



# World Wind Energy Report 2010





# WWEC 2011

10th World Wind Energy Conference  
& Renewable Energy Exhibition  
المؤتمر العالمي العاشر لطاقة الرياح  
ومعرض الطاقات المتجددة

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## 10<sup>TH</sup> WORLD WIND ENERGY CONFERENCE & RENEWABLE ENERGY EXHIBITION

***GREENING ENERGY:  
CONVERTING DESERTS INTO  
POWERHOUSES***

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With special thanks to Mr Jean-Daniel Pitteloud

Cover page photo: Wind farm on Jeju island, South Korea

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# The World Wind Energy Association WWEA

## Uniting the World of Wind Energy

*The World Wind Energy Association (WWEA) is a non-profit organisation which works for a world energy system fully based on the various renewable energy technologies, with wind energy as one cornerstone. WWEA acts as a communication platform for all wind energy actors worldwide, WWEA advises national governments and international organisations on favourable policies for wind energy implementation and WWEA enhances international technology transfer, a key in the accelerated dissemination of this clean technology.*



*Currently, WWEA has 500 members and represents the wind sector from 100 countries on all continents. Amongst the WWEA members, there are the national wind energy associations of the major wind countries – which themselves represent more than 50'000 members – as well as companies, scientific institutions and public bodies.*

*In 2007, WWEA was granted Special Consultative Status at the United Nations. WWEA has observer status e.g. at the UNFCCC Climate Conferences and cooperates with further international organisations. WWEA is represented at the International Steering Committee of REN21 and is one of the first and major proponents of the creation of the International Renewable Energy Agency IRENA.*

*WWEA organises annually World Wind Energy Conferences like the WWEC2011 in Cairo/Egypt in October/November 2011 and in the previous years in:*

- Istanbul/Turkey (2010)
- Jeju/South Korea (2009),
- Kingston/Canada (2008),
- Mar del Plata/Argentina (2007),
- New Delhi/India (2006),
- Melbourne/Australia (2005),
- Beijing/China (2004),
- Cape Town/South Africa (2003),
- Berlin/Germany (2002).

*WWEA is governed by a Board which comprises WWEA President Dr Anil Kane (India), the Senior Vice President Hon. Peter Rae AO (Australia), ten Vice Presidents from the five continents and the Treasurer. The Secretary General Stefan Gsänger manages the daily administration of the association at the WWEA Head Office in Bonn/Germany.*

*In cooperation with Husum fair, WWEA has invited for the World Summit for Small Wind Turbines, taking place in Husum/Germany in conjunction with New Energy fair.*

*WWEA cooperates with and supports numerous wind and renewable energy events all over the world.*

*WWEA publishes on a regular basis information about wind energy and provides up-to-date information about wind energy technology, like*

- the World Wind Energy Report,
- the technology website [www.world-wind-energy.info](http://www.world-wind-energy.info)
- the biannual yearbook Wind Energy International which comprises updated country reports about 100 countries and numerous special reports.

*WWEA also cooperates with the magazine Windtech International.*

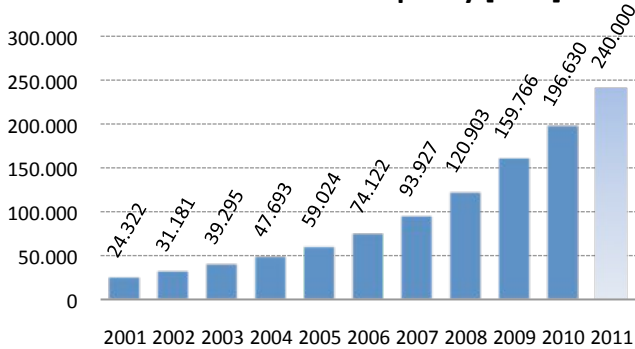
## Executive Summary

- Worldwide capacity reached 196 630 Megawatt, out of which 37 642 Megawatt were added in 2010, slightly less than in 2009.
- Wind power showed a growth rate of 23,6 %, the lowest growth since 2004 and the second lowest growth of the past decade.
- All wind turbines installed by the end of 2010 worldwide can generate 430 Terawatt-hours per annum, more than the total electricity demand of the United Kingdom, the sixth largest economy of the world, and equalling 2,5 % of the global electricity consumption.
- The wind sector in 2010 had a turnover of 40 billion Euro and employed 670'000 persons worldwide.
- China became number one in total installed capacity and the center of the international wind industry, and added 18 928 Megawatt within one year, accounting for more than 50 % of the world market for new wind turbines.
- Major decrease in new installations can be observed in North America and the USA lost its number one position in total capacity to China.
- Many Western European countries are showing stagnation, whereas there is strong growth in a number of Eastern European countries.
- Germany keeps its number one position in Europe with 27 215 Megawatt, followed by Spain with 20 676 Megawatt.
- The highest shares of wind power can be found in three European countries: Denmark (21 %), Portugal (18 %) and Spain 16 %).
- Asia accounted for the largest share of new installations (54,6 %), followed by Europe (27,0 %) and North America (16,7 %).
- Latin America (1,2 %) and Africa (0,4 %) still played only a marginal role in new installations.
- Africa: North Africa represents still lion share of installed capacity, wind energy plays hardly a role yet in Sub-Sahara Africa.
- Nuclear disaster in Japan and oil spill in Gulf of Mexico will have long-term impact on the prospects of wind energy. Governments need to urgently reinforce their wind energy policies.
- WWEA sees a global capacity of 600 000 Megawatt as possible by the year 2015 and more than 1 500 000 Megawatt by the year 2020.



## General situation: Stable overall market size, but decrease in market size in major countries

**World Total Installed Capacity [MW]**



In the year 2010, the wind capacity reached worldwide 196 630 Megawatt, after 159 050 MW in 2009, 120 903 MW in 2008, and 93 930 MW in 2007.

Investment in new wind turbines saw a decline in many parts of the world. For the first time in more than two decades, the market for new wind turbines was smaller than in the previous year and reached an overall size of 37 642 MW, after 38 312 MW in 2009.

China accounted for more than half of the world wind market 2010. Without taking into account China, the world market shrank by

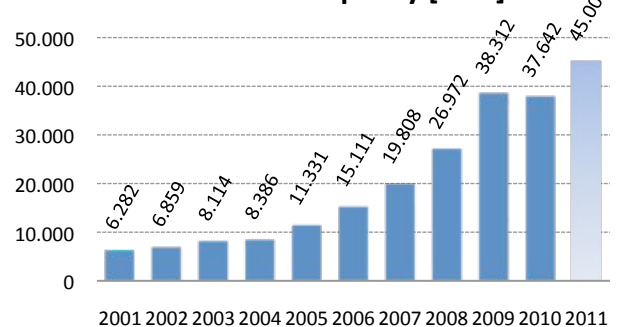
one third and decreased from 24 512 MW to 18 714 MW.

Still and in spite of the slowdown, the trend continued that the installed wind capacity more than doubled every third year.

In the year 2010, altogether 83 countries, one more than in 2009, used wind energy for electricity generation. 52 countries increased their total installed capacity, after 49 in the previous year.

The turnover of the wind sector worldwide reached 40 billion € (55 billion US\$) in 2010, after 50 billion € (70 billion US\$) in the year 2009. The decrease is due to lower prices for wind turbines and a shift towards China.

**New Installed Capacity [MW]**



## Worldwide stagnation due to lack of political support

The decrease in new capacity outside China can be seen as a result of insufficient political support for wind energy utilisation.

In a paradox situation, more and more policymakers are declaring their support for increased use of wind energy, but such statements do not go hand in hand with the necessary political decisions.

While the year 2009 had seen two major milestones – the first North American feed-in law in Ontario and the introduction of the first feed-in tariff in Africa – the year 2010 did not bring comparable breakthrough decisions in national or international policies.

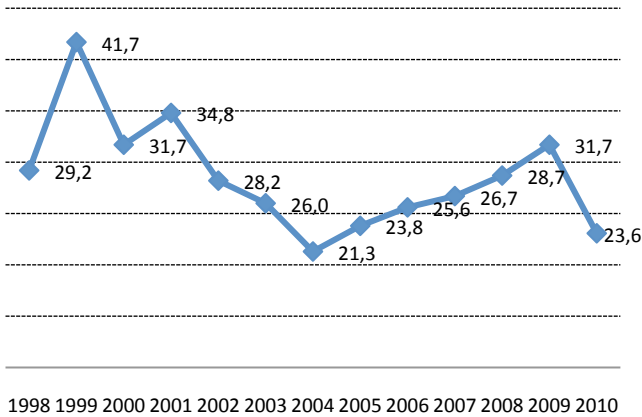
Especially in the USA, there is major regulatory uncertainty and not enough focus on renewable energy.

Also in many developing countries there is still a huge policy gap and there is not yet enough stability and reliability in market frameworks, next to a lack of financial resources.

In addition, the necessary international frameworks for renewable energy have not yet been established.

## Lowest global growth since 2004

World Market Growth Rates [%]



With 23,6 %, the year 2010 showed the second lowest growth rate of the last decade. The growth rate is the relation between the new installed wind power capacity and the installed capacity of the previous year.

Before 2010, the annual growth rate even had continued to increase since the year 2004, peaking in 2009 at 31,7 %, the highest rate since 2001.

The highest growth rates of the year 2010 by country can be found in Romania, which increased its capacity by 40 times. The

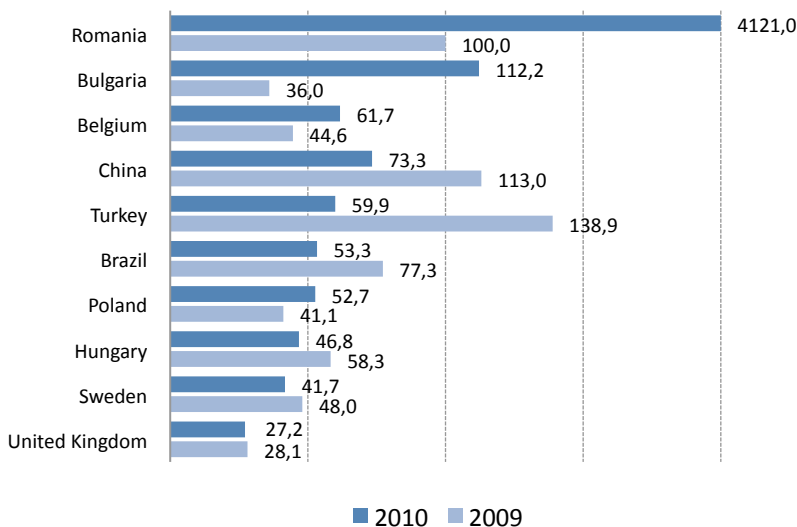
second country with a growth rate of more than 100 % was Bulgaria (112 %). In the year 2009, still four major wind markets had more than doubled their wind capacity: China, Mexico, Turkey, and Morocco.

Next to China, strong growth could be found mainly in Eastern European and South Eastern European countries: Romania, Bulgaria, Turkey, Lithuania, Poland, Hungary, Croatia and Cyprus, and Belgium.



Africa (with the exception of Egypt and Morocco) and Latin America (with the exception of Brazil), are again lagging behind the rest of the world in the commercial use of wind power.

## Top 10 Countries by Growth Rate [%] - Markets bigger than 200 MW -



## Top wind markets 2010: China is dominating

In 2010, the Chinese wind market became a class of its own, representing more than half of the world market for new wind turbines adding 18,9 GW, which equals a market share of 50,3 %.

A sharp decrease in new capacity happened in the USA whose share in new wind turbines fell down to 14,9 % (5,6 GW), after 25,9 % or 9,9 GW in the year 2009.

Nine further countries could be seen as major markets, with turbine sales in a range between 0,5 and 1,5 GW: Germany, Spain, India, United Kingdom, France, Italy, Canada, Sweden and the Eastern European newcomer Romania.

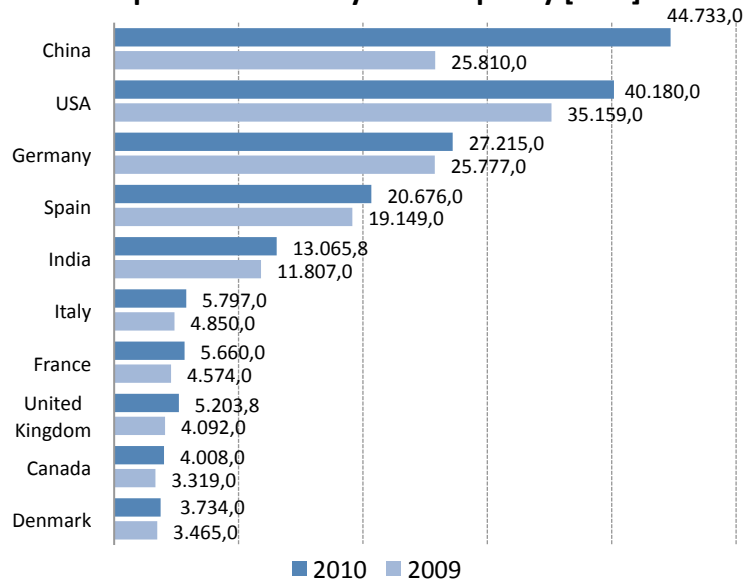
Again twelve markets for new turbines had a medium size between 100 and 500 MW: Turkey, Poland, Portugal, Belgium, Brazil, Denmark, Japan, Bulgaria, Greece, Egypt, Ireland, and Mexico.

By end of 2010, 20 countries had installations of more than 1 000 MW, compared with 17 countries by end of 2009 and 11 countries by end of 2005.

Worldwide, 39 countries had wind farms with a capacity of 100 Megawatt or more installed, compared with 35 countries one year ago, and 24 countries five years ago.

The top five countries (USA, China, Germany, Spain and India) represented 74,2 % of the worldwide wind capacity,

Top 10 Countries by Total Capacity [MW]



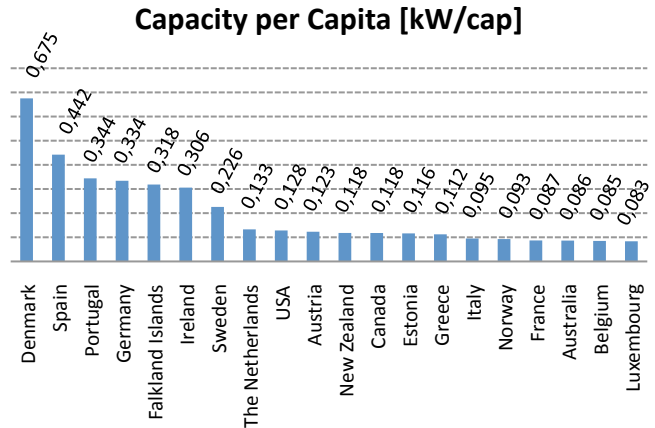
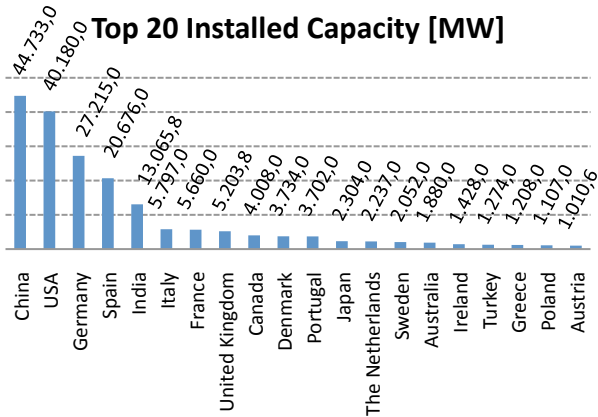
significantly more than 72,9 % in the year. The USA and China together represented 43,2 % of the global wind capacity (up from 38,4 % in 2009).

Due to the strong performance of the Chinese market, a certain concentration process of the world market on China can be observed, with China alone representing more than half of the market for new wind turbines.

The newcomer on the list of countries using wind power commercially is a Mediterranean country, Cyprus, which for the first time installed a larger grid-connected wind farm, with 82 MW.



## Installed capacity by country size: Denmark is number one



A different picture can be seen when looking at the installed installations in relation to the size of a country/region:

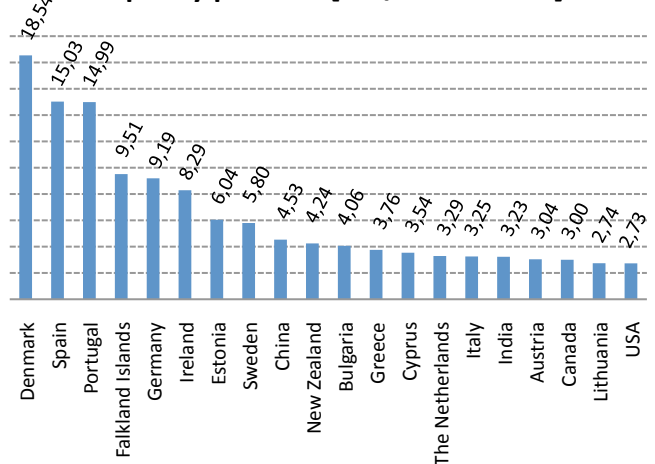
In relation to its population, Denmark has the by far highest amount of installed capacity per person (0,675 kW per person), followed by Spain (0,442 kW/person), Portugal (0,344 kW/person) and Germany (0,334 kW/person). In this perspective, world leader China only lands on place 27 (0,033 kW/person), the USA reach number 9 (0,128 kW/person) and India reaches only position 39 (0,011 kW/person).

China (4,7 kW/sqkm) reaches position 17 and the USA (4,1 kW/sqkm) position 19.

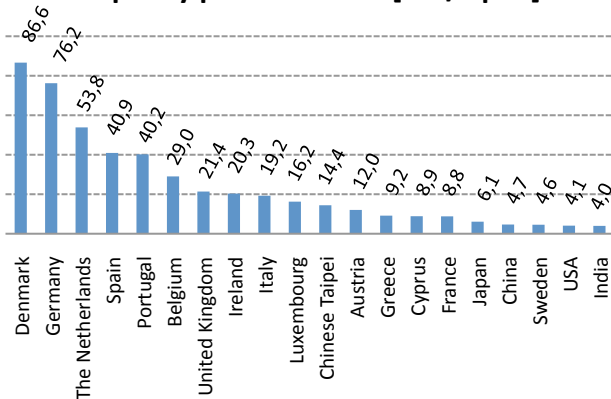
Denmark is also the leader in terms of installed wind capacity per unit of its gross domestic product (GDP): The country has an installed capacity of 18,5 kW per million US\$ of its GDP, followed by Spain (15 kW/million US\$), Portugal (15 kW/million US\$), the Falkland islands (9,5 kW/million US\$) and Germany (9,2 kW/million US\$). China can be found on place 9 with 4,5 kW/million US\$, the USA reaches position 20, with 2,7 kW/million US\$.

Also per land area, Denmark is the number one wind country/region in the world with 86,6 kW per square kilometer, followed by Germany (76,2 kW/sqkm), the Netherlands (53,8 kW/sqkm), Spain (40,9 kW/sqkm), and Portugal (40,2 kW/sqkm).

## Capacity per GDP [kW/million USD]



## Capacity per Land Area [kW/sqkm]



## Wind share in electricity supply

All wind turbines installed globally by the end of the year 2010 contribute potentially 430 Terawatthours to the worldwide electricity supply which represents 2,5 % of the global electricity demand.



This energy amount is more than the electricity needs of the United Kingdom, an industrialised country with more than 60 million inhabitants, and the sixth largest economy in the world.



In some countries and regions wind has become one of the largest electricity sources. Again in terms of wind share, Denmark is the world leader. The countries with the highest wind shares are:

- Denmark: 21 %
- Portugal: 18 %
- Spain: 16 %
- Germany: 9 %

In China, wind contributed 1,2 % to the overall electricity supply, while in the USA the wind share has reached about 2 %.

## Employment in the wind sector

By the end of the year 2010, about 670 000 persons were employed worldwide directly and indirectly in the various branches of the wind sector. Within five years, the number of jobs almost tripled, from 235 000 in 2005.

There is an increasing demand for a very broad range of jobs, from engineers, skilled workers to managers, financial, environmental and legal experts.



## Offshore wind

Offshore wind capacity continued to grow in the year 2010. Like in the previous year, wind farms installed in the sea could be found in twelve countries, ten of them in Europe, as well as in China and Japan.

Total installed offshore wind capacity amounted to 3 117,6 MW, out of which 1 161,7 MW were added in 2010. This represents a growth rate of 59 %, far above the average growth rate of the wind sector.

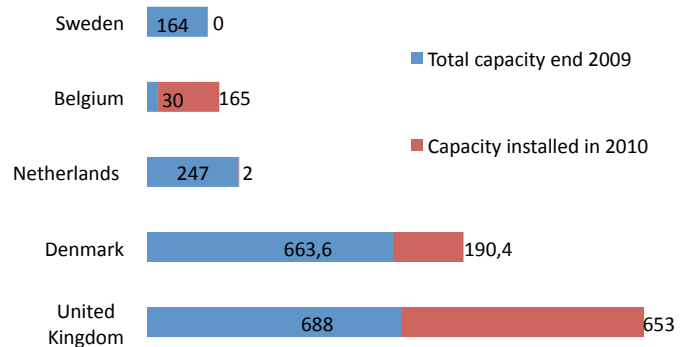
The share of offshore in total wind capacity worldwide went up from 1,2 % in 2009 to 1,6 % in 2010. The share of offshore capacity in new installations went up to 3,1 %.

The United Kingdom accounted for more than half of the offshore market in 2010 and installed 653 MW of offshore wind turbines. With this strong growth, the UK established itself as the by far biggest market for offshore wind turbines, with a total offshore capacity of 1 351 MW.

In the UK, offshore wind represents 26 % of the total wind capacity and 59 % of the capacity added in 2010.

Denmark is the number 2 offshore wind country with a current offshore capacity of 854 MW, 22,9 % of the total wind capacity. Offshore wind turbines represented 62 % of the capacity added in Denmark in 2010.

### Top 5 in Offshore Wind [MW]



Another major market for offshore wind was Belgium which added 165 MW, representing 49 % of the market for new wind turbines in this country.

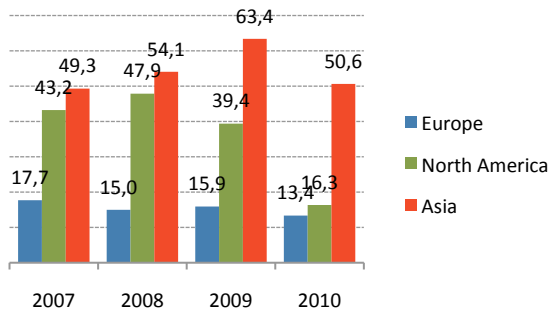
China installed its second major offshore wind farm, near Shanghai, with a capacity of 100 MW. However, in relation to the total size of the wind market in the country, offshore wind still plays only a marginal role (share: 0,5 % of new installations).

Japan added the Kamisu nearshore windfarm (14 MW) which survived the earthquake and tsunami on 11 March 2011 without being damaged.

Position 2010	Country	Total Offshore Capacity 2010 [MW]	Added Offshore Capacity 2010 [MW]	Rate of Growth 2010 [%]	Total Offshore Capacity 2009 [MW]	Total Offshore Capacity 2008 [MW]
1	United Kingdom	1341	653	94,9	688	574
2	Denmark	854	190,4	28,7	663,6	426,6
3	Netherlands	249	2	0,8	247	247
4	Belgium	195	165	550,0	30	30
5	Sweden	164	0	0,0	164	134
6	China	123	100	434,8	23	2
7	Germany	108,3	36,3	50,4	72	12
8	Finland	30	0	0,0	30	30
9	Ireland	25	0	0,0	25	25
10	Japan	16	15	1500,0	1	1
11	Spain	10	0	0,0	10	10
12	Norway	2,3	0	0,0	2,3	0
<b>TOTAL</b>		<b>3117,6</b>	<b>1161,7</b>	<b>59,4</b>	<b>1955,9</b>	<b>1491,6</b>

## Continental distribution

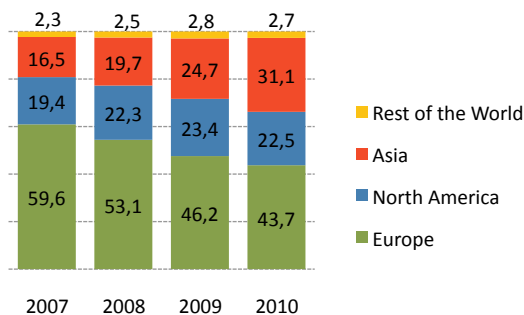
### Continental Growth Rates [%]



The most dynamic progress of the wind industry took place in Asia, and the focus of the global wind sector moved further away from Europe as well as from North America.

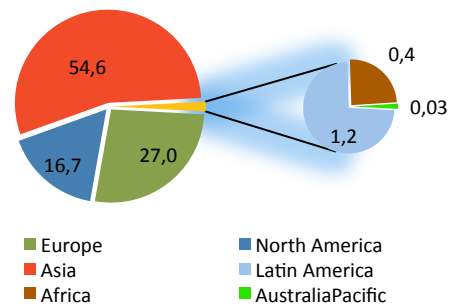
Asia became the new continental leader, accounting for 54,6 % of the newly installed wind turbines (40,4 % in 2009, 31,5 % in 2008).

### Continental Shares in Total Capacity [%]



Five years ago Europe dominated the world market for wind turbines with 70,7 % of the new capacity and it fell back to position 3 in 2009. In 2010, the continent came back to position two and accounted for 27 % of the new installed turbines (2009: 27,3 %; 2008: 32,8 %), but again ahead of North America whose share dropped from 28,4 % in 2009 to 16,7 % in 2010.

### Continental Shares in New Capacity 2010 [%]



Europe now accounts for clearly less than half of the total global capacity: In the past years, Europe's share had steadily gone down from 65,5 % in 2006 to 43,7 % in 2010.

Latin America (1,0 %, after 1,5 % in 2009, 0,6 % in 2008) and Africa (constantly at 0,5 % since 2008) still counted for only minor shares of the total capacity.

Latin America had a share in new installations of 1,2 % (2009: 1,5 %, 2008: 0,4 %), while Africa's share in new wind turbines stayed at 0,4 % (2009: 0,4 %, 2008: 0,3 %).

## Africa

All wind turbines installed in Africa in 2010 had a capacity of 906 MW (0,5 % of the worldwide capacity), out of which 155 MW were added (169 MW in the year 2009), in three countries, Egypt, Morocco and South Africa.

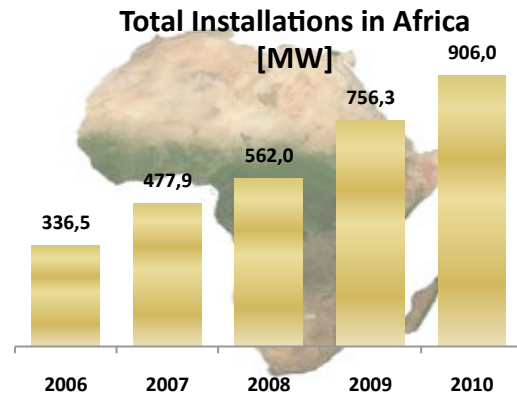
Although Africa was already on a comparatively low level, the 2010 growth rate of 20 % was again below the global average of 23,6 %.

With Egypt (550 MW installed capacity) and Morocco (286 MW), the wind leaders on the African continent can be found in Northern Africa. Together with Tunisia (54 MW), this region represents the lion share of the African wind capacity: 890 MW out of a total of 906 MW are installed in these three countries.



After the introduction of the feed-in tariff, South Africa with its current capacity of 10 MW has the potential to become the wind leader in Southern Africa. 700 MW of new wind projects are expected to be installed under this new regime by the year 2013.

Egypt, host of the WWEC2011 in October/November 2011, aims at the installation of more than 7 GW of wind power by the year 2020.



Also Morocco with its Sahara Wind project has ambitious long-term plans in the range of several GW.



In general, new political support schemes will be necessary to support the financing of wind farms in Africa, especially in Sub-Sahara Africa. A special consideration should be given to small scaled and hybrid systems for rural electrification so that hundreds of millions Africans in unserved areas can eventually benefit from modern electricity services.

For this purpose, the establishment of a Global Fund for Renewable Energy Investment would offer huge opportunities for many African countries to bypass one of the major barriers for wind energy investments: the lack of financial resources.

## Asia

Asia became the focal point of the wind industry worldwide in 2010, mainly thanks to China but also due to a robust development in India.

The total installed wind capacity in Asia reached 61,2 GW (31,1 % of the global capacity). The continent had the highest growth rate of all world regions (50,6 %, after 63,3 % in 2009) and added 20,6 GW in 2009.

After four consecutive years during which China doubled its installations, the country still showed an impressive growth of 73,3 % and became number one in terms of new installations as well as in terms of total wind capacity, reaching 44,7 GW.

However, China still faces major challenges with grid connection of installed wind turbines. According to the China Electricity Council, only 31 070 MW were actually feeding electricity into the national grid, while a major number of wind farms is still waiting for grid connection.

In parallel with the dominating role of China as the by far largest market for new wind turbines, the Chinese wind industry is getting more and more competitive and has increased their share in global sales dramatically.

The biggest Chinese manufacturer Sinovel reached a top position with a world market share of almost 12 %.

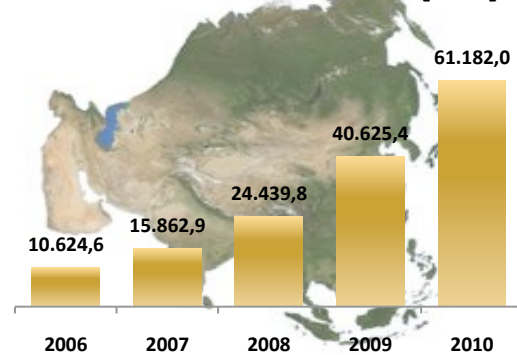
## Australia and Oceania

In 2010, the region showed stagnation and added only 11,8 MW, after 555 MW in the year 2009, reaching a total capacity of 2 386 MW.

However, a total of more than 1 000 MW are currently under construction in Australia alone. New Zealand is expected to install more than 100 MW in 2011.

New dynamics can also be expected for the development of wind energy utilisation from the Hepburn wind farm, which represents the

Total Installations in Asia [MW]



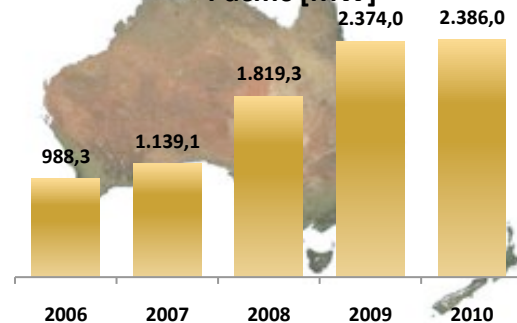
The second largest Asian market remained India, with a 10,7 % growth rate, reaching a total capacity of 13 GW. Further modest growth can be expected in the future.

The three medium-size Asian markets showed modest growth rates as well: Japan (total capacity 2,3 GW, after 2,1 GW in 2009), the island of Taiwan (519 MW, after 436 MW) and South Korea (379 MW, after 364 MW).

It can be expected that especially Japan will focus much more on wind and other renewable energy sources, after the nuclear incident that hit the country in spring 2011. No wind farm was damaged by the earthquake or the tsunami.

Vietnam installed a major wind farm and tripled its capacity from 9 MW to 31 MW.

Total Installations in Australia - Pacific [MW]



first community owned wind farm in Australia and will start operation in 2011.

## Europe

Europe still represents the world region with the by far biggest wind capacity installed, with a total capacity of 86 GW.

However, with a decreased share of 43,7 % in global capacity, Europe lost again substantially. The role of Europe is still diminishing and the size of the European wind markets even decreased in the past year: The European wind sector added 9'970 MW, less than the 10 474 MW in the year 2009.

Germany (27 215 MW total capacity, 1 551 MW increase, after 1 880 MW increase in 2009) and Spain (total 20 676 MW, 1 527 MW increase, after 2 460 MW increase in 2009) were still by far the biggest markets, but also with very modest growth rates (5,6 % and 8,0 %).

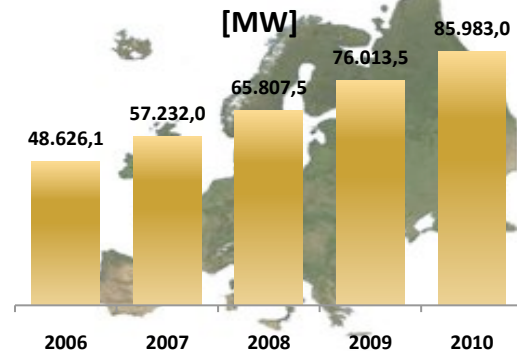
European medium-sized markets with robust growth of around 20 % were Italy (5 797 MW, new: 950 MW), France (5 660 MW, additional: 1 086 MW), and the United Kingdom (5 204 MW, added: 1 112 MW).

Some of the most dynamic, however still small wind markets can be found in Eastern Europe: Romania (more than 4 000 % growth, 591 MW total capacity), Croatia (161 %, 70 MW), Bulgaria (112 %, 375 MW), Lithuania (69 %, 154 MW), Poland (53 %, 1'107 MW) and Hungary (47%, 295 MW). Also Switzerland (139 %, 42 MW), Belgium (62 %, 886 MW), Turkey (60 %, 1'274 MW) and Cyprus (82 MW, up from 0) showed impressive growth.

The Danish, German and Spanish wind turbine manufacturing industries were still playing a leading role in many wind markets around the world. However, competitors especially from Asia (China, India, Korea as well as Japan) have been able to increase their market shares in their home markets as well as on international markets.

In spite of the stagnation in 2010, the general prospects in Europe are good, considering the ambitious targets of many countries:

Total Installations in Europe



In Germany, a wind share in electricity supply of 20-25 % is expected by the year 2020, equalling 150 TWh, or 45 GW onshore installations plus 10 GW offshore.

Spain expects 38 GW of installed capacity by the year 2020, including 370 MW of small wind and 3 GW of offshore wind.

The United Kingdom, world leader in offshore wind, has set a target for 2020 of 15 GW onshore and 13 GW offshore.

Italy set an official target of 12 680 MW in 2020, which would more than double its installed capacity.

Poland expects 8,6 GW to be installed by 2020.

Europe continues to be the leading continent in offshore installations where 96 % of the offshore wind turbines can be found.

Another important trend has started in Germany: Repowering of older turbines plays an increasing role: In 2010, 183 MW were replaced by bigger machines. This market is expected to grow substantially in the future.

Another important trend can be found in Denmark, the birthplace of community based wind farms. The country re-introduced special incentives for community ownership of wind turbines.

Considering the importance of a high social acceptance, policymakers in other parts of the world should feel encouraged to take up the Danish model.

## Latin America

Latin America stayed far below the growth of 2009 and added only 467 MW, reaching a total capacity of 1 983 MW. The growth rate of 30,8 % was well above the worldwide average, however, much below the 113 % of the previous year.

Still the continent accounted for only 1,2 % of the globally added wind turbines.

Only six Latin American countries installed new wind turbines in the year 2010: Brazil (320 MW), Mexico (104,5 MW), Argentina (25,3 MW), Uruguay (10 MW), Cuba (4,5 MW) and Chile (2,6 MW).

With the exception of Brazil and Mexico, most Latin American wind markets can still be regarded as in a state of infancy.

## North America

In the year 2010, North America lost its position as the second most dynamic world region. Its growth rate decreased from 39 % in 2009 to 16 % in 2010, mainly due to the sharp drop in the USA.

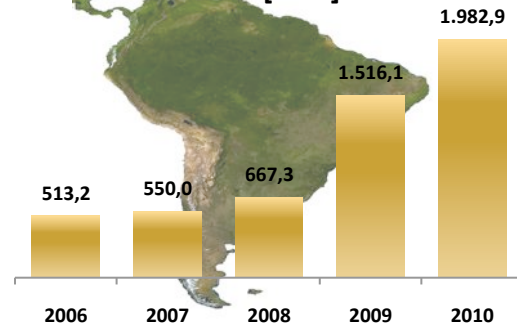
The USA saw a major decline of new installations in 2010, adding only 5,6 GW, after 9,9 GW in 2009. The leading state was Texas with a total capacity of 10 GW, which would be number 6 in global terms.

By the end of 2010, 5 GW of wind farms were under construction. In 2011, various forecasts suggest a new capacity of up to 10 GW.

The main driver has been the Production Tax Credit which has been extended through the end of 2012. Still there are some regulatory uncertainties regarding the introduction of a new national support scheme for wind power. Currently, the US government seems to prefer a Clean Energy Standard which would also include gas, "clean coal" and nuclear energy. It is not clear which role wind energy will have under such scheme.

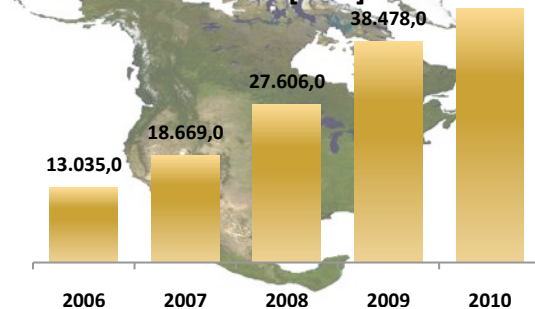
Many US states have set up their own support schemes for wind energy, e.g. 29 US states have established renewable portfolio standards.

Total Installations in Latin America [MW]



Major wind farms are expected to start operation in 2011 especially in Mexico (800 MW) as well as in Brazil, but also further countries like in the Dominican Republic.

Total Installations in North America [MW]



Canada saw a stable market and increased its capacity by 21 %, adding 690 MW, to a total of 4 008 MW. In Canada, several provinces have introduced (Ontario, Prince Edward Island) or are about to introduce feed-in tariffs (British Columbia, New Brunswick). Important to notice that several of these provinces have become pioneers in the support of community based wind farms and give special incentives for such projects, like Ontario. Such ownership models can be expected to have a very positive long-term effect on social acceptance of wind farms.

A weakness of the North American markets lies in the lack of manufacturing capacities. Although the industrial capacities are getting stronger, a major share of the wind turbines and related equipment has to be imported from outside the region. There are only few domestic wind turbine manufacturers in USA as well as in Canada.



## Future challenges and prospects worldwide

Six major drivers will have a decisive impact on the mid-term and long-term prospects of wind power:

1. The ongoing debate on climate change and how to find emission free energy solutions.
2. The depletion of fossil as well as nuclear resources, especially reflected in the increasing oil prices which especially represent a huge burden for the developing countries.
3. The damages caused by utilisation of fossil resources, as it became obvious during the oil spill disaster in the Gulf of Mexico, and the economic burden it has put on the economy of the USA.
4. The increasing awareness regarding the hazardous risks related with the utilisation of nuclear energy, recently driven by reports on the huge nuclear disaster in Fukushima/Japan.
5. The increasing awareness regarding the potentials and actual contributions of wind and other renewable energies to an energy supply which is economically, socially as well as ecologically sustainable.
6. Further improvements in wind energy and related technologies, including backup and storage technologies.

In order to make use of the full potential of wind and other renewable energies, it will be of crucial importance to strengthen the related frameworks, institutions and policies.

The world community as well as national governments will have to set up additional policies in favour of wind energy.

Special consideration has to be given to the deployment of renewable energy in the so-called developing countries.

Incentives for decentralised and integrated 100 % renewable energy supply need to be

created, again especially but not exclusively for developing countries.

Another key issue for the prospects of wind power in this context will be social acceptance. Recent studies from Scotland and Germany suggest that social acceptance is significantly higher in the case of wind farms which are owned by the local community where the wind farm is located. In general, acceptance of wind farms is high, however, people who see themselves as owners of a wind farm naturally have an even more positive attitude.

Policymakers have to draw the right conclusions from such results and introduce legislation that favours community based ownership models of wind farms.

In spring 2011, the International Renewable Energy Agency IRENA will be officially established. It can be expected that the agency will eventually start its operations and will be able to contribute to the dissemination of technical as well as political and economic knowhow of wind and other renewable technologies.

It will be of crucial importance that renewable energy eventually move into the center of the debate at the UN Climate Change conferences.

In order to provide more financial resources on an international level, WWEA has suggested, together with our partners of the International Renewable Energy Alliance, the creation of a Global Fund for Renewable Energy Investment.

A core element of such a fund should be a global feed-in tariff programme as a primary tool to kick-start markets for grid-connected wind power in the developing world.

## Forecast for 2015 and 2020

In spite of the need to reinforce national and international policies and to accelerate the deployment of wind power, it can be observed that appetite for investment in wind power is strong and many projects are in the pipeline.

Further substantial growth can especially be expected in China, India, Europe and North America.

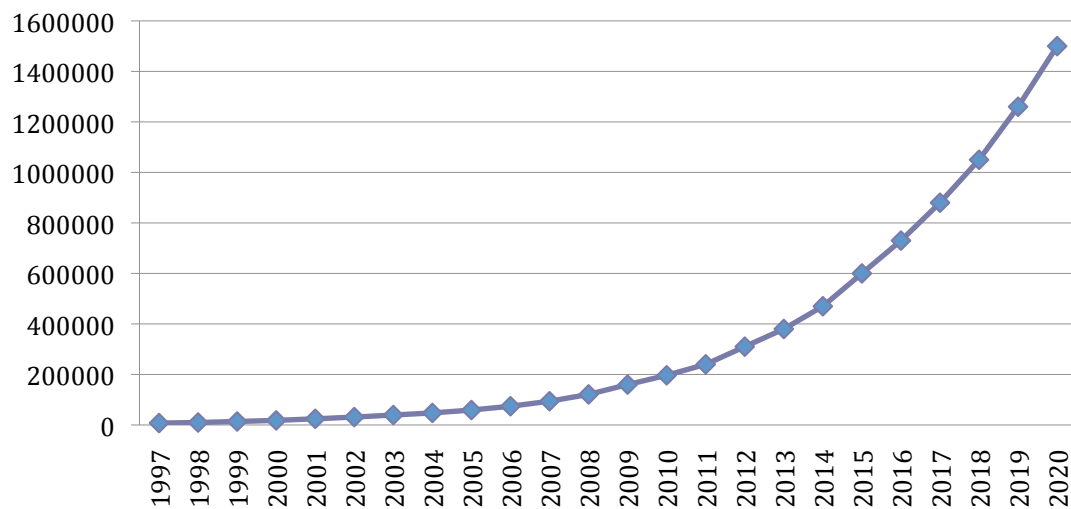
High growth rates can be expected in several Latin American as well as new Asian and Eastern European markets. In the mid-term, also some of the African countries will see major investment, after all in Northern Africa, but also in South Africa.

Based on the current growth rates, WWEA revises its expectations for the future growth of the global wind capacity:



In 2015, a global capacity of 600 000 MW is possible. By the end of year 2020, at least 1 500 000 MW can be expected to be installed globally.

**Total Installed Wind Capacity 1997-2010 [MW]**  
Development and Prognosis



Position 2010	Country / Region	Total capacity end 2010 [MW]	Added capacity 2010 [MW]	Growth rate 2010 [%]	Position 2009	Total capacity end 2009 [MW]	Total Capacity end 2008 [MW]	Total Capacity end 2007 [MW]	Total Capacity end 2006 [MW]
1	China	44.733,0	18.928,0	73,3	2	25.810,0	12.210,0	5.912,0	2.599,0
2	USA	40.180,0	5.600,0	15,9	1	35.159,0	25.237,0	16.823,0	11.575,0
3	Germany	27.215,0	1.551,0	6,0	3	25.777,0	23.897,0	22.247,4	20.622,0
4	Spain	20.676,0	1.527,2	8,0	4	19.149,0	16.689,0	15.145,1	11.630,0
5	India	13.065,8	1.258,8	10,7	5	11.807,0	9.587,0	7.850,0	6.270,0
6	Italy	5.797,0	950,0	19,6	6	4.850,0	3.736,0	2.726,1	2.123,4
7	France	5.660,0	1.086,0	23,7	7	4.574,0	3.404,0	2.455,0	1.567,0
8	United Kingdom	5.203,8	1.111,8	27,2	8	4.092,0	3.195,0	2.389,0	1.962,9
9	Canada	4.008,0	690,0	20,8	11	3.319,0	2.369,0	1.846,0	1.460,0
10	Denmark	3.734,0	309,0	8,9	10	3.465,0	3.163,0	3.125,0	3.136,0
11	Portugal	3.702,0	345,0	10,3	9	3.357,0	2.862,0	2.130,0	1.716,0
12	Japan	2.304,0	211,0	10,1	13	2.083,0	1.880,0	1.528,0	1.309,0
13	The Netherlands	2.237,0	15,0	0,7	12	2.223,0	2.235,0	1.747,0	1.559,0
14	Sweden	2.052,0	603,8	41,7	15	1.448,2	1.066,9	831,0	571,2
15	Australia	1.880,0	3,0	0,2	14	1.877,0	1.494,0	817,3	817,3
16	Ireland	1.428,0	118,0	9,0	16	1.310,0	1.027,0	805,0	746,0
17	Turkey	1.274,0	477,5	59,9	19	796,5	333,4	206,8	64,6
18	Greece	1.208,0	123,0	11,3	17	1.086,0	989,7	873,3	757,6
19	Poland	1.107,0	382,0	52,7	20	725,0	472,0	276,0	153,0
20	Austria	1.010,6	16,0	1,6	18	995,0	994,9	981,5	964,5
21	Brazil	920,0	320,0	53,3	21	600,0	338,5	247,1	236,9
22	Belgium	886,0	340,0	62,0	22	548,0	383,6	286,9	194,3
23	Romania	591,0	577,0	4.121,4	55	14,0	7,0	7,8	2,8
24	Egypt	550,0	120,0	27,6	26	435,0	390,0	310,0	230,0
25	Mexico	521,0	104,5	25,1	27	416,8	85,0	85,0	84,0
26	Chinese Taipeh	518,7	82,6	18,9	24	436,0	358,2	279,9	187,7
27	New Zealand	506,0	8,8	1,8	23	497,0	325,3	321,8	171,0
28	Norway	434,6	18,4	4,3	25	431,0	429,0	333,0	325,0
29	Korea (South)	379,3	48,9	14,0	28	348,4	278,0	192,1	176,3
30	Bulgaria	374,5	198,0	112,2	30	176,5	157,5	56,9	36,0
31	Hungary	295,0	94,0	46,8	31	201,0	127,0	65,0	60,9
32	Morocco	286,0	33,0	13,0	29	253,0	124,0	125,2	64,0
33	Czech Republic	215,0	24,0	12,6	32	191,0	150,0	116,0	56,5
34	Finland	197,0	52,0	35,4	33	147,0	143,0	110,0	86,0
35	Chile	170,0	2,6	1,5	39	167,6	20,1	20,1	2,0
36	Lithuania	154,0	63,0	69,2	36	91,0	54,4	52,3	55,0
37	Estonia	149,0	6,9	4,8	34	142,3	78,3	58,6	33,0
38	Costa Rica	123,0	0,0	0,0	35	123,0	74,0	74,0	74,0
39	Iran	100,0	18,0	22,0	38	82,0	82,0	66,5	47,4
40	Ukraine	87,4	0,6	0,7	37	90,0	90,0	89,0	85,6
41	Cyprus	82,0	82,0	∞	0	0,00	0,0	0,0	0,0
42	Croatia	69,8	43,0	161,0	46	26,7	18,2	17,2	17,2
43	Argentina	54,0	25,3	88,2	43	28,7	29,8	29,8	27,8
44	Tunisia	54,0	0,0	0,0	44	29,7	20,7	20,7	20,7

Position 2010	Country / Region	Total capacity end 2010 [MW]	Added capacity 2010 [MW]	Growth rate 2010 [%]	Position 2009	Total capacity end 2009 [MW]	Total Capacity end 2008 [MW]	Total Capacity end 2007 [MW]	Total Capacity end 2006 [MW]
45	Luxembourg	42,0	7,0	19,8	41	35,3	35,3	35,3	35,3
46	Switzerland	42,0	24,4	138,6	53	17,6	13,8	11,6	11,6
47	Nicaragua	40,0	0,0	0,0	40	40,0	0,0	0,0	0,0
48	Philippines	33,0	0,0	0,0	42	33,0	25,2	25,2	25,2
49	Latvia	31,0	2,0	7,0	45	28,5	26,9	27,4	27,4
50	Vietnam	31,0	22,3	254,3	57	8,8	1,3	0,0	0,0
51	Uruguay	30,5	10,0	48,8	50	20,5	20,5	0,6	0,2
52	Jamaica	29,7	0,0	0,0	52	54,0	20,0	20,0	20,0
53	Netherlands Antilles	24,3	0,0	0,0	47	24,3	12,3	12,3	12,0
54	Guadeloupe	20,5	0,0	0,0	49	20,5	20,5	20,5	20,5
55	Colombia	20,0	0,0	0,0	51	20,0	19,5	19,5	19,5
56	Russia	15,4	1,2	8,6	54	14,0	16,5	16,5	15,5
57	Guyana	13,5	0,0	0,0	56	13,5	13,5	13,5	13,5
58	Cuba	11,7	4,5	62,5	58	7,2	7,2	2,1	0,5
59	South Africa	10,0	2,0	25,0	48	8,0	21,8	16,6	16,6
60	Israel	6,0	0,0	0,0	59	6,0	6,0	6,0	7,0
61	Slovakia	6,0	0,0	0,0	60	6,0	6,0	5,0	5,0
62	Pakistan	6,0	0,0	0,0	61	6,0	6,0	0,0	0,0
63	Faroe Islands	4,0	0,0	0,0	62	4,0	4,1	4,1	4,1
64	Cape Verde	2,8	0,0	0,0	63	2,8	2,8	2,8	2,8
65	Ecuador	2,5	0,0	0,0	64	2,5	4,0	3,1	0,0
66	Nigeria	2,2	0,0	0,0	66	2,2	2,2	2,2	2,2
67	Belarus	1,9	0,0	0,0	67	1,9	1,1	1,1	1,1
68	Antarctica	1,6	0,0	0,0	68	1,6	0,6	0,0	0,0
69	Jordan	1,5	0,0	0,0	69	1,5	1,5	1,5	1,5
70	Indonesia	1,4	0,0	0,0	70	1,4	1,2	1,0	0,8
71	Mongolia	1,3	0,0	0,0	65	1,3	2,4	0,0	0,0
72	Martinique	1,1	0,0	0,0	71	1,1	1,1	1,1	1,1
73	Falkland Islands	1,0	0,0	0,0	72	1,0	1,0	1,0	1,0
74	Eritrea	0,8	0,0	0,0	73	0,8	0,8	0,8	0,8
75	Peru	0,7	0,0	0,0	74	0,7	0,7	0,7	0,7
76	Kazakhstan	0,5	0,0	0,0	75	0,5	0,5	0,5	0,5
77	Syria	0,4	0,0	0,0	77	0,4	0,4	0,3	0,3
78	Namibia	0,2	0,0	0,0	76	0,5	0,5	0,5	0,3
79	Dominican Republic	0,2	0,0	0,0	78	0,2	0,2	0,0	0,0
80	Dominica	0,2	0,0	0,0	79	0,2	0,2	0,0	0,0
81	North Korea	0,2	0,0	0,0	80	0,2	0,2	0,0	0,0
82	Algeria	0,1	0,0	0,0	81	0,1	0,1	0,0	0,0
83	Bolivia	0,01	0,0	0,0	82	0,01	0,01	0,01	0,01
<b>Total</b>	<b>World</b>	<b>196.629,7</b>	<b>37.642,0</b>	<b>23,56</b>		<b>159.766,4</b>	<b>120.903,0</b>	<b>93.926,8</b>	<b>74.122,0</b>



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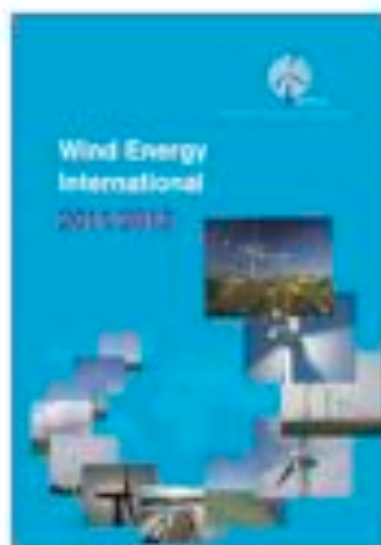
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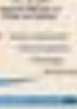


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الجمعية المصرية لطاقة الرياح



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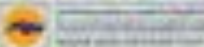
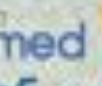
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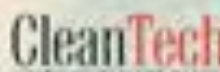
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