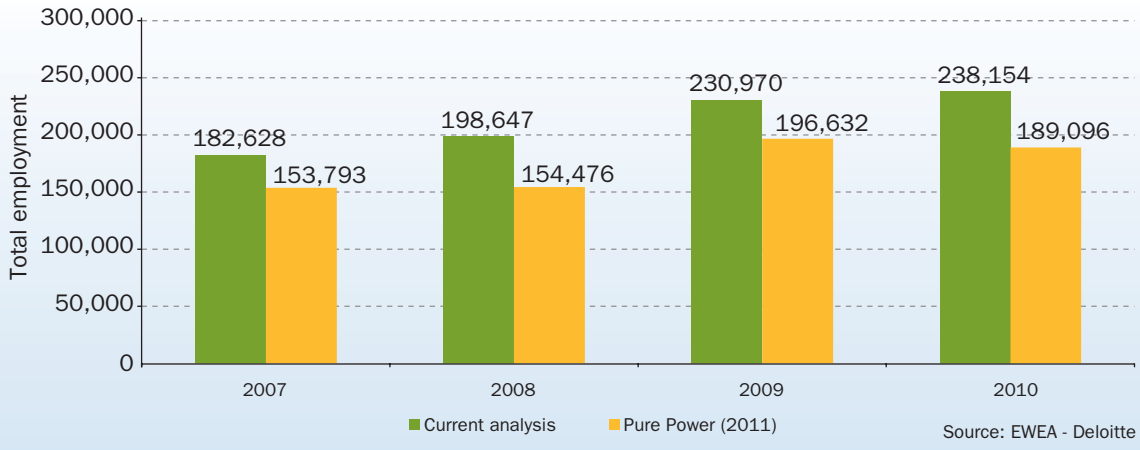
FIGURE 5.5 EVOLUTION OF DIRECT, INDIRECT AND TOTAL EMPLOYMENT OF THE WIND ENERGY SECTOR IN NUMBERS OF FTE JOBS



	2007	2008	2009	2010
Direct	104,666	117,773	129,874	135,863
Indirect	77,961	80,874	101,097	102,292
Total	182,628	198,647	230,970	238,154

Source: Deloitte

FIGURE 5.6 EVOLUTION OF TOTAL EMPLOYMENT OF THE WIND ENERGY SECTOR IN NUMBERS OF JOBS

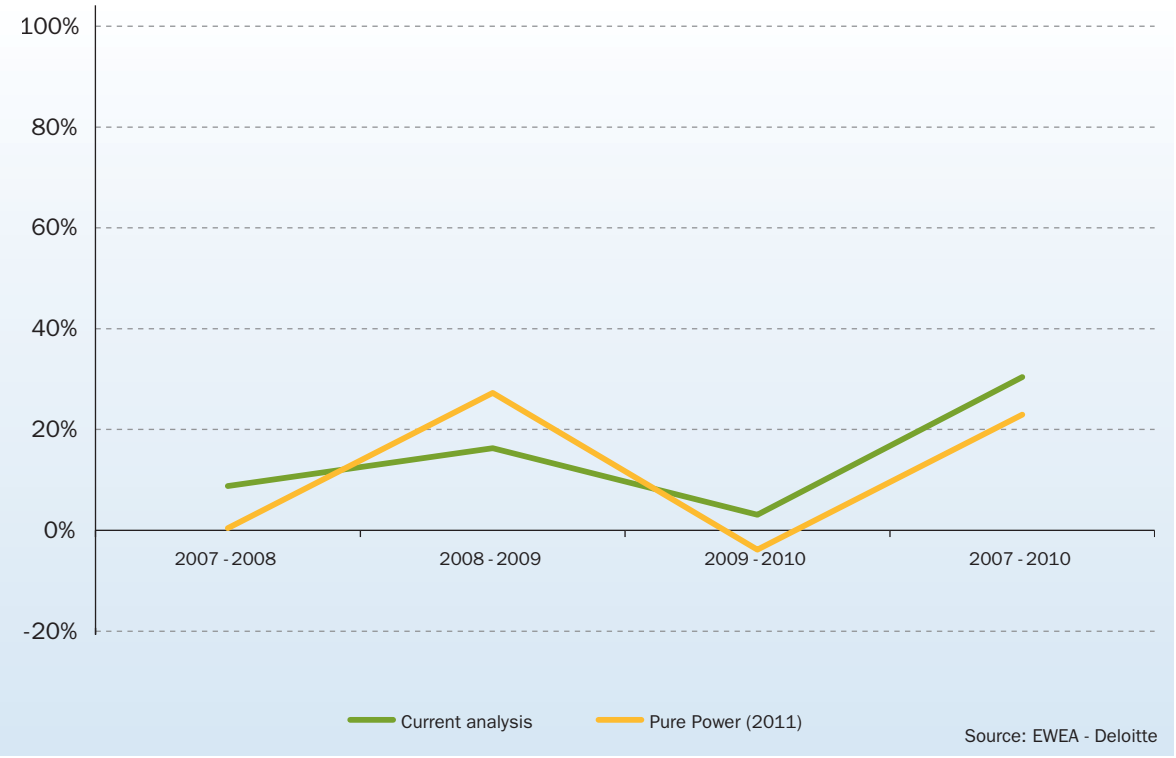


Source: EWEA - Deloitte

The variation in the number of employees in both analyses is shown in figure 5.7.

[17] Pure Power – wind energy targets for 2020 and 2030, July 2011, EWEA - http://www.ewea.org/fileadmin/ewea_documents/documents/publications/reports/Pure_Power_III.pdf

FIGURE 5.7 GROWTH OF EMPLOYMENT IN EWEA 2011 AND EWEA 2012 ANALYSES



The methodology used by EWEA in 'Pure Power' was more theoretical and fluctuates more than the current analysis, which estimates numbers of jobs by looking at companies' financial statements. The approach followed in 'Pure Power' gave more conservative results than the current analysis. However, the order of magnitude in terms of total jobs is not significantly different (26% in 2010); both methodologies capture the sector's general employment trend (figure 5.7). Thus the results appear to be consistent.

KEY FINDINGS

The wind industry's total contribution to EU GDP was €32.43 bn in 2010 and increased by 33% since 2007.

The wind industry's total share of EU GDP reached almost 0.3% in 2010, up from just under 0.19% in 2007.

Overall, the wind industry employed more than 238,000 people in 2010.

Photo: Vestas

6 ECONOMIC EFFORT IN R&D

The European wind industry sector invests significantly in R&D. The amount invested in R&D by the sector is considerably higher the amount invested, on average, by other sectors of the EU economy.

R&D expenditure was 5.11% of the industry's turnover in 2010, while the average R&D expenditure across the economy is estimated at 2.1% of GDP. The wind industry's 5.11% is considerably higher than the EU's objective of 3% of GDP being invested in R&D, and highlights how seriously European wind power companies are taking the competition emerging from China, the US, India, South Korea and Japan. As shown in figure 6.1, expenditure on R&D as a percentage of GDP has been increasing over the period, both for the wind sector and the economy overall.

Figure 6.2 breaks down the wind energy sector's R&D investments by sub-sector. As wind turbine manufacturers are at the forefront of technology research, of the four sub-sectors they commit the largest share of their turnover to R&D activities: around 10%.

By the same token, developers committed around 4.2% to R&D in 2010, double the economy-wide average for 2010 of 2.1%. Component manufacturers devoted just over 3% of their turnover to R&D activities. Service providers commit the least of the four sub-sectors, around 2.5% of GDP in 2010, which is still above the economy-wide average.

FIGURE 6.1 EVOLUTION OF WIND ENERGY SECTOR AND EU ECONOMY-WIDE EXPENDITURE ON R&D AS A PERCENTAGE OF GDP

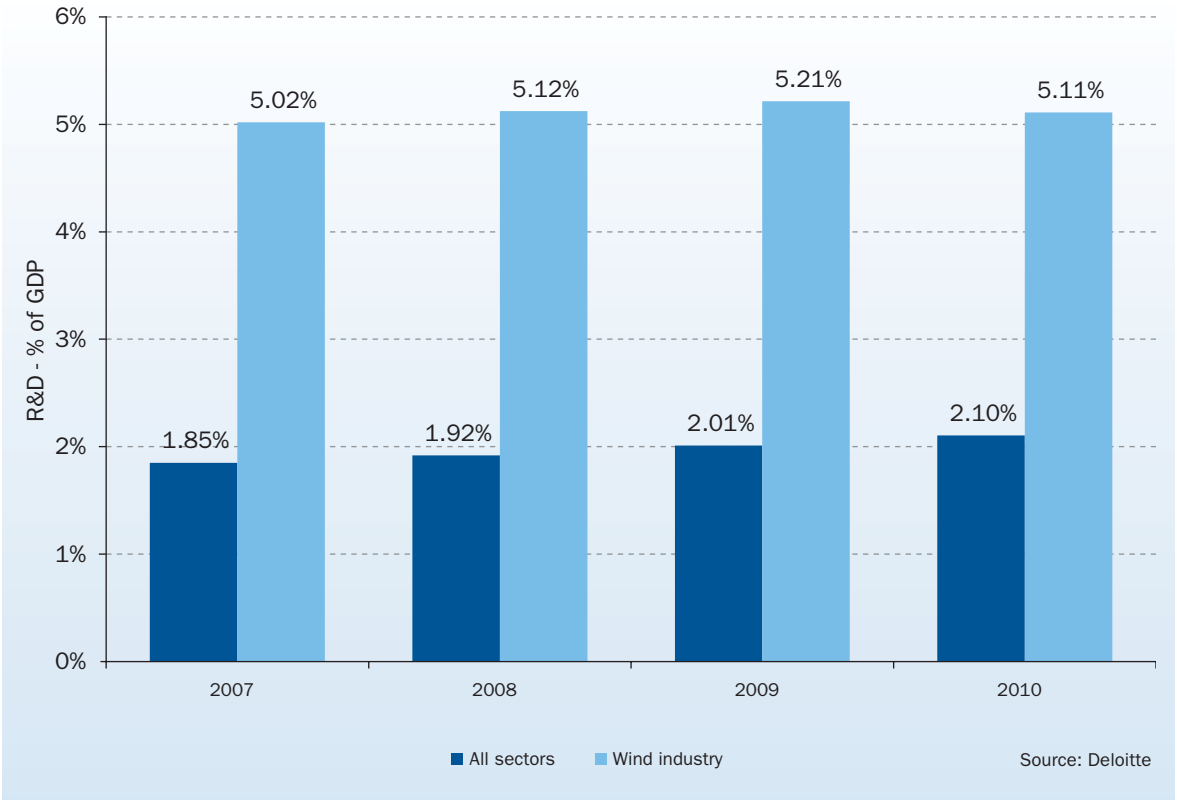
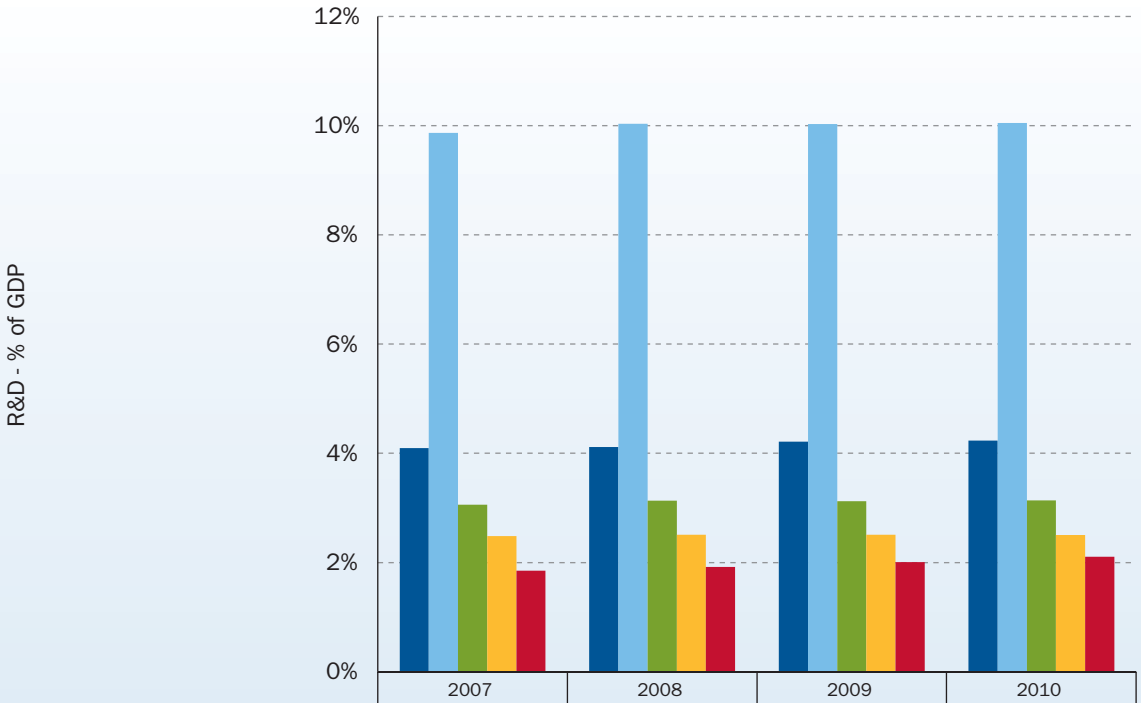


FIGURE 6.2 EVOLUTION OF WIND ENERGY SECTOR R&D EXPENDITURE AS PERCENTAGE OF GDP PER SUB-SECTOR



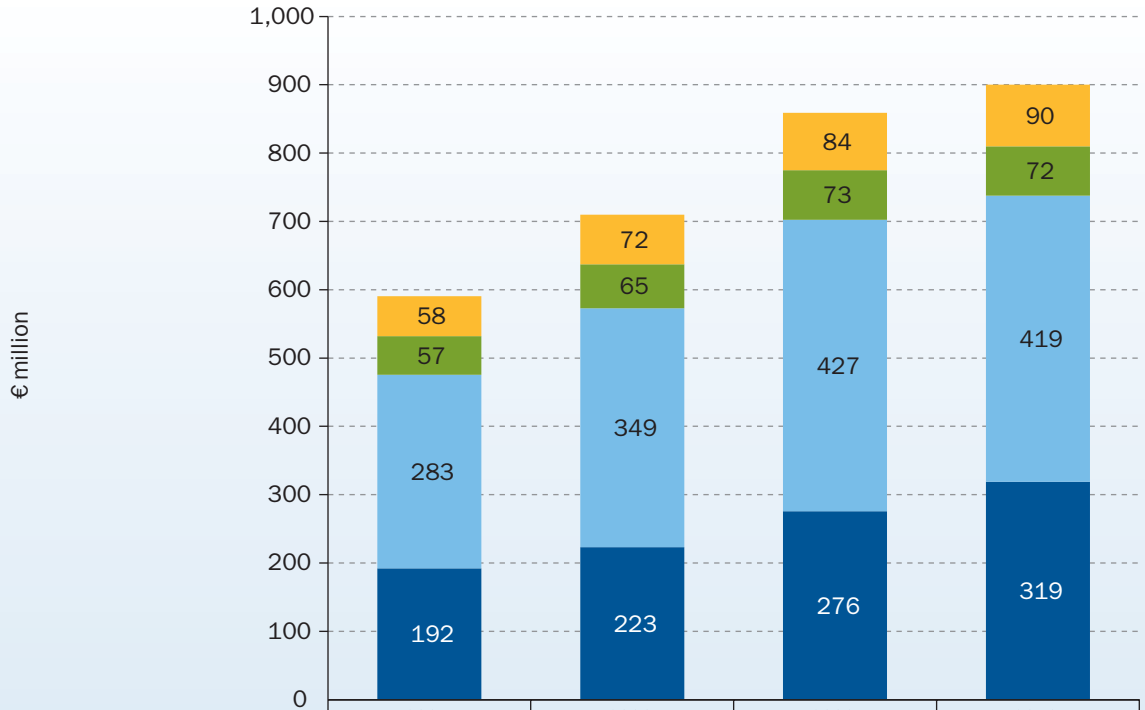
	2007	2008	2009	2010
Developers	4.09%	4.11%	4.21%	4.23%
Wind turbine manufacturers	9.87%	10.04%	10.03%	10.05%
Component manufacturers	3.06%	3.13%	3.12%	3.14%
Services	2.49%	2.51%	2.51%	2.50%
EU economy-wide expenditure on R&D as a percentage of GDP	1.85%	1.92%	2.01%	2.10%

Source: Deloitte

In monetary terms, the sector invested approximately €900 mn in R&D in the EU during 2010. Over the 2007 to 2010 period, R&D expenditure grew by 34.4% from €590 mn in 2007.

In 2010, wind turbine manufacturers contributed the most to R&D (€419 mn) followed by developers accounting for €319 mn, service providers for €90 mn and component manufacturers for €74 mn (figure 6.3).

FIGURE 6.3 EVOLUTION OF WIND ENERGY SECTOR R&D EXPENDITURE PER SUB-SECTOR IN € MILLION



	2007	2008	2009	2010
Services	58	72	84	90
Component manufacturers	57	65	73	72
Wind turbine manufacturers	283	349	427	419
Developers	192	223	276	319
Total	590	710	859	900

Source: Deloitte

KEY FINDINGS

Since 2007, the sector's R&D expenditure has constantly been above 5% of its GDP, 2.5 to three times more than economy-wide expenditure.

In 2010, the wind energy sector spent €900 mn on R&D.

Wind turbine manufacturers commit the most to R&D, around 10% of their GDP.

Photo: Dreamstime

7 FORECAST TO 2020 AND 2030

7.1 Total contribution to GDP

7.2 Employment

EWEA expects 230 GW of installed wind power capacity in 2020, of which 40 GW offshore. By 2030, it expects 400 GW of installed wind power capacity, of which 150 GW offshore. Wind energy production will reach 581 TWh in 2020 and 1,154 TWh in 2030, enough to meet 16% and 29% of the EU's total electricity consumption. According to the national governments of the EU[18], wind energy will supply 14% of EU electricity consumption in 2020 (494.7 TWh from 213 GW installed capacity). The European Commission, in its Energy Roadmap 2050[19], expects wind energy to be the key technology by 2050, supplying more electricity than any other technology and meeting between 31.6% and 48.7% of Europe's electricity production.

This growth will be reflected by an increasing wind industry contribution to the EU's economy and GDP growth.

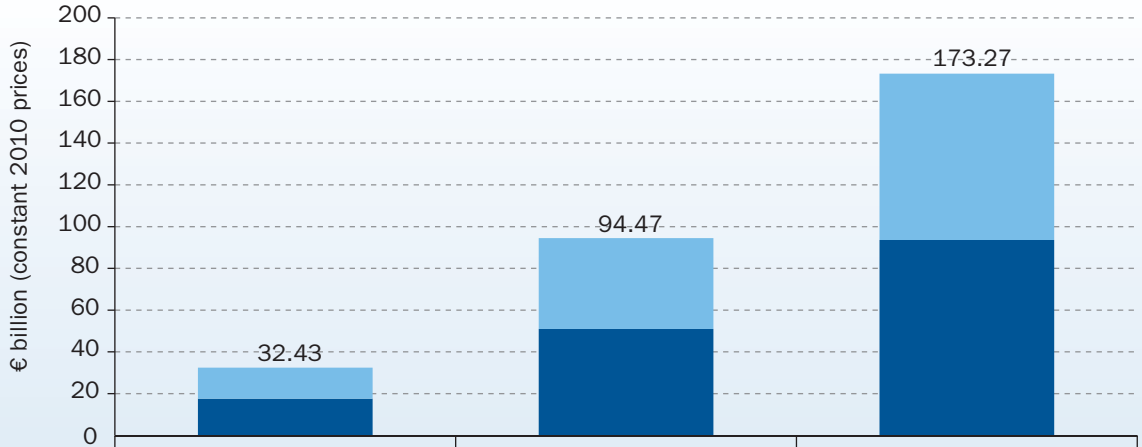
Building on EWEA's targets, this chapter forecasts the macro-economic impact of the European wind energy sector in 2020 and 2030 (the methodology is outlined in Annexe IV).

7.1 Total contribution to GDP

The wind industry's GDP will increase almost three-fold over the decade to reach nearly €94.5 bn by 2020. During the following decade, it will almost double to reach €173 bn by 2030. Direct (€93.6 bn) and indirect (€80 bn) contributions will have similar shares of the sector's total contribution to GDP, 54% and 46% respectively.

As in the previous years, the growth rate of the wind industry is expected to be higher than that of the European economy as a whole. Therefore the wind industry will be a driver for economic growth. The anticipated rise in absolute contribution to the EU's GDP will also increase the sector's weight within the economy. From 0.26% in 2010, the wind industry is expected to represent up to 1% of EU GDP in 2030.

FIGURE 7.1 WIND ENERGY SECTOR'S CONTRIBUTION TO EU GDP (€ BILLION IN CONSTANT PRICES, 2010)

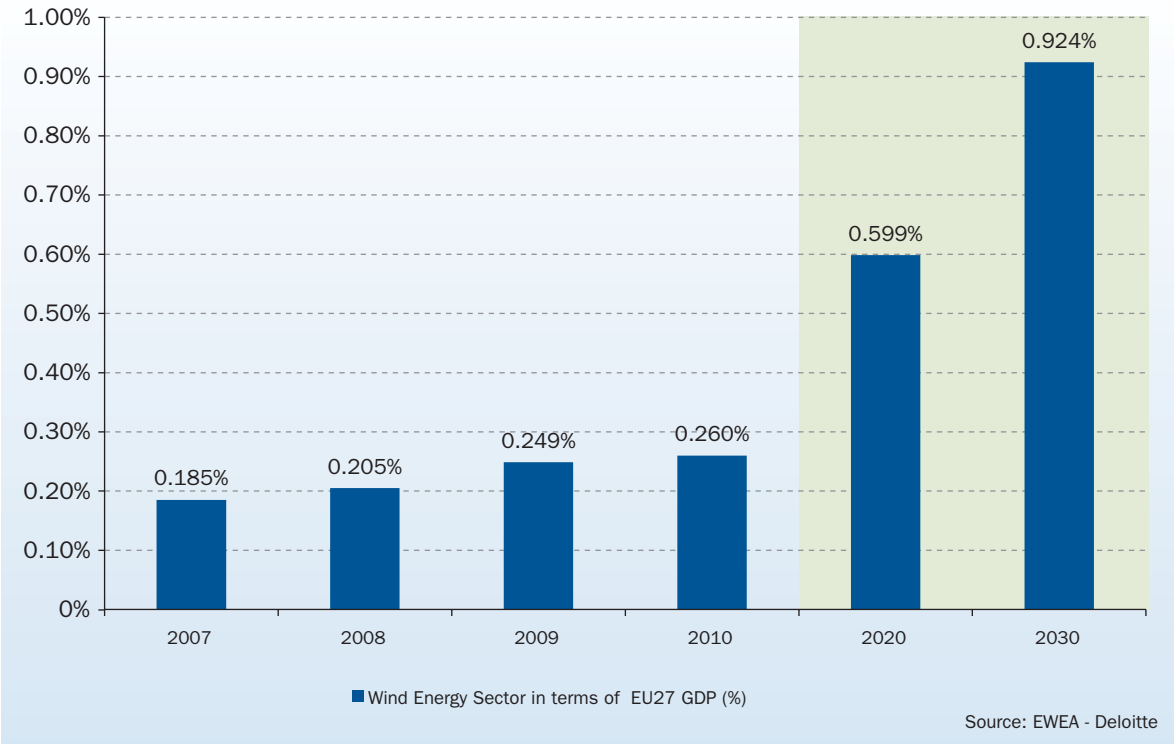


	2010	2020	2030
Direct	17.61	51.01	93.56
Indirect	14.82	43.45	79.70
Total	32.43	94.47	173.27

Source: Deloitte - EWEA

[18] EWEA 2011. Compilation of National Renewable Energy Action Plans. p20
http://www.ewea.org/fileadmin/ewea_documents/documents/publications/reports/EWEA_EU_Energy_Policy_to_2050.pdf
[19] http://ec.europa.eu/energy/energy2020/roadmap/index_en.htm

FIGURE 7.2 RELATIVE WEIGHT OF WIND ENERGY SECTOR IN EU GDP[20]: PAST, CURRENT AND FORECAST



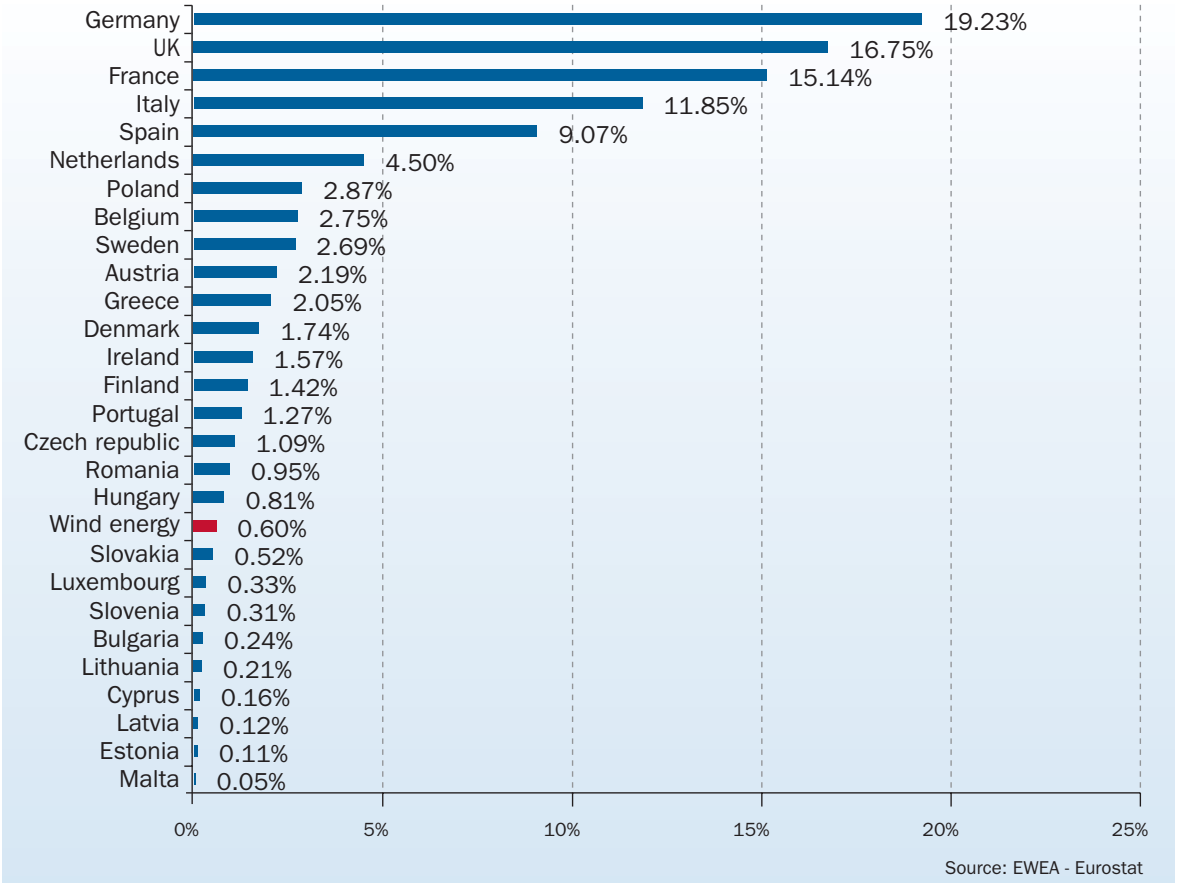
Source: EWEA - Deloitte

Ranking each Member State by its expected contribution to overall EU GDP in 2020, the wind industry would come in between Hungary and the Slovak Republic, contributing 0.6% of the EU's GDP, which would make the wind industry the '19th Member State' (figure 7.3).

By 2030, the wind industry's contribution to EU GDP will be greater than that of Hungary, placing it as the '18th Member State', slightly below Romania.

[20] Source of EU27 GDP (2007-2010): Eurostat

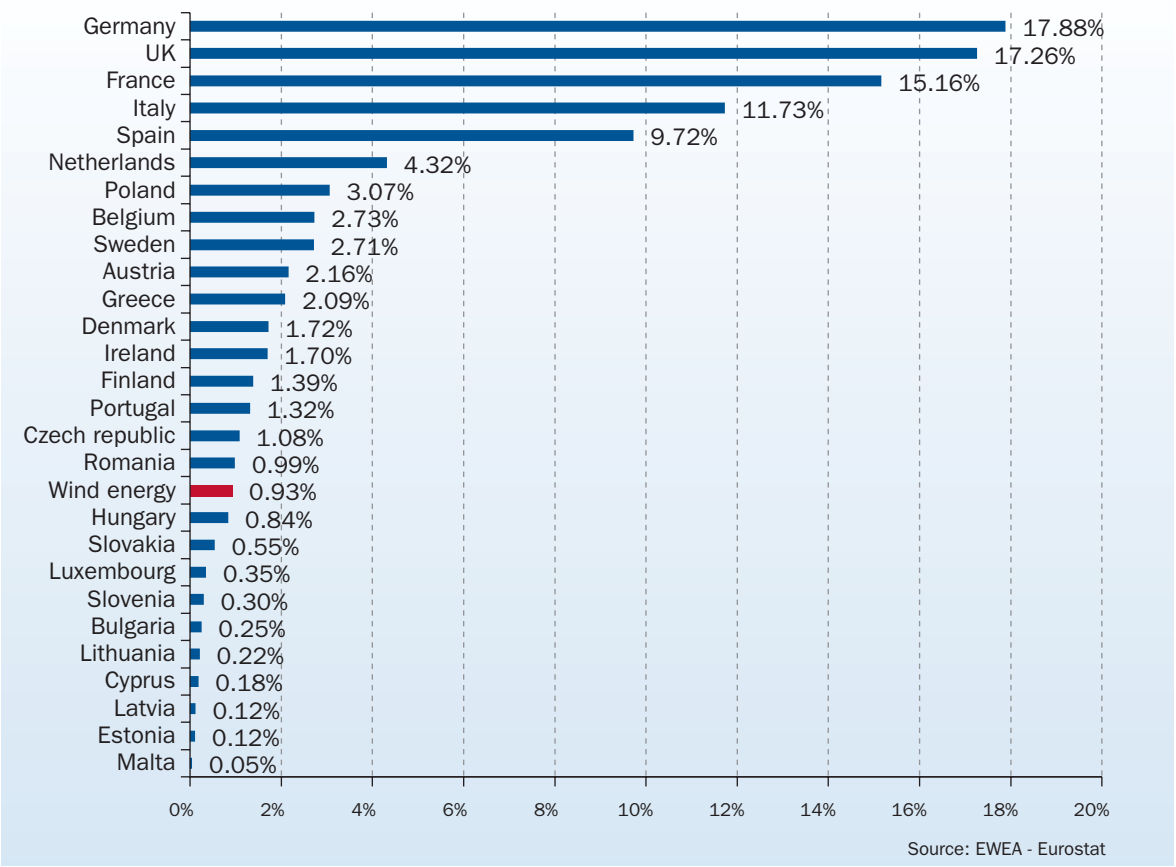
FIGURE 7.3 FORECAST OF WIND ENERGY SECTOR'S CONTRIBUTION TO EU GDP COMPARED TO CONTRIBUTION OF 27 MEMBER STATES IN 2020[21]



Source: EWEA - Eurostat

[21] Source of forecast for EU-27 GDP: EU Energy Trends to 2030 (European Commission-Directorate General for Energy).

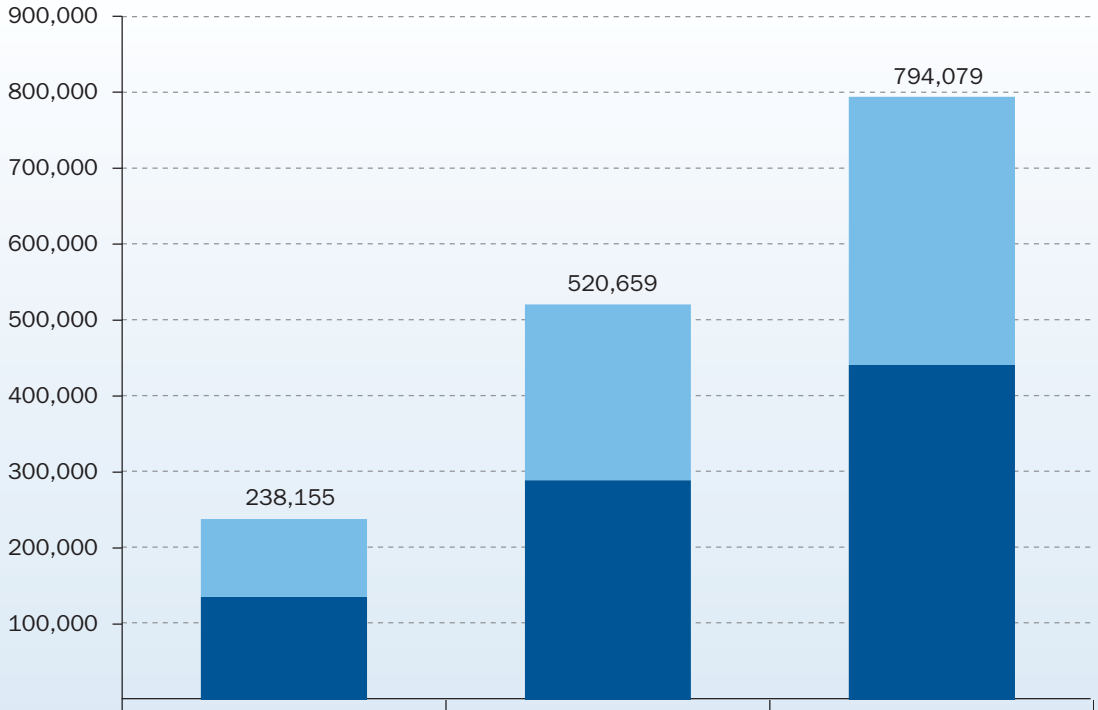
FIGURE 7.4 FORECAST FOR WIND ENERGY SECTOR'S CONTRIBUTION TO EU GDP COMPARED TO CONTRIBUTION OF 27 MEMBER STATES IN 2030



7.2 Employment

Employment in the wind industry will increase by 233% to reach 794,079 jobs in 2030. Direct jobs will continue to be the largest share of employment in the sector. The proportion of direct to indirect jobs will remain stable, with the former responsible for around 56% of total wind energy-related employment in both 2020 and 2030.

FIGURE 7.5 FORECAST OF DIRECT AND INDIRECT EMPLOYMENT IN WIND ENERGY SECTOR IN 2020 AND 2030 IN NUMBERS OF JOBS



	2010	2020	2030
Direct	135,863	289,255	441,155
Indirect	102,292	231,404	352,924
Total	238,155	520,659	794,079

Source: EWEA

KEY FINDINGS

The wind sector's GDP will increase four-fold to reach €173 bn by 2030 (€93.6 bn direct contribution, €80 bn indirect), representing 1% of total EU GDP.

The wind energy sector will continue to grow faster than the EU economy for the next two decades.

Wind industry's contribution to EU GDP will make it the EU's 19th Member State in 2020 and 18th in 2030.

The sector will employ over 794,000 people in 2030, 55% (441,000) directly, representing a 233% increase in under 20 years.

Photo: LM Glasfiber

8 EU WIND ENERGY SECTOR – THE GLOBAL LEADER

8.1 Activity of European energy players in non-EU countries

8.1 Activity of European energy players in non-EU countries

The analysis of the activities of 457 wind energy companies (Annexe IV) based in the European Union shows that 222 (48.6%) are doing business outside the EU. 152 companies (33%) have business in North America, 85 (18.6%) in China, 50 (11%) in India and 41 (9%) in Brazil.

8.1.1 Developers

Of the 10 biggest world-wide wind energy developers, five are EU based. Of more than 53.9 GW of cumulative capacity installed by the top 10 developers, 56.7% (30.5 GW) was installed by EU companies. The Spanish developer Iberdrola is the world leader with more than 12 GW of installed capacity, or 35.8% of the capacity installed by the top ten developers.

8.1.2 Wind turbine manufacturers

Taking figures from three wind energy market analysts[22], globally, the top ten wind turbine manufacturers had a market share of between 79% and 82.5% at end 2010. Four of the top ten are EU-based and, together, account for 31% to 34.5% of the global market. The Danish manufacturer, Vestas, has the biggest share of the world market, reaching almost 15% according to two sources and around 12% according to the third.

TABLE 8.1 TEN BIGGEST WIND ENERGY DEVELOPERS – TOTAL INSTALLED CAPACITY END 2010

Company	Country	Installed capacity (MW)
Iberdrola	Spain	12,136
Nextera Energy	United States	8,300
Acciona	Spain	6,614
EDP Renovaveis	Portugal/Spain	5,792
China Guodian Corporation	China	5,345
China Detang Corporation	China	4,028
China Huaneng Group	China	3,522
E.ON	Germany	3,322
Enel	Italy	2,654
Infigen Energy	Australia	2,194
Total		53,907
Total	*EU*	*30,518*
Total	*Rest of world*	*23,389*

Source: Deloitte

[22] Deloitte, Make Consulting *("Market report: supply side", June 2011")* and BTM Consult (a part of Navigant): *"International wind energy development: supply chain assessment"*, November 2011.

TABLE 8.2 TEN BIGGEST WIND TURBINE MANUFACTURERS – MARKET SHARE END 2010

Company	Country	Market share Deloitte	Market share Make consulting	Market share BTM consult
Vestas	Denmark	14.7%	12.0%	14.8%
Sinovel	China	11.1%	11.0%	11.1%
GE Energy	United States	9.5%	10.0%	9.6%
Goldwind	China	9.4%	10.0%	9.5%
Enercon	Germany	7.2%	7.0%	7.2%
Suzlon	India	6.8%	6.0%	6.9%
Dongfang	China	6.6%	7.0%	6.7%
Gamesa	Spain	6.6%	7.0%	6.6%
Siemens	Germany	6.0%	5.0%	5.9%
Guodian United Power	China	4.2%	4.0%	4.2%
Total		82.1%	79%	82.5%
Total	*EU*	*34.5%*	*31%*	*34.5%*
Total	*Rest of world*	*47.6%*	*48%*	*48%*

Source: Deloitte, Make consulting and BTM consult.

Looking specifically at MAKE Consulting data[23], EU turbine manufacturers had a global market share of 37% in 2010, consisting of 89% of the EU market, 32% of the US market, and 8% of the Chinese market (the world's largest market). European companies, despite numerous examples of protectionist policies outside the EU, have achieved a higher share in foreign markets than non-European manufacturers have achieved in Europe. This is due to Europe's first mover advantage and its technology leadership. In addition, European component suppliers (electronics, gearboxes, generators, bearings, castings, blades), consultancies, research institutes, and developers are reaping significant benefits from the development of the global wind industry, particularly in China, the US, India and South America. This is despite difficult – and at times discriminatory – conditions in some markets.

The European wind industry views international competition as an opportunity rather than as a threat, on condition that global discriminatory trade and investment practices, including local content requirements, are removed as a matter of priority.

Increasing international competition from Asia and the US could put EU leadership at risk. However, by adopting long term policies, the EU will be in a position to maintain, and even improve, the global position of European wind energy companies. Failure to do so could result in Europe losing its leadership to non-European companies, at a time when the industry globally is experiencing rapid growth rates.

Key elements of maintaining European leadership of the sector are technology development and policies to support the continued development of a European wind industry – that is, policies to promote the expansion of European markets, both onshore and offshore, as well as increased R&D efforts.

Additionally, there are more than 20,000 EU professionals working in EU-based wind energy companies in non-EU countries.

[23] MAKE Consulting 2011.

KEY FINDINGS

Over 48% of European wind energy sector companies have activities outside the EU.

Of the 10 biggest wind turbine manufacturers in the world, four are EU-based.

Five of the ten biggest wind energy developers in the world are EU-based.

EU wind energy companies employ some 20,000 EU professionals in non-EU countries

Photo: Vattenfall - Ben Barden

ANNEXES

Annexe I. Methodology

I.i Direct contribution to GDP

To calculate the wind energy sector's contribution to EU GDP, three equivalent approaches – recognised by the European System of National and Regional Accounts (ESNRA)[24] were used: expenditure, added value and income.

The wind energy sector is made up of companies that carry out a wide range of different activities integrated in the value chain of the industry. Therefore, the sector was divided into four sub-sectors:

- wind farm developers and wind energy developers
- wind turbine manufacturers
- component manufacturers
- providers of specific services for the wind energy sector

350 EU companies active in wind energy were identified and their financial statements analysed for the period between 2007 and 2010.

The value added and income approaches were used to estimate the sector's contribution to GDP, using the information companies disclose in their financial statements. Additional information, such as tax balance and R&D expenditure, was gathered by surveying wind industry players. Combining these two data sets, it was possible to calculate the total direct impact on GDP.

I.ii Indirect contribution to GDP

The different sub-sectors of the wind energy industry purchase from, and provide services to, other sectors of the economy. This has an indirect impact on GDP.

This impact is quantified using input-output models from the EU[25]. However, these tables do not consider the wind energy sector as a separate industry. It was, therefore, necessary to add the information of this sector to the evaluation scheme. To do this the information was completed with sectoral data collected directly from relevant industry players.

Based on this input-output table, income multipliers containing information on the wind energy sector's impact on the rest of the economy were calculated.

For full details of the methodology, please refer to Annexe II.

[24] Definitions as given by Eurostat: http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/National_accounts_%E2%80%93_GDP

[25] An input-output model is a quantitative economic technique that captures the correlations between different branches of an economy or among branches of different and even competing economies.

Annexe II. Calculating the wind energy sector's direct contribution to GDP

Three equivalent approaches, recognised by the European System of National and Regional Accounts (ESNRA)[26], can be used to calculate an economic sector's contribution to GDP:

1. ***Expenditure approach:*** GDP is defined as what individuals spend on final consumption, plus what the government spends on final consumption, plus gross capital formation, plus exports and minus imports. In the system of national accounts, only households, non-profit institutions serving households (NPISH)[27] and governments have final consumption, whereas corporations have intermediate consumption. Private final consumption expenditure is defined as expenditure on goods and services for the direct satisfaction of individual needs, whereas government consumption expenditure includes goods and services produced by the government, as well as the purchase of goods and services by the government to supply households as social transfers in kind. Gross capital formation is the sum of gross fixed capital formation and the change in inventories (stocks). The external balance is the difference between exports and imports of goods and services. Depending on the size of exports and imports, it can be positive (a surplus) or negative (a deficit).

2. ***Value added approach***: the gross value added of various sectors, plus taxes, minus subsidies on products. The output of the economy is measured using gross value added. Gross value added is defined as the value of all newly generated goods and services minus the value of all goods and services consumed in their creation; the depreciation of fixed assets is not included. When calculating value added, output is valued at basic prices and intermediate consumption at purchasers' prices. Taxes minus subsidies on products have to be added to value added to obtain GDP at market prices.

3. ***Income approach:*** includes salaries and other money spent on employees, net taxes on production and imports, gross operating surplus and mixed income. The income approach shows how GDP is distributed between different participants in the production process, as the total of:

- ***compensation of employees***: the total remuneration, in cash or in kind, payable by an employer to an employee in return for work done by the latter during the accounting period; the compensation of employees is broken down into: wages (in cash and in kind); employers' social contributions (actual social contributions and imputed social contributions)
- ***gross operating surplus***: the surplus (or deficit) on production activities before account has been taken of the interest, rents or charges paid or received for the use of assets
- ***mixed income***: this is the remuneration for the work carried out by the owner (or by members of his/her family) of an "unincorporated" company[28]; this is referred to as "mixed income" since it cannot be distinguished from the entrepreneurial profit of the owner
- ***Taxes on production and imports minus subsidies***: these consist of compulsory (in the case of taxes) payments to or from general government or institutions of the EU on production or import of goods and services, the employment of labour, and the ownership or use of land, buildings or other assets used in production.

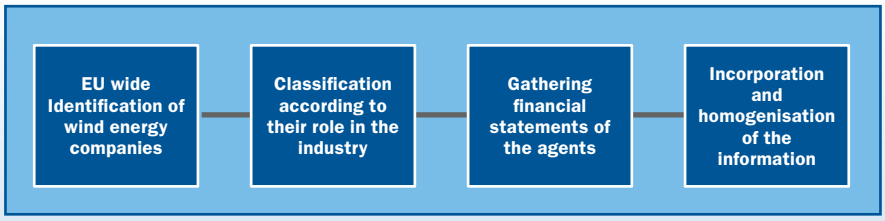
The wind energy sector is made up of companies that carry out a wide range of different activities integrated in the value chain of the industry.

[26] Definitions as given by Eurostat: http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/National_accounts_%E2%80%93_GDP

[27] Eurostat definition: non-profit institutions are not mainly financed or controlled by governments and they provide goods or services to households for free or at prices that are not economically significant. Examples include churches and religious societies, sports and other clubs, trade unions and political parties.

[28] These are companies for which it is not possible to separate profits and salaries.

FIGURE II.1 INFORMATION COLLECTION FOR THE VALUE ADDED AND INCOME APPROACHES



The methodology used in this report divides the sector into four sub-sectors:

- wind farm developers and wind energy developers
- wind turbine manufacturers
- component manufacturers
- providers of specific services for the wind energy sector

350 companies active in wind energy were identified and their financial statements analysed for the period between 2007 and 2010.

The financial statements gathered include information that allows the sector's contribution to GDP to be estimated using two of the three methods this report is based on: the value added approach and the income method. The information collected from a survey of 350 EU wind energy players was extrapolated to the total size of the sector using the following methods:

- For ***wind energy developers***: the installed wind energy capacity of each developer was analysed. The study analyses companies covering 86% of installed wind power capacity. In order to apply the results to the whole European Union, the behaviour of all wind energy developers is considered similar to the behaviour of small and medium players.
- For ***wind turbine manufacturers***: the study covers 92% of installed wind power capacity. Calculations are made to apply the results of the survey to the total installed capacity.
- For ***component manufacturers and service providers***: the indirect impact of the two previous sub-sectors on these activities was calculated.

Two of the approaches above, value added and income, can be used to estimate the sector's contribution to GDP using the information companies disclose in their financial statements. Additional information, such as tax balance and R&D expenditure, was gathered by surveying wind industry players. Combining these two data sets, it was possible to calculate the total direct impact on GDP[29].

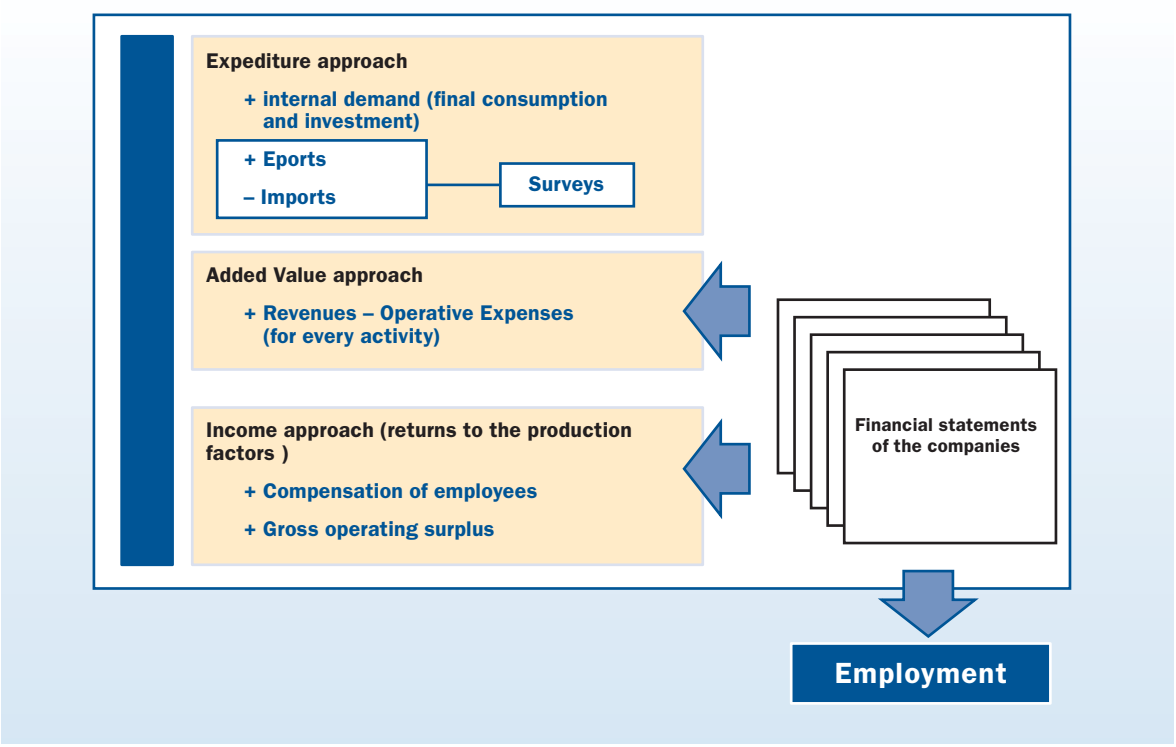
The expenditure approach requires information on electricity production from wind installations, the investments made by the sector, and the sector's exports and imports.

Additionally, figures on cost structures, exports and imports were obtained directly from a selection of companies in each of the industry's sub-sectors.

The methodology and the sources for assumptions for all the different methodologies used are depicted in figure II.2.

[29] All the information is presented in both current and constant values, using the GDP deflator published by the International Monetary Fund (IMF). Currencies from non-Euro countries were converted into Euros applying the average exchange rates published by the European Central Bank.

FIGURE II.2 ESTIMATION OF DIRECT GDP CONTRIBUTION USING THREE ENSRA RECOGNISED METHODOLOGIES



Annexe III. Calculating the wind energy sector's indirect contribution to GDP

Input-output analysis methodology was developed by Wassily Leontief in 1936. It is a quantitative economic technique that shows the interdependencies between different branches of a national economy or between branches of different, even competing economies.

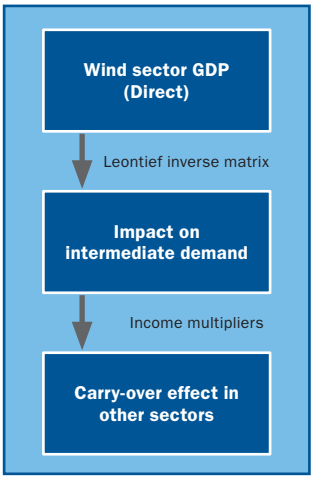
The different sub-sectors of the wind industry require products and services from other sectors. Therefore, the sector has an additional economic impact on other economic sectors that can be evaluated from input-output tables.

The input-output tables show all the production and distribution that takes place in the different sectors of the economy. The indirect effects of an industry on other sectors of the economy can be quantified from the matrix of technical coefficients and the Leontief inverse matrix.

Currently, the European account tables do not break the wind sector into sub-sectors, so it is necessary to evaluate the interrelationships with other economic sectors separately. In order to achieve this, a questionnaire was prepared and completed by industry players on the supply structure of the different sub-sectors of the industry.

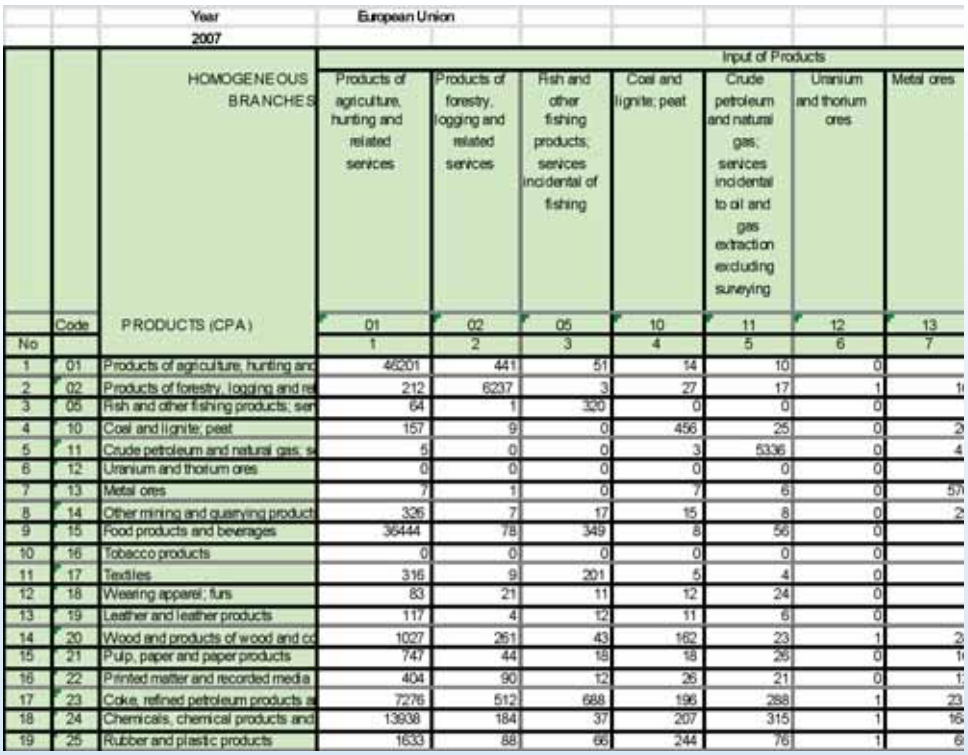
Therefore, based on latest tables published and the information gathered via the questionnaires, a new type of table was built containing the broken down sub-sectors identified by the wind energy sector.

FIGURE III.1 OUTLINE OF THE ANALYTICAL METHODOLOGY USED



[30] http://epp.eurostat.ec.europa.eu/portal/page/portal/esa95_supply_use_input_tables/data/workbooks

FIGURE III.2 SYMMETRIC INPUT-OUTPUT TABLE FOR DOMESTIC OUTPUT AT BASIC PRICES

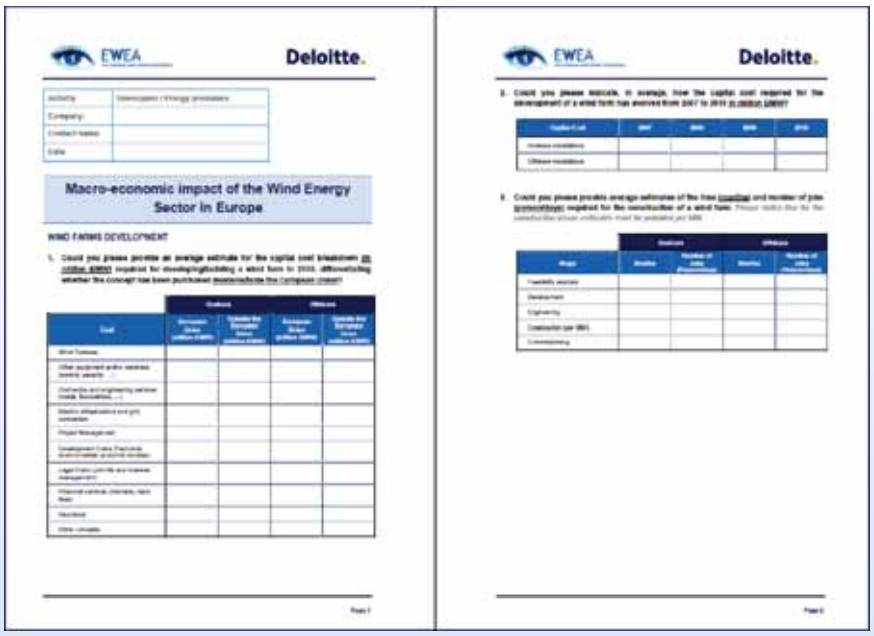


		Year	European Union						
		2007							
			Input of Products						
		HOMOGENEOUS BRANCHES	Products of agriculture, hunting and related services	Products of forestry, logging and related services	Fish and other fishing products; services incidental of fishing	Coal and lignite; peat	Crude petroleum and natural gas; services incidental to oil and gas extraction excluding surveying	Uranium and thorium ores	Metal ores
	Code	PRODUCTS (CPA)	01	02	05	10	11	12	13
No			1	2	3	4	5	6	7
1	01	Products of agriculture; hunting and	46201	441	51	14	10	0	
2	02	Products of forestry, logging and re	212	6237	3	27	17	1	1
3	05	Fish and other fishing products; ser	64	1	320	0	0	0	
4	10	Coal and lignite; peat	157	9	0	456	25	0	2
5	11	Crude petroleum and natural gas; s	5	0	0	3	5336	0	4
6	12	Uranium and thorium ores	0	0	0	0	0	0	
7	13	Metal ores	7	1	0	7	6	0	57
8	14	Other mining and quarrying product	326	7	17	15	8	0	2
9	15	Food products and beverages	36444	78	349	8	56	0	
10	16	Tobacco products	0	0	0	0	0	0	
11	17	Textiles	316	9	201	5	4	0	
12	18	Wearing apparel; furs	83	21	11	12	24	0	
13	19	Leather and leather products	117	4	12	11	6	0	
14	20	Wood and products of wood and co	1027	261	43	162	23	1	2
15	21	Pulp, paper and paper products	747	44	18	18	26	0	1
16	22	Printed matter and recorded media	404	90	12	26	21	0	1
17	23	Coke, refined petroleum products a	7276	512	688	196	288	1	23
18	24	Chemicals, chemical products and	13938	184	37	207	315	1	16
19	25	Rubber and plastic products	1633	88	66	244	76	1	6

How to calculate indirect impact:

1. Obtain the latest EU Input-Output tables (2007) from Eurostat and access the “Symmetric Input-Output Table for domestic output at basic prices”[30].

FIGURE III.3 QUESTIONNAIRE



2. Questionnaires were developed to incorporate the breakdown of the wind sector. The intermediate consumption flows between the sub-sectors (developers, developers, turbine manufacturers, component manufacturers and services) and other economic activities were then quantified.

3. Questionnaires were completed by industry players.

4. Based on the information collected via the questionnaires, transactions between the wind energy sector and the other economic sectors were introduced into the matrix.

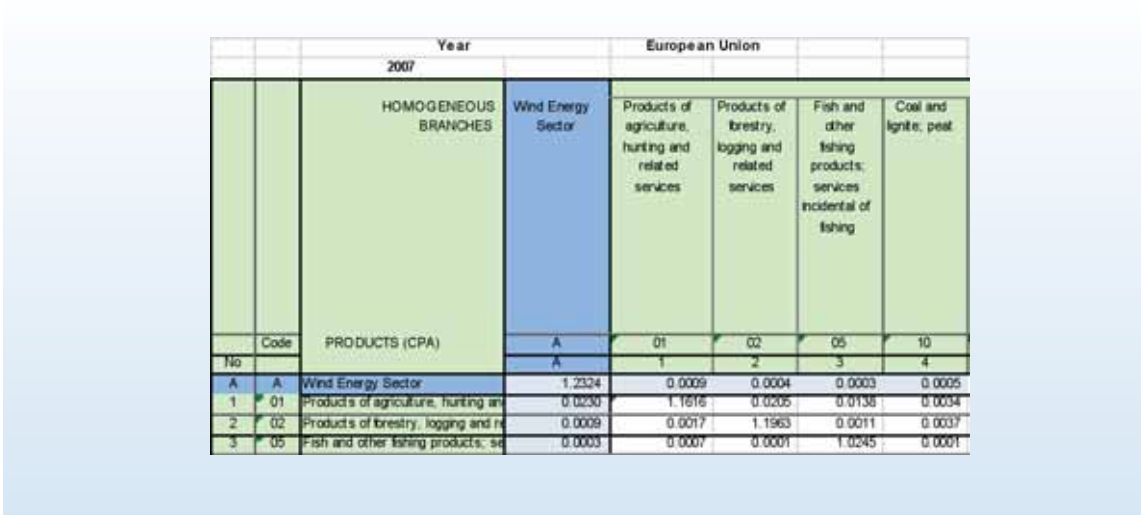
a. A technical coefficients matrix was drawn up. This measures the relative importance of each industry in the total production of another sub-sector.

b. A Leontief inverse matrix was drawn up. This measures the indirect impact of a sector on another economic activity through the multiplier effect that a sector has on the intermediate production of another.

c. Income multipliers were calculated. These measure the existing relation between gross added value (contribution to GDP) and total production. This set of indicators, multiplied by the intermediate production, quantifies the indirect impact that an increase of €1 in the wind energy sector's contribution to the EU's GDP has on the GDP of the rest of the economy.

5. Indirect impact of wind energy sector is calculated by multiplying the direct impact on GDP by the multipliers in Table III.5.

FIGURE III.4 EXAMPLE OF THE ADAPTED INPUT-OUTPUT TABLES



Year			European Union			
2007						
		HOMOGENEOUS BRANCHES	Wind Energy Sector	Products of agriculture, hunting and related services	Products of forestry, logging and related services	Fish and other fishing products; services incidental of fishing	Coal and lignite; peat
	Code	PRODUCTS (CPA)	A	01	02	05	10
No			A	1	2	3	4
A	A	Wind Energy Sector	1.2324	0.0009	0.0004	0.0003	0.0005
1	01	Products of agriculture, hunting an	0.0230	1.1616	0.0205	0.0138	0.0034
2	02	Products of forestry, logging and re	0.0009	0.0017	1.1963	0.0011	0.0037
3	05	Fish and other fishing products; se	0.0003	0.0007	0.0001	1.0245	0.0001

TABLE III.5 INCOME MULTIPLIERS FOR WIND ENERGY SECTOR

Sector	Income multiplier
Basic metal	0.153330
Electric and electronic equipment	0.132234
Manufactured metal products	0.124333
Transport	0.061100
Construction	0.058938
Financial intermediation	0.056100
Rubber and plastic products	0.054744
Professional services	0.053324
Post and telecommunication	0.031122
IT services	0.027540
Research and development	0.023775
Chemical products	0.020568

Annexe IV. Activity of European wind energy players in third countries

TABLE IV.1 INTERNATIONAL PRESENCE OF EU WIND ENERGY SECTOR COMPANIES

Company	International presence	
	European Union	Other
2EN SA	Greece	–
4C Offshore Limited	United Kingdom	–
A. Silva Matos – Energia, SA	Hungary, Portugal, Romania, Spain	United States of America
A2SEA A/S	Denmark, Germany, United Kingdom	–
ABB	European Union	Africa and Asia, India, Middle East, North America, South America
ABO Wind AG	Belgium, Bulgaria, France, Germany, Ireland, Spain, United Kingdom	Argentina
AC Prim Sp.zo.o	Poland	–
Acciona Energia, SA	France, Germany, Greece, Hungary, Italy, Portugal, Spain	Australia, Canada, Chile, China, India, Mexico, Morocco, South Korea, United States of America
Actiflow BV	Belgium, Netherlands	–
Advanced Offshore Solutions ApS	Denmark	–
Advantech Europe GmbH	Netherlands	Brazil, China, Israel, Japan, Korea, Singapore, Thailand, Turkey, United States of America
AdVentum	Italy	–
AES Wind Generation, Europe	Bulgaria, Czech Republic, France, Hungary, Netherlands, Spain, United Kingdom	Asia, Cameroon, Kazakhstan, Mexico, Middle East, Nigeria, South America, Turkey, Ukraine, United States of America
AGY	France	China, Japan, Korea, United States of America
Aioliki Kilindrias SA	Greece	–
Aiolis Energy Investments Ltd	Greece	–
Air energy	Belgium, United Kingdom	Asia-Pacific, Australia, Middle East, United States of America
Al-Andalus Wind Power SL	Spain	–
Alnmaritec Ltd.	Belgium, Cyprus, Germany, Greece, Italy, Luxembourg, Netherlands, Portugal, United Kingdom	Algeria, Australia, Barbados, Indonesia, Israel, Kuwait, Malaysia, Norway, Pakistan, Singapore, Venezuela
Alpha Wind SRL	Ireland, Denmark, Poland, Romania, United Kingdom,	Egypt, Norway, United States of America
Alstom Wind	Belgium,Germany, Greece, Hungary, Ireland, Italy, Netherlands, Portugal, Spain, United Kingdom	Asia, Australia, Indonesia, Middle East, Nigeria, North Africa, North America, Panama, Russia, South Africa, South America, Turkey
Altahullion Wind Farm Limited	Ireland, United Kingdom	–

Company	International presence	
	European Union	Other
Alushіp Technology Ltd.	Poland	–
Ammonit Measurement GmbH	Austria, Czech Republic, France, Germany, Italy, Portugal, Spain	Australia, China, North America, Russia, South Africa, South America
AOS Sp. z o.o.	Poland	–
Aplicaciones de Energías Sustitutivas	Greece, Spain	Colombia
AQSystem	Finland, Italy, Spain, Sweden, United Kingdom	Canada
ArcelorMittal Ringmill	Belgium	–
Ardrossan Wind Farm (Scotland) Limited	United Kingdom	–
AREVA – Renewable Energies Business Group	France	–
Arise Windpower AB	Sweden	–
Aristoncavi SpA	Italy	China, Dubai, Singapore
ASJA Ambiente Italia SpA	Italy	Argentina, Brazil, China
Atlas Magnetics Group	Germany, Netherlands	Canada, China, United States of America
ATM-PRO SPRL	Belgium	–
Availon GmbH	Germany, Italy, Spain	United States of America
Avancos	Germany, Netherlands, Spain, United Kingdom	China, India, United States of America
Avanti Wind Systems A/S	Denmark, Germany, Spain, United Kingdom	Australia, China, India, South Korea, United States of America
Avantis Europe GmbH	Germany	Australia, Hong Kong
AVL List Gmbh	Austria, Benelux, Czech Republic, Finland, France, Germany Hungary, Italy, Poland, Portugal, Romania, Slovenia, Spain, United Kingdom	Argentina, Asia, Australia, Brazil, Croatia, North America, Russia, Scandinavia, Switzerland, Turkey
AWS Truepower	Spain	India, United States of America
Axis Renewables	Ireland, United Kingdom	Bermuda, Switzerland, United States of America
Bachmann electronic GmbH	Austria, Denmark, Germany, Netherlands	China, India
Bakker Magnetics BV	Belgium, Netherlands	–
Ballast Nedam Offshore	Netherlands	–
Baltic Wind Park	Latvia	–
BARD Engineering GmbH	Germany	–
Barlovento Recursos Naturales SL	Romania, Spain	Brazil, Peru
Barrow Offshore Wind Limited	United Kingdom	–
BBB Umwelttechnik GmbH	Germany	–
Beaufort Wind Limited	United Kingdom	–
BEN Aketil Wind Energy Limited	United Kingdom	–
BerlinWind GmbH	Germany	–

Company	International presence	
	European Union	Other
Beten International	France	Kazakhstan, Russia, Ukraine
Bicker FEN Windfarm Limited	United Kingdom	–
Bilbster Wind Farm Limited	United Kingdom	–
Blue H Technologies BV	Cyprus, Italy, Netherlands, United Kingdom	–
Bonfiglioli Riduttori SpA	France, Germany, Italy, Spain, United Kingdom	Australia, Canada, India, South Africa
Bonorva Windenergy S.R.L.	Italy	–
Boryszewo Wind Invest Sp. z o.o.	Poland	–
BTI Light Systems A/S	Denmark	–
Bulgarian Power EOOD	Bulgaria	–
Bureau Waardenburg bv	Netherlands	–
Cambrian Wind Energy Limited	United Kingdom	–
Capital Safety Group Limited	Sweden, United Kingdom	Asia, Australia, Canada, Latin America, United States of America
Carlisle Industrial Brake & Friction	Netherlands, United Kingdom	China, India, Japan, United States of America
Cathie Associates SA/NV	Belgium, France, United Kingdom	–
Causeymire Windfarm Limited	United Kingdom	–
CD-adapco	France, Germany, Greece, Italy, Netherlands, United Kingdom	Africa, Brazil, India, Israel, Japan, Korea, Russia, Singapore, United States of America
Cenaero	Belgium, France	–
CEZ Obnovitelne zdroje sro	Czech Republic, Germany, Hungary, Netherlands, Poland, Romania	Albania, Serbia
CG Power Systems Belgium NV	Belgium, France, Germany, Hungary, Ireland, Netherlands, Sweden, United Kingdom	Canada, China, Curacao, India, Indonesia, United States of America
Chapin International LLC	France	United States of America
Clipper Windpower Europe Limited	United Kingdom	United States of America
Cockerill Forges & Ringmill	Belgium	–
Community Windpower Limited	United Kingdom	–
Consolidated Contractors International Company SAL	Greece, Italy, United Kingdom	Africa, Malaysia, Middle East, United States of America
Continental Wind Project Management SRL	Romania	–
Converteam UK Ltd	Austria, Denmark, France, Germany, Italy, United Kingdom	Brazil, Canada, China, India, Norway, Russia, Singapore, South Korea, United Arab Emirates, United States of America
CONWX Aps	Denmark	–
Coöperatieve Vereniging tot Collectief Bezit van Windmolens "De Windvogel" BA	Netherlands	–

Company	International presence	
	European Union	Other
Corrosion & Water-Control BV	Cyprus, Denmark, Finland, France, Germany, Greece, Italy, Netherlands, Spain, United Kingdom	China, Iceland, India, Iran, Norway, Singapore, South Korea, Taiwan, Turkey, Ukraine, United Arab Emirates, Vietnam
C-Power NV	Belgium	–
Cresto A/S	Denmark, Sweden	–
Crockagarran Wind Farm Ltd	United Kingdom	–
Croon Elektrotechniek BV	Netherlands, Poland	–
CUE DEE AB	Sweden	–
Cummins Generator Technologies Ltd	Austria, Germany, Italy, United Kingdom	Canada, China
Dalry Community Wind Company Limited	United Kingdom	–
Danish Wind Investment A/S	Denmark	–
Daunia Wind S.R.L.	Italy	–
Davi – Promau SRL	Italy	Australia, Brazil, China, India, Norway, South Africa, United States of America
David Brown Gear Systems Limited	France, United Kingdom	Australia, Brazil, Chile, China, India, Indonesia, South Africa, United States of America
dB Vib Groupe	France	–
DDIS	France	–
Delta Energy Systems (Germany) GmbH	Czech Republic, Finland, France, Germany, Italy, Netherlands, Poland, Romania, Slovakia, Spain, Sweden, United Kingdom	Australia, Brazil, China, India, Japan, Russia, Singapore, Switzerland, Thailand, United States of America
Deutsche WindGuard Offshore GmbH	Germany	–
DEWI GmbH – Deutsches Windenergie-Institut	France, Germany, Italy, Spain	Brazil, Canada, China, Turkey
DeWind Europe GmbH	Germany	Canada, South Korea, United States of America
DEWI-OCC Offshore and Certification Centre GmbH	Germany	–
Dexia	Belgium, France, Luxembourg	Turkey
DHI	Bulgaria, Czech Republic, Denmark, France, Germany, Hungary, Italy, Poland, Portugal, Romania, Slovak Republic, Spain, Sweden	Australia, Brazil, Canada, China, India, Malaysia, New Zealand, Norway, Singapore, South Africa
DHL Global Forwarding (Sweden) AB	European Union	Africa, Asia, North America, Oceania, South America
DIgSILENT GmbH	Germany	–
DONG Energy A/S	Denmark, France, Germany, Netherlands, Poland, Sweden, United Kingdom	Norway
Doosan Power Systems	Czech Republic, Germany, United Kingdom	United States of America

Company	International presence	
	European Union	Other
Draka	European Union	Asia-Pacific, Canada, Central America, Mexico, South America, United States of America
DST - Wind, S.A.	Portugal	
Du Pont Iberica, SL	European Union	Asia-Pacific, Canada, Central America, Mexico, South America, United States of America
Dummuies Windfarm Huntly Limited	United Kingdom	–
E.ON Climate & Renewables GmbH	Germany, Italy, Spain, Sweden, United Kingdom	United States of America
EarthStream	France, Germany, Poland, Spain, United Kingdom	Brazil China, Dubai, Malaysia, Singapore, South Africa, United States of America, Vietnam
Eco - Wind Construction S.A.	Poland	–
ECO Wind Power Limited	Ireland	–
Ecofys	Germany, Netherlands, United Kingdom	China, United States of America
E-Connection Project B.V.	Netherlands	–
EDF ENERGIES NOUVELLES	France	Canada, United States of America
EDP Renováveis	Belgium, France, Italy, Portugal, Romania, Spain, United Kingdom	Brazil, Canada, United States of America
Eesti Energia A/S	Estonia	–
Eickhoff Wind Power GmbH	Bulgaria, Germany, Poland, United Kingdom	Australia, Belarus, China, Russia, South Africa, United States of America
Electrawinds Evolis Wind	Belgium	–
Eléna Energie	France	–
Eleon A/S	Estonia	–
Elos Fixturlaser AB	Germany, Netherlands, Sweden	Australia, Brazil, Canada, China, Russia, Taiwan, United States of America
EMD International A/S	Denmark, France, Germany, Spain, United Kingdom	Canada, Middle East, Norway, United States of America
EMEK SA	Bulgaria, Greece	–
Emerging Energy Research	Spain	Singapore, United States of America
EMU Limited	United Kingdom	Middle East, North Africa
EnBW Erneuerbare Energien GmbH	Germany	–
ENCIS ENERGIES VERTES	France	–
Eneco Wind BV	Netherlands	–
Enel Green Power	France, Greece, Italy, Portugal, Romania, Slovakia, Spain	Latin America, North America, Russia
Enercon GmbH	Austria, Belgium, Denmark, France, Germany, Greece, Italy, Netherlands, Portugal, Spain, Sweden	Argentina, Brazil, Canada, Turkey
Energiekontor AG	Germany, Portugal, United Kingdom	–
ENERGOTECH SA	Greece	–

Company	International presence	
	European Union	Other
Energy Competence Centre GmbH	Germany	–
Energy Research Centre of the Netherlands ECN	Netherlands	–
Enerpac BV	Austria, Belgium, Denmark, France, Germany, Greece, Iceland, Ireland, Netherlands, Portugal, Spain, Sweden, United Kingdom	Australia, Brazil, Canada, China, India, Japan, Latin America, Middle East, New Zealand, North Africa, Norway, Russia, Singapore, South Africa, South Korea, United States of America
Enertec	Greece	–
EnerVest AG	Belgium, Germany	–
Enfinity	Belgium, Czech Republic, France, Italy, United Kingdom	Brazil, Canada, China, India, Israel, United States of America
Engy AB	Luxembourg, Sweden	–
Enolia Ventus SA	Greece	–
ENSPEC Power Limited	United Kingdom	–
Ensto Finland Oy	European Union	
Environmental Protection Engineering S.A	Greece	–
Eolfi	France, Greece, Poland	United States of America
Eolia Renovables	France, Germany, Poland, Portugal, Spain	Canada, Mexico
EP Global Energy Ltd	Cyprus, Greece, Romania	Albania, United Arab Emirates
EPA	Poland	–
Equipaggiamenti Elettronici Industriali – EEI SRL	Italy	–
Erasmus University College	Belgium	–
ERM – Environmental Resources Management	Austria, Belgium, France, Germany, Hungary, Italy, Poland, Portugal, Spain, Sweden, United Kingdom	Argentina, Brazil, Canada, China, Colombia, Hong Kong, India, Indonesia, Japan, Kazakhstan, Korea, Malaysia, Mexico, New Zealand, Panama, Peru, Puerto Rico, Russia, Singapore, South Africa, Taiwan, Thailand, United Arab Emirates, United States of America, Vietnam
ESK Ceramics GmbH & Co KG	Germany	–
Essex Wind Farm III ApS	Denmark	–
ESTIA consulting & engineering SA	Greece	–
European Wind Farms A/S Ewp Windtower Production AB	Bulgaria, Denmark, France, Germany, Greece, Italy, Poland, Sweden	Bosnia, Croatia
EWT B.V. (Emergya Wind Technologies)	Netherlands, Sweden, United Kingdom	India, United States of America
Faccin SRL	Germany, Italy, Spain	China, United States of America
Falck Nutec	Denmark, Germany, Netherlands, United Kingdom	Azerbaijan, Brazil, Indonesia, Malaysia, Nigeria, Norway, Russia, Singapore, Thailand, Trinidad and Tobago, United Arab Emirates, United States of America, Vietnam
Fersa	Estonia, France, Italy, Poland, Spain	China, Montenegro, Panama

Company	International presence	
	European Union	Other
Fiberline Composites A/S	Denmark	–
Fibox oy Ab	European Union	Australia, Canada, China, Hong Kong, Indonesia, Israel, Japan, Korea, New Zealand, Russia, South Africa, Taiwan, United States of America
FLOW	Netherlands	–
FORCE Technology	Denmark, Sweden	China, Norway, Russia, United States of America
Forgital Group	Italy	–
ForWind – University of Oldenburg	Germany	–
Freudenberg Simrit GmbH & Co KG	Austria, Belgium, Denmark, Finland, France, Germany, Hungary, Italy, Poland, Portugal, Romania, Spain, Sweden, United Kingdom	Australia, Brazil, Canada, China, India, Japan, Mexico, Norway, Russia, Switzerland, Turkey, United States of America
Fugro Engineers BV	Netherlands	–
Fuhrländer AG	Bulgaria, Germany, Poland, Portugal, Spain	Azerbaijan, Brazil, China, Japan, Ukraine, United States of America, Vietnam
Fyns Kran Udstyr A/S	Denmark	–
G&G International	Belgium	–
Gamesa	France, Germany, Greece, Italy, Portugal, Romania, Spain, United Kingdom	China, Mexico, United States of America
Gaoh Offshore Limited	United Kingdom	–
Garrad Hassan and Partners Ltd	France, Germany, Ireland, Italy, Netherlands, Poland, Portugal, Spain, United Kingdom	Australia, Brazil, Canada, Chile, China, Egypt, India, Japan, Korea, Mexico, New Zealand, South Africa, Turkey, United States of America
Garves Wind Limited	United Kingdom	–
GDF SUEZ	Europe* does this mean EU?	Africa, Asia-Pacific, North America, South America
GE Energy	European Union	Africa, Asia-Pacific, North America, South America
GEO-NET Umweltconsulting GmbH	Germany	–
GeoSea NV	Belgium	Australia
Gerber Technology	Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Lithuania, Netherlands, Portugal, Romania, Spain, Sweden, United Kingdom	Africa, Asia-Pacific, Canada, South America, United States of America
Gerken SA	Belgium, Finland, Italy, Poland, Spain, United Kingdom	Australia, China, Croatia, Dubai, Ecuador, India, India, Indonesia, Iran, Japan, Korea, Mexico, Morocco, Norway, Pakistan, Philippines, Singapore, South Africa, Switzerland, Thailand, Turkey, United States of America

Company	International presence	
	European Union	Other
Gestamp Eolica	Belgium, Bulgaria, Poland, Romania, Spain	Brazil, Turkey, United States of America
Gexpro Services / Rexel	France, Hungary, Italy	Chile, China, United States of America
Glens Of Foudland Wind Farm Limited	United Kingdom	–
Global Energy Services	France, Germany, Greece, Hungary, Ireland, Italy, Portugal, Spain, United Kingdom	Chile, Egypt, Mexico, Morocco, Turkey, United States of America
Global Marine Systems Limited	United Kingdom	China, Dubai, Singapore, United States of America
Global Steel Service	Latvia, Poland	–
Global Tech I Offshore Wind GmbH	Denmark, Germany	–
Global Wind Power	Bulgaria, Denmark, France, Germany, Romania	Turkey
Global Wind Power BV	Netherlands	–
Goldwind Windenergy GmbH	Germany	Australia, China, South Africa, United States of America
GOLIATH Wind Ltd	Estonia	–
Green Energy World GmbH	Germany	–
Green Power Development Holding Company BV	Netherlands, Poland	United States of America
GREEN WIND ENERGY	Denmark	–
Greenoge Windfarm Limited	Ireland	–
Grupo Apia XXI	Poland, Spain	Bahrain, Bolivia, Chile, Mexico, United States of America
GSG Towers	Poland	–
Guascor Wind	Spain	Argentina
GustoMSC	Netherlands	–
GWU-Umwelttechnik GmbH	Germany	–
H2air SAS	France	–
Hailo-Werk	Austria, Belgium, Czech Republic, Estonia, France, Germany, Greece, Italy, Luxembourg, Malta, Netherlands, Portugal, Spain	Chile, Dubai, Hong Kong, Japan, Korea, Malaysia, Norway, Singapore, Switzerland, Syria, Turkey
Hansen Transmissions International nv	Belgium, France, Germany, Sweden	Australia, China, India, Japan, Latin America, North Africa, North America, South Africa
HBM	Austria, Belgium, Denmark, Germany, Italy, Netherlands, Poland, Portugal, Spain, Sweden, United Kingdom	Asia, Australia, Latin America, Middle East, Morocco, Norway, Russia, South Africa, Switzerland, Tunisia
HELLENIC CABLES S.A.	Greece, Ireland, United Kingdom	–
Hibernian Wind Power Limited	Ireland, United Kingdom	–
Holmatro Industrial Equipment B.V.	Netherlands, Poland	United States of America
Hungarian Wind Energy Industry Association	Hungary	–
HydrauRent	Netherlands	–

Company	International presence	
	European Union	Other
I.L.M.E. S.p.A.	Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Malta, Netherlands, Portugal, Slovakia, Slovenia, Spain, Sweden, United Kingdom	Australia, Canada, Chile, China, Colombia, India, Israel, Japan, Korea, Malaysia, Mexico, Peru, Russia, Singapore, South Africa, Switzerland, Thailand, Turkey, Ukraine, United States of America, Venezuela
Iberdrola Renovables	France, Germany, Hungary, Italy, Poland, Portugal, Spain, United Kingdom	United States of America
ICPE SA	Romania	–
IHC EQUIPEMENTS & SERVICES	France	–
Impol-Inotechna d.o.o.	Slovenia	–
IMT BV	Belgium, Germany, Italy, Netherlands, Poland	Abu Dhabi, Dubai, Malaysia, Singapore, United Arab Emirates
Industrial Clutch Parts	United Kingdom	–
Industrie COMETTO S.p.A.	Italy	–
INEGI	Portugal	–
Inergia Spa	Italy	–
INFLOW	Greece	–
Ingeniería y Diseño Europeo SA (IDESA)	Spain	–
Ingeteam	Czech Republic, France, Germany, Spain	Brazil, China, Mexico, United States of America
Inneo Torres, S.L.	Spain	–
Intellifast GmbH	France, Germany, Italy, Netherlands, Spain, United Kingdom	China, Israel, Malaysia, United States of America
International Marine Consultancy bvba	Belgium	–
International Paint BV	Netherlands	Argentina, Australia, Brazil, Canada, China, Indonesia, Japan, Korea, Malaysia, Mexico, Panama, Russia, Singapore, South Africa, Taiwan, United States of America, Vietnam
Irish Sea Contractors	Ireland	–
Isolux	Italy, Portugal, Spain, United Kingdom	Algeria, Angola, Bangladesh, Gabon, Guinea, India, Jordan, Kenya, Kuwait, Latin America, Morocco, Mozambique, Oman, Qatar, Saudi Arabia, Syria, United States of America
ITW Chemical Products Scandinavia	Denmark	–
IVPC SRL	Italy	–
James Walker RotaBolt Ltd	United Kingdom	–
Janneniska Oy	Finland, Germany, Spain, Sweden	Norway
JDR Cable Systems Ltd	United Kingdom	Norway, Singapore, Thailand, United States of America
Jens Chr. Siig Int. Transport – Production – Wind Energy	Poland	–

Company	International presence	
	European Union	Other
juwi Holding AG	Bulgaria, Czech Republic, France, Germany, Greece, Italy, Poland, Spain, United Kingdom	Chile, Costa Rica, India, South Africa, United States of America
Karomex Invest SRL	Romania	–
KCI	Netherlands	–
KDE Energy BV	Belgium, France, Netherlands, Poland, United Kingdom	–
KENERSYS EUROPE GmbH	Germany	India, United States of America
Kintech Ingenieria S.L.	Denmark, Spain	Chile, China, United States of America
Kloosterboer Vlissingen V.O.F.	France, Netherlands	Canada, United States of America
KR Wind	Denmark, Germany, Italy, Romania, United Kingdom	Australia, Canada, United States of America
La Compagnie du Vent	France	–
Lafert SpA	France, Germany, Italy, Slovenia, Spain, United Kingdom	Australia, North America, Singapore
Lahmeyer International GmbH	Germany	–
Latchways Plc	France, Spain, United Kingdom	South Africa, United States of America
Leitwind SpA	European Union	Belarus, Canada, Georgia, Norway, Turkey, Ukraine, United States of America
Leosphere	France	Brazil, China, India, Korea, United States of America
LM Wind Power	Denmark, Netherlands, Poland	Canada, China, India, United States of America
LOGI.CO SRL	Italy	–
Logic Energy Ltd	Finland, France, Germany, Ireland, Italy, Poland, Spain, United Kingdom	Australia, India, Japan, Malaysia, Russia, Turkey, United States of America
LPG Tecnicas en Extinsion de Incendios S.L.	Spain	–
LS Cable	France, United Kingdom	Australia, Brazil, China, Egypt, India, Indonesia, Japan, Korea, Malaysia, Russia, Singapore, South Africa, United States of America, Vietnam
Mac Cup AD	Bulgaria	–
MAINA Organi di Trasmissione S.p.A.	Italy	China
Mainstream Renewable Power Ltd	Germany, Ireland, United Kingdom	Canada, Chile, South Africa, United States of America
Mammoet Europe BV	Netherlands	Australia, Qatar, Saudi Arabia, United Arab Emirates
MARTIFER ENERGY SYSTEMS	Belgium, Czech Republic, France, Greece, Italy, Portugal, Slovakia, Spain, United Kingdom	United States of America
MCPS LTD	United Kingdom	Argentina, Brazil, China, Dubai, Singapore, United States of America

Company	International presence	
	European Union	Other
MCT Brattberg AB	European Union	Asia-Pacific, Canada, Central America, Mexico, South America, United States of America
MECAL	Netherlands	Japan, United States of America
Mekanord	Denmark, France, Greece, Ireland, Italy, Netherlands, Spain, United Kingdom	Argentina, Brazil, China, Croatia, Indonesia, Malaysia, Peru, Russia, Singapore, South Africa, Turkey, United Arab Emirates
MENCK GmbH	France, Germany, Netherlands	China, United States of America
Mercon Steel Structures BV	Netherlands	–
MERSEN France Amiens S.A.S.	Austria, Belgium, Denmark, Finland, France, Germany, Italy, Luxembourg, Netherlands, Spain, Sweden, United Kingdom	Australia, Brazil, Canada, China, Hong-Kong, India, Japan, Korea, Latin America, Morocco, Norway, Russia, South Africa, South East Asia, Taiwan, Turkey, United States of America
Mervento Oy	Finland	–
METEODYN	France, Spain	Argentina, Australia, China, Peru, Switzerland, United States of America
MeteoGroup	Austria, Belgium, France, Germany, Ireland, Italy, Netherlands, Poland, Spain, United Kingdom	Switzerland, United States of America
METOC PLC	United Kingdom	–
MGM motori elettrici SpA	Italy	–
Mitsubishi Power Systems Europe, Ltd	Austria, Germany, Italy, Spain, United Kingdom	Egypt, Turkey
MLS Intelligent Control Dynamics	Spain, United Kingdom	China, Korea, United States of America
MME Group	Netherlands, United Kingdom	China
Mobimar Ltd	Finland	–
momac GmbH & Co.KG	Germany	–
Moog	Germany, Italy, United Kingdom	Australia, China, India, Japan, United States of America
Morgan Carbon Europe	Belgium, Czech Republic, France, Germany, Hungary, Italy, Luxembourg, Netherlands, Poland, Spain, Sweden, United Kingdom	Russia, South Africa, Switzerland, Turkey
Mott MacDonald	France, Hungary, Ireland, Netherlands, Poland, United Kingdom	Australia, China, India, Russia, South Africa
MPI Offshore Ltd	United Kingdom	–
Mtorres	Spain	Chile
Nabtesco	Germany	Japan
Narec	United Kingdom	–
Nass&Wind SAS	France	–
National R&D Institute for Gas Turbines – COMOTI	Romania	–
Natural Power Consultants Ltd	France, United Kingdom	Chile, Turkey, United States of America

Company	International presence	
	European Union	Other
NDE SWEDEN AB	Sweden	–
Nexgen	United Kingdom	–
Nheolis	France	–
Nomura International PLC	United Kingdom	–
Nordenergie Renewables A/S	Denmark	–
Nordex SE	Austria, Denmark, France, Germany, Greece, Ireland, Italy, Poland, Spain, Sweden, United Kingdom	China, Japan, Turkey, United States of America
Nordic Wind Solutions AB	Denmark, Sweden	–
NORTHERN OFFSHORE SERVICES AB	Sweden	–
Offshore Marine Management Ltd	Germany, United Kingdom	Dubai, Mexico, New Zealand, Thailand, United States of America
Offshore Solutions BV	Netherlands	–
Operation Management Services Ltd.	Bulgaria	–
OPUS MARINE GmbH	Germany	–
Orga Aviation BV	Netherlands	United States of America
Oriel Windfarm Limited	Ireland	–
ORMAZABAL	France, Germany, Poland, Spain	Australia, China, Latin America, Turkey
Osiris Marine Services Ltd	United Kingdom	–
Osiris Projects	United Kingdom	–
Outsmart BV	Germany, Netherlands	–
Owens Corning	Belgium	–
Pall Corporation	European Union	Africa, Asia-Pacific, Canada, Latin America, Middle East, Puerto Rico, United States of America
PCS Power Converter Solutions GmbH	Germany	–
Peikko Group Oy	Austria, Czech Republic, Denmark, Estonia, Finland, Finland, France, Germany, Greece, Hungary, Italy, Latvia, Lithuania, Netherlands, Poland, Slovakia, Spain, Sweden, United Kingdom	Canada, China, Norway, Russia, Switzerland, Turkey, United Arab Emirates, United States of America
PEKKANISKA GROUP	Estonia, Finland, Latvia, Lithuania, Sweden	Russia, Ukraine
Pemamek Oy	Finland	–
Phoenix Contact GmbH & Co.KG	European Union	Asia-Pacific, Canada, Central America, Mexico, South America, United States of America
PM Renewables GmbH	France, Germany, Italy, Netherlands, Spain	Asia, Australia, Canada, Chile, Egypt, Nigeria, Russia, South Africa, United States of America
Polish Wind Energy Society in Gdansk	Poland	–
POWEO	France	–
Power Climber Wind	Belgium	United States of America

Company	International presence	
	European Union	Other
Power Composites Holland BV	Netherlands	–
Power One	Italy	United States of America
Power@Sea NV	Belgium	–
Powernet Oy	Finland, Germany, Sweden	–
PowerWind GmbH	Germany	–
PP Techniq	Denmark	–
PPC Renewables SA	Greece	–
Procovent	Germany, Sweden	–
PRÜFTECHNIK AG	European Union	Asia-Pacific, Canada, Central America, Mexico, South America, United States of America
PRYSMIAN Cables & Systems	France, Germany, Italy, Netherlands, Spain, United Kingdom	Australia, India, India, North America, Russia, South America, Turkey
Pure Energy Professionals Limited	United Kingdom	–
RAPID-TORC SA	Belgium	United States of America
RAYCAP	Germany, Greece	United States of America
Reichhold	Czech Republic, Finland, France, Germany, Italy, Netherlands, United Kingdom	Africa, Asia-Pacific, Brazil, Canada, India, Mexico, Middle East, Norway, Turkey, United States of America
Relight Energie SRL	Italy	–
Renewable Energy Park Newcastle	United Kingdom	–
Renovatio Engineering	Romania	–
REpower Systems AG	Belgium, France, Germany, Italy, Poland, Portugal, Spain, Sweden, United Kingdom	Australia, Canada, China, United States of America
RES GROUP	France, Ireland, Sweden, United Kingdom	Australia, South Africa, Turkey
RG Renovatio Group Limited	Austria, Bulgaria, Cyprus, Greece, Italy, Poland, Portugal, Romania	–
Ricardo UK Ltd	Czech Republic, Germany, Italy, United Kingdom	China, India, Japan, Korea, Russia, United States of America
RISOE National Laboratory, Denmark´s Technical University	Denmark	–
Rockwell Automation European Headquarters SA/NV	European Union	Asia-Pacific, Canada, Central America, Mexico, South America, United States of America
Romanian Association of Wind Power Developers (APEER)	Romania	–
Romanian Wind Energy Association (RWEA)	Romania	–
Romax Technology Ltd	France, United Kingdom	China, India, Japan, South Korea, United States of America
Roxtec International AB	European Union	Asia-Pacific, Canada, Central America, Mexico, South America, United States of America

Company	International presence	
	European Union	Other
RWE Innogy GmbH	Germany	–
S&C Electric Europe Ltd	United Kingdom	United States of America
SABE di Sala Pasquale SRL	Italy	–
Safety SAS	France, Germany, Italy, Spain	China
SAMTECH	Belgium, France, Germany, Italy, Spain, United Kingdom	China, Japan
Sandvik A/S	European Union	Africa, Asia-Pacific, Canada, Central America, Mexico, South America, United States of America
Saorgus Energy Ltd	Ireland	–
Sapa Profiler A/S	Austria, Belgium, Denmark, Estonia, Finland, France, Germany, Italy, Latvia, Lithuania, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom	Bosnia, Canada, China, Croatia, Mexico, Norway, Switzerland, United States of America, Vietnam
Savino del Bene Global Logistics and Forwarding Company	Bulgaria, France, Germany, Italy, Poland, Portugal, Slovenia, Spain, United Kingdom	Argentina, Australia, Bosnia, Brazil, Canada, Chile, China, Colombia, Costa Rica, Croatia, El Salvador, Ghana, India, Indonesia, Japan, Libya, Malaysia, Mexico, Montenegro, Nicaragua, Panama, Peru, Russia, Serbia, Singapore, South Africa, South Korea, Switzerland, Thailand, Turkey, Ukraine, United States of America, Uruguay, Venezuela, Vietnam
SC CONTINENTAL WIND RO SRL	Bulgaria, Poland, Romania, United Kingdom	Croatia, Monaco, Serbia, United States of America
Schneider Electric SA	European Union, France	Africa, Asia-Pacific, Canada, Central America, Mexico, South America, United States of America
Schuler Pressen GmbH & Co.KG	France, Germany, Italy, Poland, Slovakia, Spain, United Kingdom	Brazil, China, India, Mexico, United States of America
Schunk Electrographite SAS	European Union	Africa, Asia-Pacific, Canada, Central America, Mexico, South America, United States of America
Scintec AG	Germany	
SEaB Energy Ltd	France, United Kingdom	South Africa, United States of America
SeaCom Digitale Mess- und Übertragungssysteme GmbH	Germany	–
SeaEnergy Renewables Limited	United Kingdom	–
Seajacks UK Ltd	United Kingdom	Bermuda
Seaports of Niedersachsen GmbH	Germany	–
SEAS-NVE AmbA	Denmark	–
SeaZip Offshore Service B.V.	Netherlands	–
Senergy Alternative Energy	United Kingdom	Australia, Indonesia, Malaysia, New Zealand, Norway, United Arab Emirates, United States of America

Company	International presence	
	European Union	Other
SET Sustainable Energy Technologies GmbH	Austria	–
Shepherd Offshore Limited	United Kingdom	–
SICME MOTORI SRL	Austria, Belgium, Czech Republic, France, Germany, Greece, Italy, Netherlands, Poland, Slovakia, Spain, Sweden, United Kingdom	Africa, Asia, Australia, Canada, Mexico, Russia, Turkey, United States of America
Siemens Wind Power A/S	Denmark, Finland, Germany, Netherlands	Brazil, Colombia, Ecuador, Mexico, Peru, United States of America, Venezuela
SKF	Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Iceland, Italy, Latvia, Netherlands, Poland, Portugal, Romania, Spain, Sweden, United Kingdom	Africa, Asia-Pacific, Canada, Central America, Mexico, South America, United States of America
Smalley Europe	France, Sweden	Panama, United States of America
Smulders Groep	Netherlands	–
Solent Composite Systems Ltd	United Kingdom	–
SPERIAN PROTECTION EUROPE	Czech Republic, France, Germany, Hungary, Italy, Poland, Slovakia, United Kingdom	Brazil, Canada, Norway, Russia, United States of America
SPX Hydraulic Technologies	Finland, France, Germany, Italy, Netherlands, Spain, United Kingdom	Australia, Canada, China, India, Indonesia, Malaysia, Norway, Philippines, Singapore, South Africa, Sri Lanka, Switzerland, Taiwan, Thailand, United States of America, Vietnam
SSE Renewables	Ireland, Netherlands, Sweden, United Kingdom	–
STE GLOBAL	France, Spain	–
Stork Gears & Services	Belgium, Germany, Italy, Netherlands	Mexico, Singapore, United Arab Emirates
Stromag France	European Union	Australia, Canada, Chile, China, Egypt, India, Korea, Mauritania, Morocco, Singapore, South Africa, Thailand, United States of America
STX Windpower BV	Netherlands	–
Subocean Group	United Kingdom	–
Svendborg Brakes A/S	Czech Republic, Denmark, Germany, Poland, Spain	Australia, Brazil, Chile, China, Korea, South Africa, United States of America
Sword CTSpace	France, Germany, United Kingdom	United Arab Emirates, United States of America
Taiga Mistral SL	Poland, Spain	–
Team Humber Marine Alliance	United Kingdom	–
Technip Offshore Wind Ltd	European Union	Africa, Asia-Pacific, North America, South America

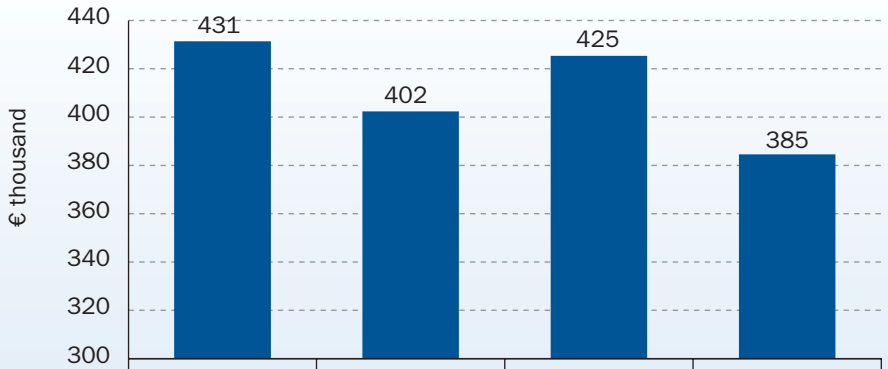
Company	International presence	
	European Union	Other
Tekmar Energy Ltd	United Kingdom	–
Tele-Fonika Kable Sp.z.o.o.S.K.A	European Union	Africa, China, North and South America, Serbia, Turkey, Ukraine
Telvent	Portugal, Spain, Sweden	Argentina, Australia, Brazil, Canada, Chile, China, Libya, Mexico, Peru, Qatar, Switzerland, Thailand, Turkey, United Arab Emirates, United States of America, Uruguay, Venezuela
Tensar International Ltd	European Union	Africa, Asia, Central and South America, North America
TER Tecno Elettrica Ravasi S.R.L.	European Union	Australia, Canada, China, Malaysia, Turkey, United States of America
The Switch	Denmark, Finland, Germany, Spain	China, India, Korea, United States of America
THEOLIA	France	
Total Wind A/S	Denmark, France, Germany, Netherlands, Poland, Spain	Brazil, Canada, Morocco
Tractebel Engineering	Belgium, Czech Republic, France, Italy, Poland, Romania	Brazil, Chile, India, Panama, Thailand, Turkey, United Arab Emirates
Tractel Group	European Union	Angola, Asia-Pacific, Middle East, Mozambique, North America, South America
Trelleborg Ridderkerk BV	Netherlands, Spain	China, Russia
Turbowinds NV/SA	Belgium, Bulgaria, Italy, Netherlands, United Kingdom	Canada, China, Israel, United States of America
TV 95 Premier S.L.	Spain	–
Ubifrance	France	–
Uniline Safety Systems Ltd	United Kingdom	Australia
Uudenkaupungin Rautavalimo Oy	Finland	–
Vattenfall Wind Power AB	Belgium, Denmark, Finland, France, Germany, Netherlands, Poland, Sweden, United Kingdom	Norway
VDL Klima BV	Netherlands, Scandinavia, United Kingdom	Canada, Singapore, Turkey, United States of America, Vietnam
Ventyx	France, United Kingdom	Japan, North America, South Africa
Verbrugge Zeeland Terminals BV	Netherlands	Northern Europe
Vergnet	France, Italy, Lithuania	Australia, Caribbean islands, Chile, Eritrea, Ethiopia, Japan, Kenya, Mauritania, Nigeria, Taiwan, United States of America
Verlinde SA	France	–
Vestas Wind Systems A/S	European Union	Argentina, Australia, Brazil, Canada, Chile, China, India, Japan, Korea, Mexico, New Zealand, Singapore, South Africa, Taiwan, United States of America

Company	International presence	
	European Union	Other
Visser & Smit Marine Contracting	Germany, Netherlands, United Kingdom	–
VITEC ENERGY	Finland, Sweden	Norway
VORTEX	Spain	–
Vos Prodect Innovations BV	Netherlands	–
WIND DIRECT SERVICES	France	–
Wind Energie Zirkel Hanse e. V.	Germany	–
WIND PROSPECT GROUP LIMITED	France, Ireland, Poland, United Kingdom	Australia, Canada, China, Singapore, South Africa, Turkey
WIND SERVICE SRL	Italy	–
Wind Site Evaluation Ltd	Ireland	–
WIND STARS SRL	Romania	–
WIND TO MARKET SA	Spain	–
WIND TO POWER SYSTEMS	Germany, Italy, Portugal, Spain	China
WIND TURBINE ENGINEERING	Italy	–
WINDAR LOGISTICS SL	Spain	–
WINDAR RENOVABLES	Spain	–
WINDBUD SP Z.O.O.	Poland	–
WINDENERGY SERVICE B.V.	Netherlands	–
WINDER POWER LIMITED	United Kingdom	–
Windfair.net	Germany	–
Windfarm Development UAB	European Union	–
windhunter-serwis sp. z o.o.	Bulgaria, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Netherlands, Poland, Romania	Argentina, Chile, Costa Rica, North America
WINDKRAFT ALSLEBEN 1 GMBH & CO. KG	Germany, United Kingdom	–
WINDKRAFT SIMONSFELD BG AD	Bulgaria	–
WINDNOVATION Engineering Solutions	Germany	–
WINDPARKSERVICE GMBH	Germany, Ireland	Norway
WINDPOWER MONTHLY NEWS MAGAZINE A/S	Denmark, United Kingdom	–
WindPro (GCube Underwriting Ltd)	France, Germany, Spain, United Kingdom	Canada, China, Middle East, United States of America
WINDPROJEKT SP. Z O.O.	Poland	–
Windstar	Greece, Italy, Sweden	Latin America
Windtechnics SAS	Belgium, Bulgaria, France, Germany, Greece, Ireland, Italy, Poland, Romania, United Kingdom	Switzerland, Turkey
windtest grevenbroich gmbh	Germany	India, South Korea, United States of America
WINDTEST IBERICA SL	Spain	–
WINDVISION BELGIUM	Belgium, Cyprus, France, Netherlands	–

Company	International presence	
	European Union	Other
WindVision Ltd	Belgium, France	–
WINDVISION WINDFARM ESTINNES	Belgium	–
Winergy AG	Germany	China, India, United States of America
Winwind Ltd	Denmark, Estonia, Finland, Portugal, Sweden	India
WIP	Germany	–
WKN Windkraft Nord AG	Bulgaria, France, Germany, Italy, Poland, Sweden	South Africa, Ukraine, United States of America
World Wide Wind Energy SPA	Italy	–
World wind Sweden AB	Sweden	–
Worldwideworker.com BV	European Union	–
wpd think energy GmbH & Co KG	Bulgaria, Finland, France, Germany, Greece, Italy, Poland, Romania, Spain, Sweden	Argentina, Canada, Chile, Croatia, Panama
XEMC Darwind BV	Netherlands	China
Yorkshire Windpower Limited	United Kingdom	–
Zephyr Investments Limited	United Kingdom	–
ZF Friedrichshafen AG	European Union	Algeria, Argentina, Australia, Brazil, Canada, China, Egypt, India, Japan, Jordan, Mexico, Russia, South Africa, South East Asia, Syria, United Arab Emirates, United States of America

Annexe V. Contribution to GDP and employment by MW/MWh

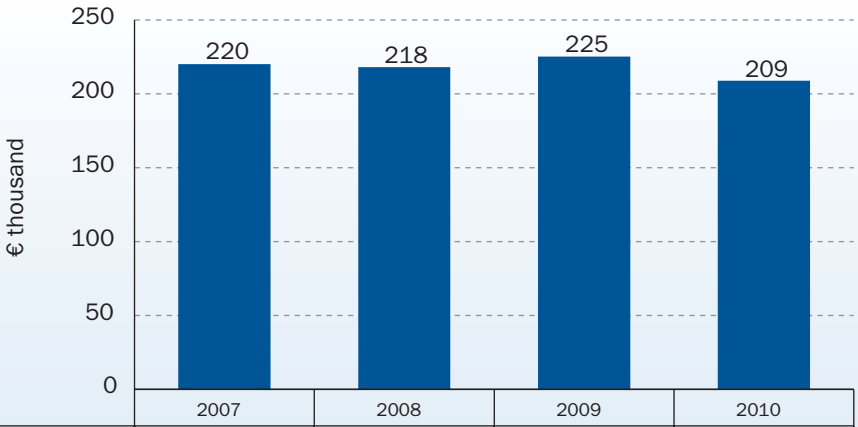
FIGURE V.1. TOTAL SECTOR CONTRIBUTION TO GDP (€ THOUSAND) DIVIDED BY WIND ENERGY CAPACITY IN MW (CONSTANT PRICES 2010)



	2007	2008	2009	2010
Sector contribution/ capacity (thousands of €/MW - constant prices 2010)	431	402	425	385
Wind energy capacity (MW)	56,517	64,719	75,090	84,324
Total sector GDP contribution (thousands of €)	24,381,810	26,039,515	31,939,448	32,430,144

Source: EWEA - Deloitte

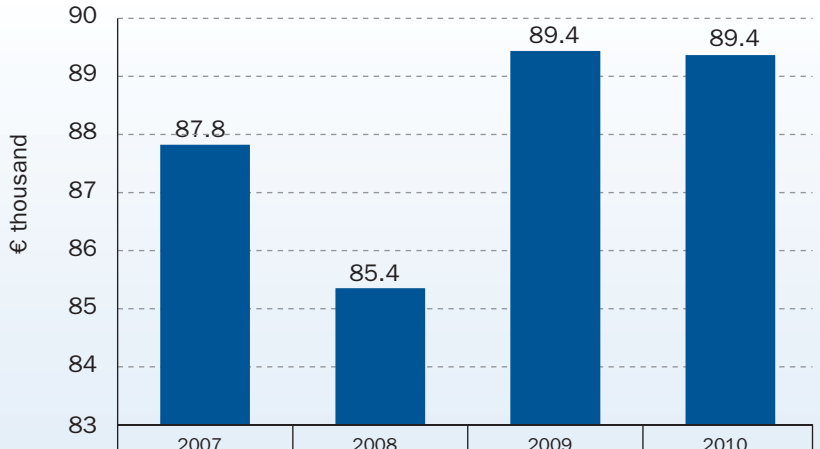
FIGURE V.2. DIRECT CONTRIBUTION TO GDP (€ THOUSAND) DIVIDED BY WIND ENERGY CAPACITY IN MW (CONSTANT PRICES, 2010)



	2007	2008	2009	2010
Sector GDP/wind energy capacity (thousands of €/MW): constant prices (2010)	220	218	225	209
Wind energy capacity (MW)	56,517	64,719	75,090	84,324
Sector GDP (thousands of €)	12,439,889	14,109,862	16,909,568	17,610,605

Source: EWEA - Deloitte

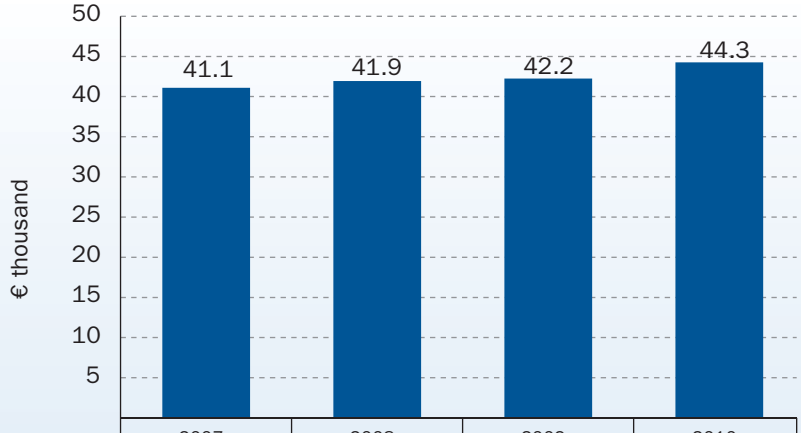
FIGURE V.3. WIND ENERGY DEVELOPERS' CONTRIBUTION TO THE EU'S GDP (€ THOUSAND) DIVIDED BY WIND ENERGY CAPACITY IN MW (CONSTANT PRICES, 2010)



	2007	2008	2009	2010
Contribution to GDP of wind energy producer/wind energy capacity (thousands of € /MW): constant prices (2010)	87.8	85.4	89.4	89.4
Wind energy capacity (MW)	56,517	64,719	75,090	84,324
Contribution to GDP of wind wnergy producer (thousands of €)	4,963,496	5,524,044	6,715,792	7,535,659

Source: EWEA - Deloitte

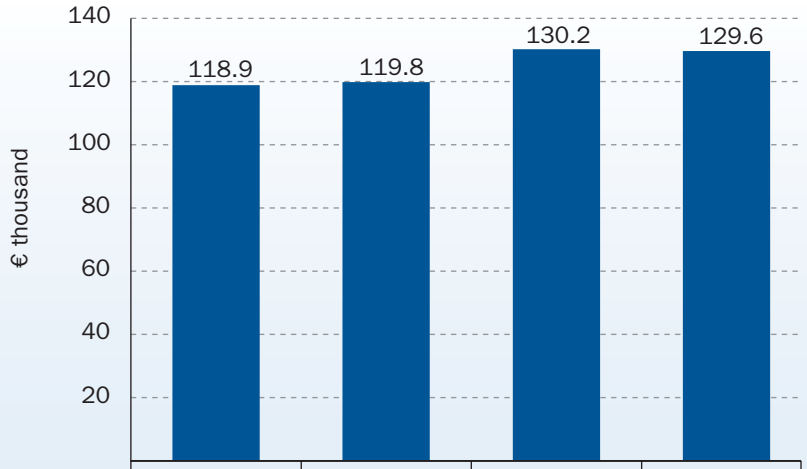
FIGURE V.4. WIND ENERGY DEVELOPERS' CONTRIBUTION TO GDP (€ THOUSAND) DIVIDED BY WIND POWER PRODUCTION (MWh) (CONSTANT PRICES, 2010)



	2007	2008	2009	2010
Contribution to GDP of wind energy producer/wind energy production (€/MWh): constant prices (2010)	41.1	41.9	42.2	44.3
Wind energy production (TWh)	121	132	159	170
Contribution to GDP of wind energy producer (thousands of €)	4,963,496	5,524,044	6,715,792	7,535,659

Source: EWEA - Deloitte

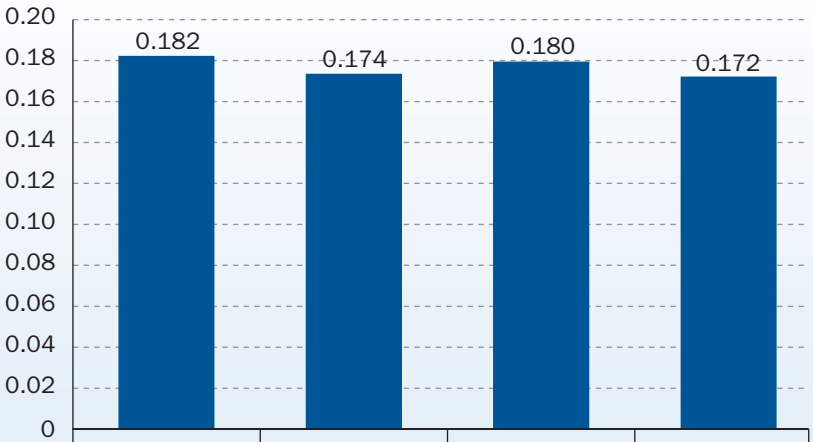
FIGURE V.5. SECTOR GDP (€ THOUSAND) DIVIDED BY NUMBER OF PROFESSIONALS (CONSTANT PRICES, 2010)



	2007	2008	2009	2010
Sector GDP/number of professionals (thousand€ per person): constant prices (2010)	118.9	119.8	130.2	129.6
Sector GDP (thousands of €)	12,439,889	14,109,862	16,909,568	17,610,605
Number of professionals	104,666	117,773	129,874	135,863

Source: EWEA - Deloitte

FIGURE V.6. NUMBER OF EMPLOYED BY WIND ENERGY DEVELOPERS DIVIDED BY WIND ENERGY CAPACITY (MW)



	2007	2008	2009	2010
Number of professionals in wind energy production/wind energy capacity (professional/MW)	0.182	0.174	0.180	0.172
Number of professionals in wind Energy Production	10,302	11,233	13,482	14,519
Wind energy capacity (MW)	56,517	64,719	75,090	84,324

Source: EWEA - Deloitte

Annexe VI. Assumptions for wind energy sector's economic impact in 2020 and 2030

Gross domestic product (GDP): market value of all final goods and services produced in a country during a time period.

GDP is the sum of final consumption expenditure, gross capital formation (GCF), and net exports (exports minus imports).

The forecast is based on the following assumptions:

a) New annual installed wind power capacity

TABLE VI.1 ANNUAL INSTALLED CAPACITY (GW)

		2020	2030
EU[31]	Onshore	18	10
	Offshore	7	14
	Total	25	24
Rest of world[32]	Total	63	124

b) Installed EU wind power capacity

TABLE VI.2 CUMULATIVE INSTALLED CAPACITY (GW)[33]

	2020	2030
Onshore	190	250
Offshore	40	150
Total	230	400

c) Market share of European players in new global wind installations

TABLE VI.3 MARKET SHARE OF EU WIND ENERGY SECTOR ACCORDING TO NON-EU COUNTRY ASSUMPTIONS

	2020	2030
EU market share in third countries	20%	15%

d) Wind energy investment costs per MW

TABLE VI.4 WIND ENERGY INVESTMENT COSTS PER MW (CONSTANT PRICES, 2010)[34]

Investment in wind energy per MW	Onshore (€mn)	Offshore (€mn)
2020	0.91	1.51
2030	0.84	1.34

[31] EWEA: *'Pure Power'*, 2011.
[32] Global Wind Energy Council Global: Wind Report, Annual Market Update 2010, Reference Model.
[33] EWEA: *'Pure Power'*, 2011.
[34] Ibid.

e) Wind energy production (TWh):

TABLE VI.5 WIND ENERGY PRODUCTION (TWh)[35]

	Onshore	Offshore	Total
2020	433	148	581
2030	591	562	1,153

f) Revenue per MWh

TABLE VI.6 REVENUE PER MWh OF ELECTRICITY (CONSTANT PRICES, € 2010)[36]

	Onshore	Offshore[37]
2020	108.4	124.7
2030	119.3	137.2

g) Consumption

The revenue generated from the sale of energy on the market is calculated by multiplying the forecast price by the energy produced (additionally, energy exports are also evaluated).

TABLE VI.7 FORECAST PRODUCTION AND PRICE OF ONSHORE AND OFFSHORE WIND ENERGY GENERATION IN 2020 AND 2030

		2020	2030
Production (TWh)	Onshore	432.70	591.00
	Offshore	148.20	562.00
Prices (€/MWh)	Onshore	108.43	119.27
	Offshore	124.69	137.16
Wind energy production (€bn)		65.40	147.58
Wind energy export (€bn)		4.58	10.33
Internal consumption (€bn)		60.82	137.24

h) Investment

TABLE VI.8 FORECAST NEW CAPACITY AND INVESTMENT PER MW IN 2020 AND 2030

		2020	2030
New capacity (GW)	Onshore	17.80	10.01
	Offshore	6.90	13.69
Investment per MW (€m/MW)	Onshore	0.91	0.84
	Offshore	1.51	1.34
Investment (€bn)		26.60	26.75

[35] Ibid.

[36] Wind energy price forecast is based on the forecast generation costs of natural gas combined cycle turbines (revenue base and opportunity cost) from: *"An EU Energy Security and solidarity Action Plan Energy Sources, Production Costs and Performance of technologies for Power Generation, Heating and Transport"*, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions.

[37] 15% more than onshore wind farms.

i) Exports

Including exports of turbines, components, equipment and services according to the global market and EU companies' market share and wind energy exports outside EU.

TABLE VI.9 WIND ENERGY SECTOR EXPORT ASSUMPTIONS FOR 2020 AND 2030

	2020		2030	
	Onshore	Offshore	Onshore	Offshore
New global wind energy capacity outside EU (GW)	50.5	12.5[38]	90	34.2[39]
Investment/MW (€mn)	0.91	1.51	0.84	1.34
European share	20%	20%	15%	15%
Equipment and components exports (€bn)	9.2	3.8	11.3	6.9
Wind energy exports (€bn)	3.3	1.3	4.9	5.4
Total exports (€bn)	17.5		28.5	

j) Imports

Share of imports by the European wind energy sector is expected to remain constant at around 10% to 2030.

TABLE VI.10 WIND ENERGY SECTOR IMPORT ASSUMPTIONS FOR 2020 AND 2030

		2020	2030
Demand (€bn)	Consumption	60.8	137.24
	Investment	26.60	26.75
	Exports	17.54	28.52
Share of demand met outside EU (imports)		10%	10%
Total demand (€bn)		105.00	192.5
Imports (€bn)		10.5	19.3

[38] Announcements in China, Japan, Korea, USA and others.
[39] Same onshore to offshore ratio assumed for rest of the world as in EU ten years ago.

k) Impact on employment according to the sensitivity between GDP contribution and employment.

The future impact of the wind energy sector on employment was calculated based on the sector's expected productivity. Productivity is determined by the number of workers it takes to produce a certain contribution to GDP, therefore future productivity forecasts give an idea of future numbers of employees.

In the last ten years, direct productivity has grown by 3.13% annually. It is assumed that the trend will continue to 2020.

Between 2006 and 2010, indirect productivity grew by 2.63% per year.

It is assumed that from 2020 to 2030, due to the increasing maturity of the wind energy sector, productivity growth will slow down. For most sectors in stable economic situations productivity increases by around 1.86% per year, so the same growth rate is assumed from 2020 to 2030.

TABLE VI.11 PRODUCTIVITY PER EMPLOYEE IN 2010

	Contribution to GDP (€bn, constant prices 2010)	Full Time Equivalents	Productivity per person (€/employee)
Direct	17.6	135,863	129,620.4
Indirect	14.8	102,292	144,875.5

TABLE VI.12 PRODUCTIVITY PER EMPLOYEE IN 2020 AND 2030 (€/EMPLOYEE)

	2020	2030
Direct	176,356.2	212,088.1
Indirect	187,786.7	225,834.6

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