EWEA
THE EUROPEAN WIND ENERGY ASSOCIATION

Eastern winds

Emerging European wind power markets

A report by the European Wind Energy Association - February 2013

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Content

EXECUTIVE SUMMARY

Central, eastern and south-eastern Europe is Europe's new wind energy frontier. Significant growth, opportunity and benefits can be expected from and for the region in the years ahead. This applies equally to central, eastern and south-eastern European countries already in the European Union, and those which are applying to join, or could potentially join in the future.

These newly emerged and emerging markets are not only important in their own right, but they have increased perceived importance given the state of wind energy markets elsewhere in Europe. These new markets look set to offset, to a greater or lesser extent, declines in the near future in some of the more mature southern European markets. It therefore becomes all the more important for the European wind energy industry that the newly emerged and emerging eastern European markets are able to achieve their full potential.

The European Union's newer Member States

- Installed wind energy capacity in the EU's newer Member States[1] increased from 208 MW in 2005 to 4,200 MW by the end of 2011, growing annually by 665 MW on average. This growth is in large part driven by the EU's energy policy: indicative 2010 targets for renewable energy in all Member States[2] and binding 2020 targets set by the 2009 renewable energy directive[3].

- Wind energy development, like the policies and incentives it requires, is diverse across the region. There are as many wind energy markets as there are Member States. Interestingly, five of the 12 newer Member States (Bulgaria, Czech Republic, Hungary, Poland and Romania) have 88% of the total installed wind energy capacity in the newer Member States.

- The share of the EU's annual wind energy installations in the newer Member States has grown from just over 2% in 2005 to 12.5% in 2011.

- According to the National Renewable Energy Action Plans (NREAPs) of the newer Member States, some 16 GW of wind energy capacity should be grid connected by 2020 — an increase of 10 GW or 165% compared to 2012.

- The newer Member States are, with a few key and important exceptions, currently failing to meet their NREAP targets.

Non-EU European markets

- Beyond the EU's borders a number of European countries are also showing encouraging growth in wind energy. EU accession requirements in Croatia, and Ukraine's alignment with EU energy policy, are driving factors behind this.

- Alignment with EU accession requirements in Serbia are expected to launch the wind energy sector, once the authorities have sorted out legislative issues.

- Turkey has one of the fastest growing electricity generating sectors in the world, which is driving large investments in wind energy. A government target of 20 GW of installed wind energy capacity by 2023 has been set. Meeting this target will require adding 18 GW of new wind capacity.

- While Russia would benefit economically and environmentally from harnessing its abundant wind resources, the government currently shows little interest in developing this potential.

Financing wind energy in Europe's emerging markets

- A number of commercial banks are willing to invest in wind energy projects in central and eastern Europe. However, these countries' regulatory instability is a key issue in obtaining finance.

- Banks offer many financing schemes, but the most common are non-recourse and limited recourse senior loans. Deals are preferred in euros rather than local currency.

1 Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia and Slovenia

2 Directive 2001/77/EC of the European Parliament and of the Council of 27 September 2001 on the promotion of electricity produced from renewable energy sources in the internal electricity market

3 Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC

- Three international financing institutions are active in wind energy project financing in the region: European Investment Bank (EIB), European Bank for Reconstruction and Development (EBRD) and International Finance Corporation (IFC). The latter provide mid to long term financing or syndicated loans with local commercial banks.

- EU cohesion funds are available for financing wind energy in the EU. Between 2007 and 2010 €786m was allocated to wind energy across the EU of which €420m was in the newer Member States. However, due to complicated EU and national procedures only 3% of this amount was actually spent.

- EU funds for wind energy could increase from 2014-2020 if the funds' priorities are aligned with EU climate and energy policy.

Support mechanisms

- All the countries analysed have set up support mechanisms for wind energy. They are diverse in design and effectiveness.

- The stability of support mechanisms is key to sustained wind energy growth. Where rules are unclear, unpredictable, or frequently changing (sometimes retroactively) wind energy deployment follows boom and bust cycles or does not pick up at all.

Recommendations

- In an economic climate where credit is tight in many countries, the legal framework is critical to obtaining finance. Long-term stability, predictability and workability are thus essential.

- National governments should ensure that support mechanisms are in line with EU internal market rules. Failure by the European Commission and national governments to pro-actively engage on support mechanism compatibility may lead to long approval processes that significantly slow down market development.

- The approach to no-go areas (Natura 2000, nature protected areas, heritage protected areas, vicinity to radar) should be objective and the criteria made clear to developers. National governments should develop appropriate planning instruments to ensure that wind energy is deployed in harmony with the natural environment.

- Rules on environmental impact assessment should be clear and robust. Failing to meet the standards of international financial institutions can seriously hamper the financing of projects.

- Grid connection costs should be transparent and procedures to access the grid should be designed to favour legitimate project developers.

- Administrative procedures should be streamlined. Deadlines should be clear and governments should work towards automatic approval of requests in case these deadlines are not met.

- A one stop shop approach for administrative and grid connection procedures, and an appropriate number of trained civil servants would significantly cut lead time on projects.

The findings for each country are summarised in the table below. Further details are provided in the respective country chapters. EWEA members can access additional information, maps, company profiles and background briefings through the members area of the www.ewea.org.

SUMMARY TABLE

	Power market	Wind energy targets	Support mechanism	Resource	Supply chain	Finance	Permitting	Electricity infra-structure
First wave markets								
Bulgaria	☹	☺	☹	☺	☺	☹	☺	☹
Hungary	☹	😐	☹	😐	😐	☺	☺	☺
Poland	☹	☺	😐	☺	☺	☺	☹	☹
Romania	☺	☺	☺	☺	😐	☺	☹	☹
Turkey	☹	☺	😐	☺	☺	😐	😐	☹
Second wave markets								
Czech Republic	☹	☹	☹	😐	☺	☺	☹	☺
Croatia	😐	☺	☺	☺	☺	☺	☹	☺
Ukraine	☺	☹	☺	☺	☺	☹	☹	☹
Future markets								
Serbia	☹	☺	☺	☺	☹	😐	☹	☺
Slovakia	☹	☹	☹	😐	☹	😐	☹	☺
Slovenia	☹	☹	😐	😐	☹	😐	☹	😐
Russia	☹	☹	☹	☺	☹	☹	😐	☹

☺ Conducive to wind energy investments
☹ Not conducive to wind energy investments
😐 Neither conducive nor hindering wind energy investments

INTRODUCTION

Wind energy in Europe began in a handful of "pioneering" countries over 20 years ago. Since the late 1990s and early 2000s it spread across the EU. The Union's energy and climate policies have been a motor for the deployment of renewable energy sources, and especially wind energy, in an ever increasing number of countries.

The financial crisis in 2008 and the sovereign debt crisis that followed have created numerous new challenges for the wind energy sector in countries that were previously its strongest markets. The energy sector in the emerging markets has turned its attention to the opportunities offered by the move away from conventional generation technologies towards a renewable energy future.

In this report, the European Wind Energy Association (EWEA) analyses the situation for wind energy in the countries of central, eastern and south eastern Europe. The report gives an overview of the energy sector, the wind energy supply chain, the legal framework, support mechanisms and the financing situation for each country. It also highlights some of the main obstacles, as well as the significant opportunities.

The countries analysed have been split into five first wave markets, three second wave markets and four future markets. In the latter, existing legislation and political impetus are currently insufficient to attract investment in wind energy.

This should not, however, distract attention from developments in the other markets in this report. Some of the leading markets are changing legislation to the detriment of wind energy deployment and setting their own renewable energy targets. Others may have only momentarily struck a fragile balance in their energy policy.

Consultants PwC were brought in to supplement EWEA's research on the countries in this report. PwC conducted both primary research (phone and face-to-face interviews, online questionnaires, statistical data, legislation and so on) and secondary research (synthesis and analysis of market reports, publications, surveys conducted by third parties). PwC interviewed more than 20 experts including investors, banking representatives, NGOs, associations, regulatory representatives and other public and private stakeholders.

1 THE WIND ENERGY MARKET

In 2001, the EU adopted a directive[4] to stimulate investment in renewable energy sources. The ambition was to meet, in a decade, 22% of the EU's total electricity consumption through renewable energies.

The directive gave every Member State an indicative target, according to its existing level of renewable electricity penetration. In 2004, eight eastern and central European countries[5] and the islands of Cyprus and Malta joined the EU. Their power mix was, on the whole, more heavily reliant on coal and, in some cases, nuclear. Beyond some hydro capacity, renewables were less developed than in the 15 western European Member States.

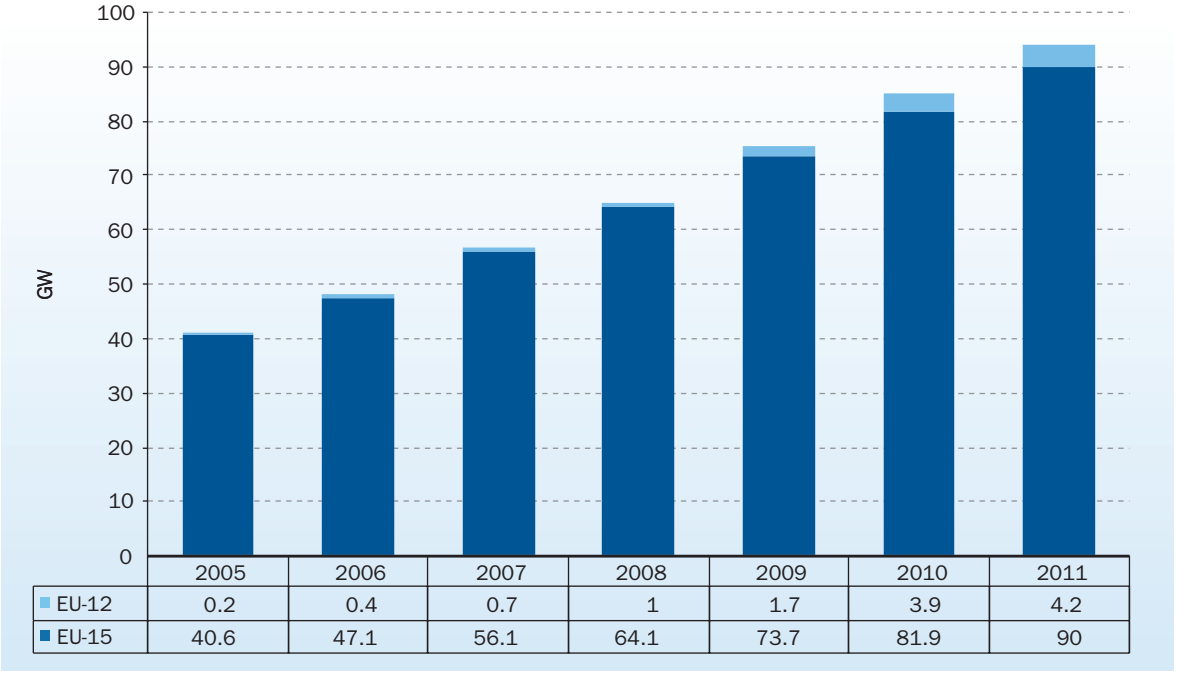
Having adopted the EU's energy acquis, the newer Member States were also given a renewable energy target. However, considering their starting point, the EU's overall renewable energy target was decreased to 21% of electricity consumption. The entry into the EU of Bulgaria and Romania in 2007 further highlighted the renewable energy gap between newer Member States and older Member States.

The adoption of the EU law nevertheless stimulated investments in renewables, particularly wind energy. This was further boosted by the adoption in 2009, of a Renewable Energy Directive[6] setting the EU an overall binding renewable energy target of 20% for 2020, including differentiated national renewable energy targets. Recent data indicates that the EU narrowly missed its 21% renewable electricity target[7].

Cumulative growth

In 2005 there was around 208 MW of wind power capacity in the EU-12 (newer Member States, Bulgaria and Romania) compared to over 40,500 MW in the EU-15 Member States, around 200 times less capacity. By 2011, 4,197 MW of wind capacity were installed in the EU-12 compared to 89,997 MW in the EU-15. The gap reduced tenfold in six years.

FIGURE 1.1 TOTAL INSTALLED WIND POWER CAPACITY IN THE EU-12* AND EU-15** (GW)



	2005	2006	2007	2008	2009	2010	2011
EU-12	0.2	0.4	0.7	1	1.7	3.9	4.2
EU-15	40.6	47.1	56.1	64.1	73.7	81.9	90

* EU-12: Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia and Slovenia

** EU-15: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom

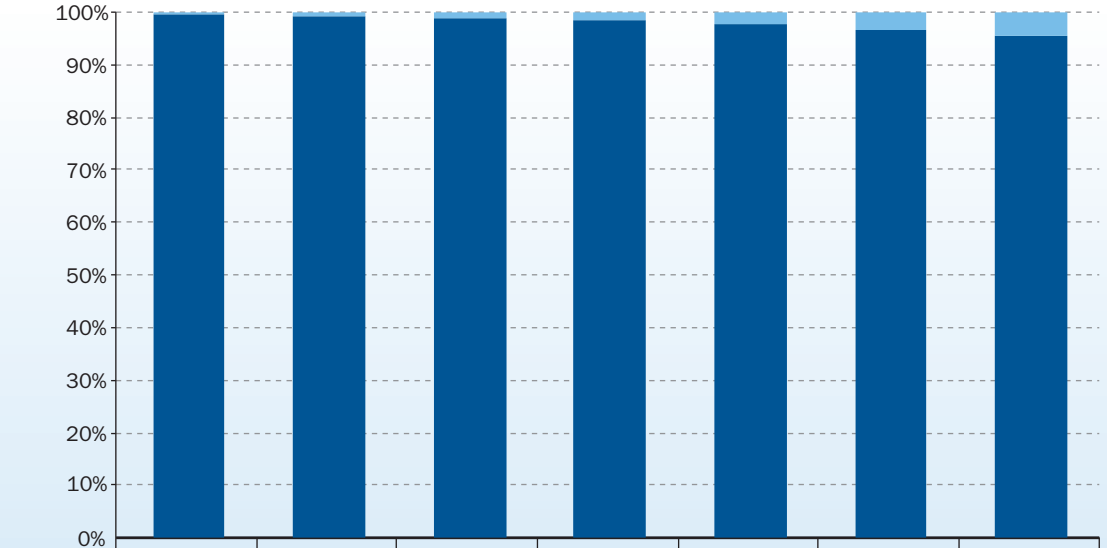
4 Directive 2001/77/EC of the European Parliament and of the Council of 27 September 2001 on the promotion of electricity produced from renewable energy sources in the internal electricity market

5 Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia

6 Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC

7 Calculations based on Eurostat and EU'Observ'ER data

FIGURE 1.2 SHARE OF EU-12* AND EU-15** INSTALLED WIND POWER CAPACITY (%) COMPARED TO EU TOTAL (GW)



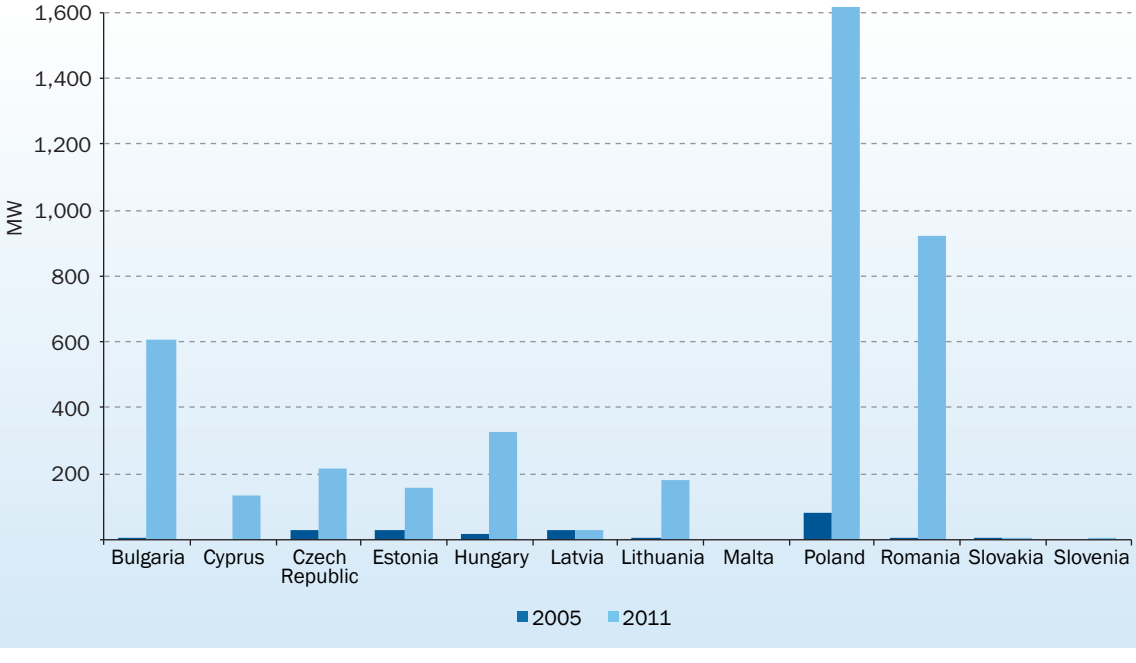
	2005	2006	2007	2008	2009	2010	2011
EU-12	0.2	0.4	0.7	1	1.7	3.9	4.2
EU-15	40.6	47.1	56.1	64.1	73.7	81.9	90

* EU-12: Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia and Slovenia

** EU-15: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom

Development of wind energy has, however, been diverse across the 12 countries. By the end of 2011, cumulative installed capacities varied from nothing in Malta and Slovenia to 1,616 MW in Poland.

FIGURE 1.3 TOTAL INSTALLED WIND CAPACITY IN EU-12 AT END 2005 AND END 2011 (MW)

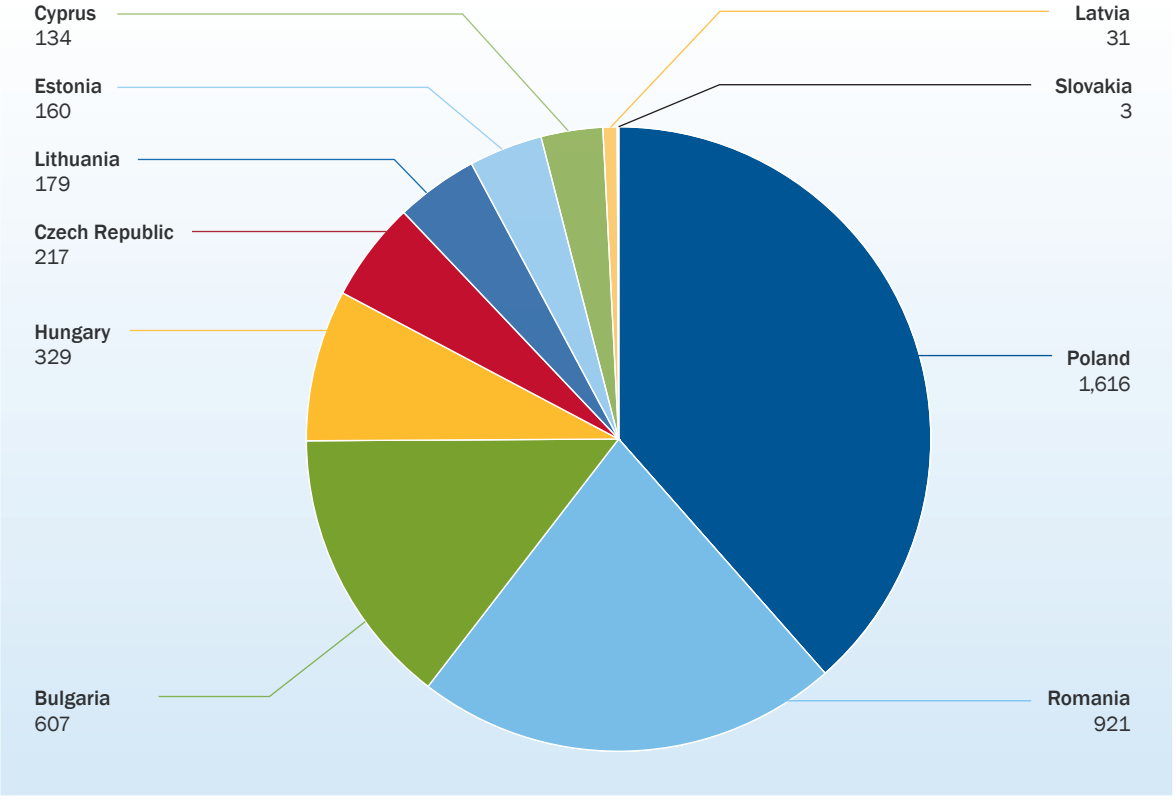


In just seven years, total installed capacity in EU-12 increased by 4 GW, an average of 665 MW a year or an increase of over 1,900%. In the EU-15, total installed capacity increased from just over 40 GW to almost 90 GW during the same period, an annual increase of 8,330 MW or an increase of 122%.

As figure 1.3 shows, the rate of development of wind power in the newer Member States has been uneven. Whereas Malta, Slovenia and Slovakia did not install any wind power capacity over the period, the increases in Bulgaria and Romania were huge. Installed capacity in Poland grew by 1,840%, in Hungary by around 1,800%, and in the Czech Republic by over 670%. Growth in the EU-15 between 2005 and 2011 was 122% and 1,921% in the EU-12; the growth for the EU as a whole was 131%. However these impressive growth rates represent marginal quantities of wind power capacity compared to the EU's total installed capacity.

The figures also indicate that of the 12 newer Member States, 87.9% of the total installed capacity (3,690 MW out of 4,197 MW) is in five countries — Bulgaria, Czech Republic, Hungary, Poland and Romania.

FIGURE 1.4 SHARE OF INSTALLED WIND ENERGY CAPACITY IN EU NEWER MEMBER STATES, END 2011



Source: EWEA

Annual growth

Against the general backdrop of strong wind energy growth in the newer Member States between 2005 and 2011, annual variations in installed capacity have been considerable. They vary between year-on-year increases of over 100% to decreases of 5%. By comparison, year-on-year variations in EU-15 Member States were in a range of +20% to -14%. In the EU as a whole annual variations were between +23% and -8%.

Looking at the countries individually, the "roller coaster" picture is even more striking, with year-on-year variations ranging between +2,515% and -91%. This instability in growth patterns is to be expected in emerging markets.

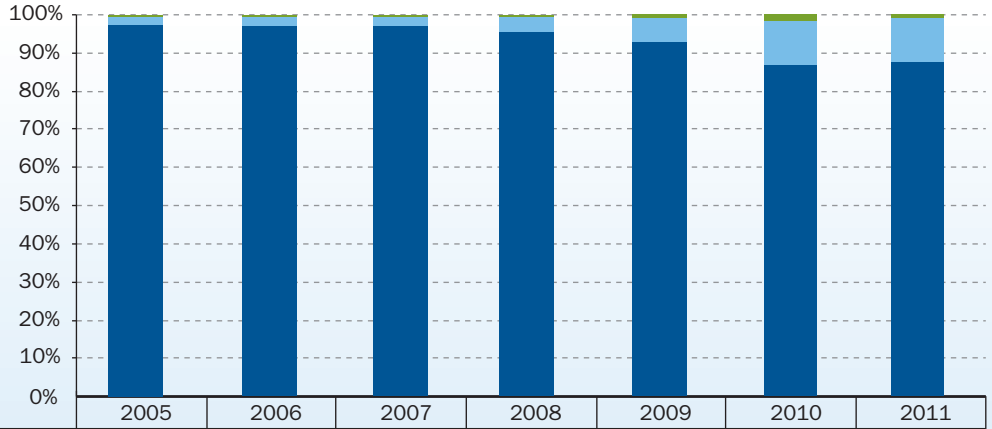
Closer analysis of the data in table 1.2 indicates that the growth rates in the newer Member States are not correlated with the EU-15 and, consequently, the EU as a whole. Years marked by strong growth in the newer Member States do not always coincide with growth years across the EU (figure 1.4).

In 2005 the countries that make up what is now the EU-12 accounted for 2.2% of wind capacity additions. The five first wave emerging markets accounted for 80% of the increase. By 2011, the newer Member States accounted for 12.5% of capacity additions, with over 93% of the rise in the first wave markets (11.6% of total EU installations).

TABLE 1.2 VARIATIONS IN ANNUAL INSTALLED CAPACITY AND COMPOUND ANNUAL GROWTH RATE

	2006/2005	2007/2006	2008/2007	2009/2008	2010/2009	2011/2010	CAGR
EU-12	39%	30%	39%	103%	72%	-5%	42%
Bulgaria	140%	-16%	373%	209%	-31%	-22%	59%
Czech Republic	189%	143%	-46%	29%	-48%	-91%	-22%
Hungary	210%	-90%	1,376%	20%	27%	-64%	16%
Poland	-18%	98%	20%	68%	66%	-4%	32%
Romania	224%	155%	5%	105%	2,515%	41%	194%
EU-15	12%	20%	-6%	20%	-14%	1%	5%
EU-27	12%	20%	-5%	23%	-8%	-0.1%	7%

FIGURE 1.5 SHARE OF ANNUAL WIND ENERGY INSTALLATIONS, FIRST WAVE EMERGING MARKETS, OTHER EMERGING MARKETS AND EU-15



	2005	2006	2007	2008	2009	2010	2011
Other emerging markets	29	42	35	23	102	162	80
First wave emerging markets	115	159	225	338	628	1,095	1,111
EU-15	6,400	7,054	8,700	8,117	9,646	8,311	8,364

Source: EWEA

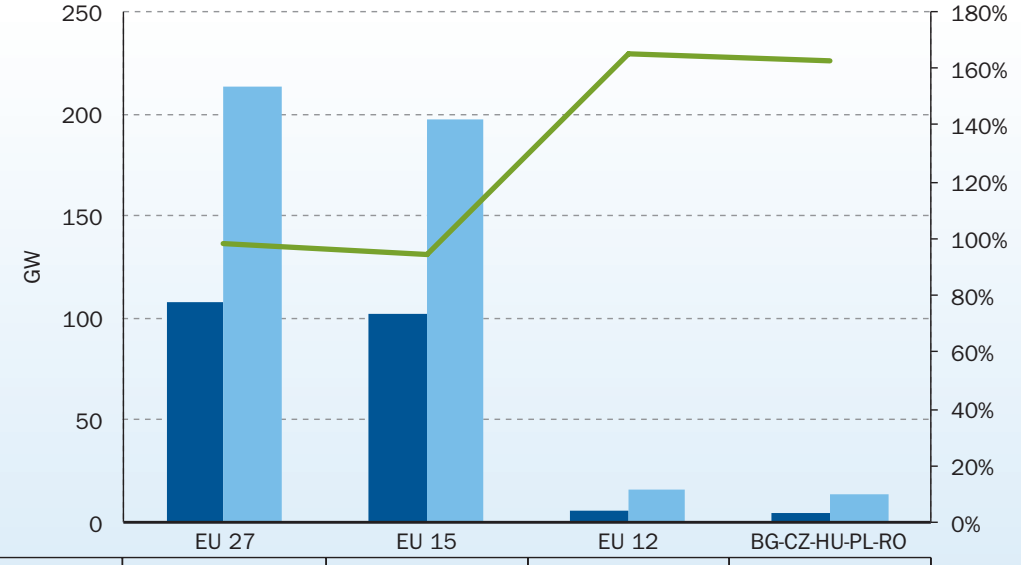
The renewable energy directive and Member States' National Renewable Energy Action Plans

In 2009, the EU adopted a directive setting binding national targets for the share of renewable energy in each of the 27 EU Member States in 2020. The directive also required every Member State to produce a National Renewable Energy Action Plan (NREAP). The NREAPs include targets for wind power installations and wind energy production for each year between 2010 and 2020.

Altogether, the NREAPs of the 27 EU Member States envisage a total of 213.4 GW of wind energy capacity in 2020. Almost 16 GW (7.4%) is expected in the 12 newer Member States.

Whereas the NREAPs forecast a 98% increase in installed wind capacity in the EU as a whole from 2012-2020, the increase in the newer Member States is 165%. The increase for EU-15 countries is predicted to be 94% over the same period.

FIGURE 1.6 WIND INSTALLED CAPACITY ACCORDING TO THE NREAPS AND 2012-2020 INCREASE (GW/%)



	EU 27	EU 15	EU 12	BG-CZ-HU-PL-RO
NREAP 2012	108	102	6	5
NREAP 2020	213	198	16	13
Increase	98%	94%	165%	163%

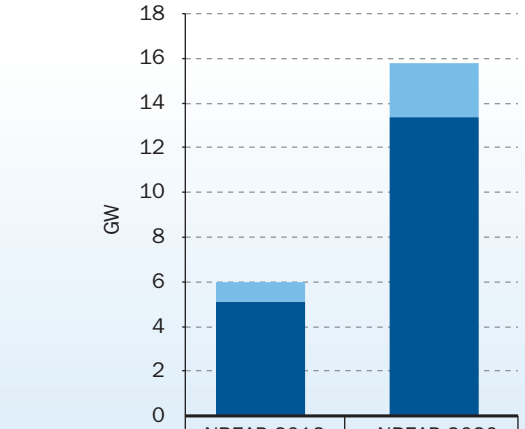
The five first wave emerging wind energy markets account for almost 85% (13.4 GW) of the capacity additions forecast in the newer Member States. The remaining seven countries forecast a combined cumulative wind capacity of 2.4 GW by 2020.

On the NREAP track?

Comparing the NREAPs' growth trajectory for installed wind energy capacity and the actual growth in installations in the emerging European markets, the newer Member States taken altogether are currently off target (-4.4%) with 4,197 MW of installations compared to a 4,392 MW target (figure 1.8).

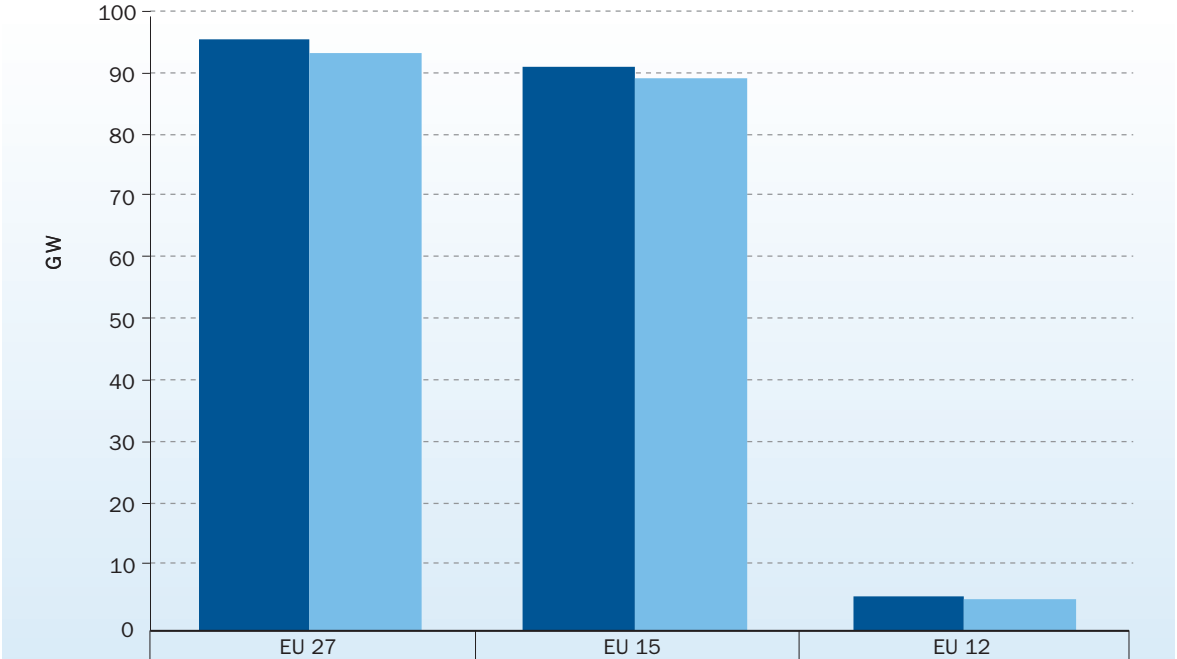
Amongst the 12 newer Member States, the five main markets are slightly less off target (-4.3%) than the seven others.

FIGURE 1.7 WIND CAPACITY INSTALLED IN EU-12 (GW)



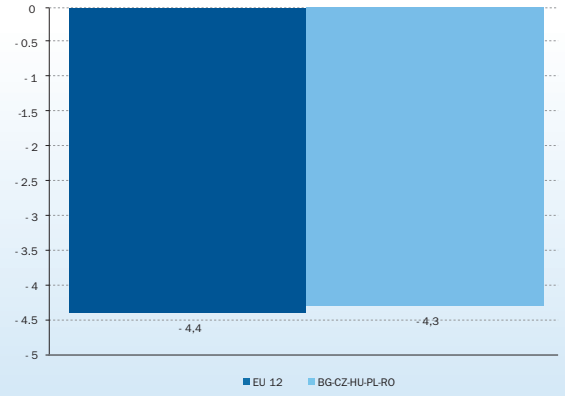
	NREAP 2012	NREAP 2020
Rest of EU 12	1	2
BG-CZ-HU-PL-RO	5	13

FIGURE 1.8 ULTIMO 2011 WIND CAPACITY INSTALLED (NREAPS AND ACTUAL) (GW)



	EU 27	EU 15	EU 12
NREAPs	96.2	91.9	4.4
Actual	94.2	90	4.2

FIGURE 1.9 EU-12, % DIFFERENCE BETWEEN WIND CAPACITY TARGETS IN NREAPS AND ACTUAL INSTALLATIONS



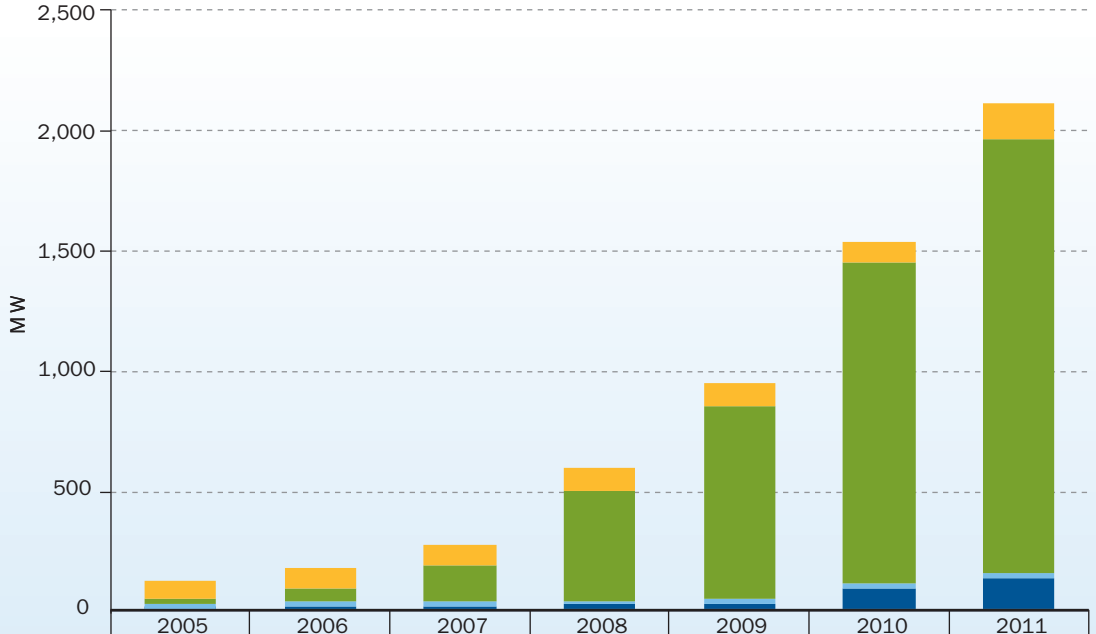
Growth beyond the EU

In other countries of Europe and beyond the borders of the EU, wind power has also been developing. As in the EU's newer Member States, developments have been patchy, both geographically and in terms of market share (see figure 1.10).

Croatia and the Ukraine began developing wind power in the mid-2000s. Croatia's installed capacity at end 2011 was 131 MW and the Ukraine's 151 MW.

Russia has a huge potential for wind power, but had only 15 MW installed at end 2011 with no growth reported for a decade. Turkey, on the other hand, boasted almost 1,800 MW of installed capacity at the end of 2011, an increase of almost 9,000% since 2005 and a compound annual growth rate (CAGR) of 72% since 2006.

FIGURE 1.10 CUMULATIVE INSTALLED WIND POWER CAPACITY IN NON-EU EUROPE (MW)



	2005	2006	2007	2008	2009	2010	2011
Ukraine	77	86	89	90	90	88	151
Turkey	20	51	147	458	801	1,329	1,799
Russia	16	16	17	16	14	15	15
Croatia	6	17	17	18	28	89	131

Serbia is the next likely big wind power market in the Balkan region, although no wind power installations were up and running at the end of 2011. However, wind farms totalling 150 MW have been permitted and a number of others are starting the permitting process.

Turkey is the biggest wind power country in central and eastern Europe and gained more than 60% of the region's market share over the period analysed, reaching 86% in 2011. This rapid increase is typical of emerging countries.

Turkey's annual rate of expansion has increased steadily, from no installations in 2005 to 470 MW installed in 2011. This is a compound annual growth rate of 72%.

Table 1.4 shows that annual variations in wind power installations in the non-EU markets are more significant than in the EU. There is huge potential for wind energy across the continent, but more stable policies and better support mechanisms are needed to ensure steady growth.

TABLE 1.3 INSTALLED WIND POWER CAPACITY IN 2005 AND 2011

Country	2005 capacity	2011 capacity	increase %
Croatia	6 MW	131 MW	2,080%
Russia	15.5 MW	15.4 MW	-1%
Ukraine	77 MW	151 MW	96%
Turkey	20 MW	1,799 MW	8,895%
Total	**103 MW**	**2,081 MW**	**1,920%**

TABLE 1.4 VARIATIONS IN ANNUAL INSTALLED CAPACITY AND CAGR

Country	2006/2005	2007/2006	2008/2007	2009/2008	2010/2009	2011/2010	CAGR
Croatia	-	-100%	-	860%	538%	-32%	30%
Russia	0%	1%	0%	0%	1%	0%	0%
Ukraine	42%	-54%	-71%	-100%	-	2,544%	50%
Turkey	-	212%	198%	20%	54%	-11%	72%
Total	**759%**	**98%**	**190%**	**22%**	**68%**	**-2%**	**115%**

The European Energy Community

In 2005 a Treaty setting up the intergovernmental European Energy Community was signed between a number of Balkan states and the EU. The Energy Community was created to develop a common approach to energy policy in south eastern Europe.

Today, it is composed of nine "contracting parties": Albania, Bosnia and Herzegovina, Croatia, Former Yugoslav Republic of Macedonia, Montenegro, Serbia, the United Nations Interim Administration in Kosovo, Moldova, Ukraine and the European Union. Armenia, Georgia, Norway and Turkey participate as observers.

The Energy Community extends the EU Internal Energy Market to the contracting parties. Specifically it aims to :

- Attract investment in power generation and networks in order to ensure stable and continuous energy supply that is essential for economic development and social stability;
- Create an integrated energy market allowing for cross-border energy trade and integration with the EU market;
- Enhance the security of supply;
- Improve the environmental situation in relation with energy supply in the region;
- Enhance competition at regional level and exploit economies of scale.

As such, EU directives and policy on market liberalisation and renewable energy targets are adopted in the member countries via the Energy Community. The EC Contracting Parties are in particular committed to implementing the principles of the 2009 Renewable Energy Directive including national renewable energy targets.

For more information visit:
www.energy-community.org

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2 WIND ENERGY FINANCING

Main findings

Commercial banks

- A number of commercial banks are active in wind energy financing in central and eastern Europe. Generally these are subsidiaries of established western European banks.
- Stability of the countries' regulatory regimes and support mechanisms are key criteria for obtaining financing.
- Availability of grid capacity is an important risk factor.
- The countries analysed have different financing profiles. Romania, Poland and Turkey have so far been seen as the most promising countries for wind energy finance.
- The most common forms of financing are non-recourse and limited-recourse senior loans.
- Financing deals are preferred in euros rather than local currency.

International finance institutions (IFIs)

- Three international institutions are active in wind energy project financing in central and eastern Europe — the EIB, the EBRD and the IFC.
- The IFIs provide mid to long- term financing or syndicated loans with commercial banks.
- The IFIs offer a large range of financing solutions such as loans, equity, leasing, guarantees.
- IFIs financing criteria can be stringent.

EU funds

- Several EU funds can be used to finance wind energy projects in the region.
- Between 2007 and 2010 €786m was earmarked for wind energy projects in the EU, of which €420m was for the newer Member States.
- Due to complicated EU and national application procedures, only 3% of earmarked funds are actually spent.
- Financing for wind energy should increase as EU funds align with climate and energy priorities from 2014-2020.

2.1 Commercial banks

Criteria and financing structure

Commercial banks are the first port of call for wind energy project and corporate finance. The most active in the region's wind sector finance are subsidiaries of the Austrian banks Erste Group and Raiffeisen Bank International, the Italian bank Unicredit and the French bank Société Generale.

The commercial banks consider Romania, Poland and Turkey the most promising countries for the development of wind energy. Croatia is seen as having a good project pipeline and several projects are under construction.

The main criteria for obtaining financing from banks are:

- ***Location.*** The project has to be in a region with significant wind potential: one year of wind measurements are a minimum requirement.

- ***Country.*** The project should be located in a country with a robust regulatory regime: permitting, grid connection and dispatch.

- ***Project developer.*** The developer should have an established track record, local experience and a presence in the market. Corporate governance of all parties involved remains a risk for commercial banks and this needs to be addressed in applications.

- ***Planning.*** Due diligence, a detailed outline of the construction budget and a programme including a financial model for the project are required.

- ***Equity.*** Minimum equity requirements are 20% to 30% of project volume, but this could increase with a rising cost of debt. A reputable investor is a plus.

- ***Permits.*** Applications for all necessary permits and licenses should have been filed.

- ***Technology.*** State of the art technology by established manufacturers must be used and technical and legal due diligence must be carried out by a reputable party. Conditions of the contract with the technology supplier — including the unit price, payment schedule, the warranty period and scope of warranty service —should be submitted.

- ***Power Purchase Agreement (PPA).*** Ideally the project company should already have had a PPA for four to six years. A signed PPA significantly increases chances of obtaining finance.

If a project fulfils banks' requirements, the chances of obtaining finance from major commercial banks are good. Commercial banks will provide non-recourse or limited recourse financing through senior loans and other instruments such as leasing contracts. Currently[8], most banks do not provide junior loans[9] or mezzanine[10] capital, because equity requirements are considered manageable[11]. Large projects are mostly backed by investment funds, eliminating the need for mezzanine capital[12].

Financing is preferred in euros, with an average maturity of around twelve years. Since the maturity depends on the project and its developer, it will be individually tailored. Gearing[13] is based on the financial model provided by the project company and is set at a maximum of 70% to 80%. Factors such as the wind site and price assumptions influence the gearing.

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8 As of July 2012

9 A loan that is subordinate to another issued by the same party. Junior debt is more risky for an investor to own, but it pays a higher rate of interest than debt with greater security.

10 Mezzanine capital is a financial instrument that usually carries interest and is senior to common shares and subordinated to senior loans. It generally takes the form of subordinated shareholder loans. The key reason for using mezzanine/shareholder loans is relative tax efficiency over simple equity injections, in most of the jurisdictions

11 Of the interviewed bankers only one specified that they would provide mezzanine capital as well, if the risk or return profile is adequate. The same bank offers debt covered by export credit agencies

12 Expert interviews, 26.07.2012

13 Gearing is the ratio of senior debt to the sum of senior debt, junior debt/mezzanine and equity. In project finance, gearing usually means the share of investment costs financed by senior loans

Commercial banks often prefer sculpted repayment[14], which is adjusted to the predicted revenue streams.

Western European banks active in the region envisage wind project financing playing an important role in their project and corporate finance activities[15].

Risks

The biggest risks identified by banks in the region relate to the regulatory framework and the availability of grid capacity.

The regulatory risks include the stability and functioning of the renewable energy support mechanism. Retroactive changes to support mechanisms, as experienced recently in the Czech Republic, pose important risks for financing institutions. Such regulatory instability has a significant impact on operators' cash flows and on repayment plans. A change in the bank rating of developers may also result. Moreover, many of the countries analysed still have changing and unclear regulatory frameworks for permitting. This increases the risk of delays or project failure.

The biggest grid related risk for banks is lack of connection capacity that is not compensated. In a number of countries in the region, for example Romania or Bulgaria, the number of connection contracts is significantly higher than available connection capacity.

Other risks highlighted by banks in the region are currency risks (for example in Croatia) and electricity price risks (unstable market prices in Turkey).

However, technical risks are less significant as they can be minimised through cooperation with an established project developer with a positive track record[16]. The short term focus of many investors, however, remains a problem along with the power purchase agreements. They are still uncommon in these markets but represent a revenue guarantee for the banks.

Finally, while inter-bank interest rates have been reduced, banks are still not lending much and risk premiums have increased markedly since the crisis. This makes capital intensive investments more difficult to finance. Banks do not trust each other and are less willing to enter syndicated loans, which have been the main financing model for large capital projects. Although this pattern is encountered across Europe, it is more significant in central and eastern Europe.

Commercial banks operating in the countries analysed are interested in supporting project developers applying for structured financing by international financial institutions.

TABLE 2.1 WIND FINANCE: REQUIREMENTS AND RISKS IDENTIFIED BY COMMERCIAL BANKS[17]

Requirements	Risks
Developer with track record	Legal changes
Fully developed project	Regulatory risks
Fulfilling equity requirements	Lack of approval/authorisation
Use of reliable technology	Corruption
State of the art wind turbines	Currency risks
Reliable regulatory framework	Price risks
Secured tariffs	Grid risks

[14] Sculpted repayment profile is a loan repayment profile based on projected cash flows available for debt service (CFADS) in any given period and a cover ratio, which represents headroom required by banks. The profile is calculated by dividing projected CFADS by a cover ratio and then subtracting interest payment. CFADS usually equal revenues less operating costs. The cover ratio is the ratio of CFADS and debt service, which is the sum of principal repayment and interest payment

[15] Expert interviews with heads of energy departments of western European commercial banks, 26.07.2012

[16] Expert interviews, 26.07.2012

[17] Summary of expert interviews conducted in July 2012

2.2 International Financing Institutions

International financial institutions (IFIs) address wind energy finance risks through a combination of investment, technical assistance and policy dialogue. Where financing cannot be offered by commercial banks, IFIs step in either as syndication partner or as provider of mid to long term finance. The three main IFIs financing wind energy projects in central and Eastern Europe are the European Bank for Reconstruction and Development (EBRD), the European Investment Bank (EIB) and the International Finance Corporation (IFC).

European Bank for Reconstruction and Development

EBRD's sustainable energy investments reached almost €2.2bn in 2010, up 64% from €1.3bn in 2009. The sustainable energy investments portfolio accounted for 24% of the Bank's annual business volume across all sectors of activity. In 2010, EBRD mobilised €363m for renewable energy projects, among these the Magyar wind project in Hungary and the Polska and Margonin wind farms in Poland. In total the EBRD enabled the construction of wind farms with a combined capacity of almost 1,300 MW from 2008-2012 in its countries of operation.

The aim of the EBRD is to stimulate the local economy and help develop the private sector. Consequently, along with environmental criteria, projects need to demonstrate their value for the national or local economy.

TABLE 2.2 SUMMARY OF EUROPEAN BANK FOR RECONSTRUCTION AND DEVELOPMENT (EBRD) FINANCING

Loans and syndicated loans	Other financing tools	Direct investment	Maturity	Eligibility	Criteria	Other
Project costs less than 35%	✓ Equity less than 25% ✓ Equity loans ✓ Guarantees ✓ Leasing facilities ✓ Trade finance	€5m to €230m	Five to fifteen years	✓ Private companies or ventures ✓ Public investors	✓ Located in EBRD country ✓ Strong commercial prospects ✓ Equity contributions in cash or in kind equal to or above EBRD contribution ✓ Project benefits local economy ✓ Project helps develop private sector ✓ Banking standards ✓ Environmental standards	✓ Offices in all target countries ✓ Online enquiry service

European Investment Bank

EIB lending to renewable energy has grown dramatically over the last few years to reach €6.2bn in 2010. The share of renewable lending in the overall EIB energy portfolio tripled from below 10% in 2006 to more than 30% in 2010. In 2011 the EIB invested €18bn in climate protection projects. Among these, it has financed wind farms totalling around 4,000 MW in capacity worth €1.7bn. The Bank has become a key source of finance for the wind industry in central and south eastern Europe.

Between 2008 and 2012, the EIB financed five wind farms in the countries considered, disbursing around €380m. A further €350m was invested in transmission system infrastructure in Serbia, Ukraine and Croatia.

The EIB generally only lends to projects within the EU. However, with a mandate from the EU institutions, it can finance projects in neighbouring countries. Moreover, the EIB only directly lends sums in excess of €25m. For smaller loans, the EIB can lend to local commercial banks that can lend on to project developers.

TABLE 2.3 SUMMARY OF EUROPEAN INVESTMENT BANK (EIB) FINANCING

Loans	Other financing tools	Direct investment	Eligibility	Criteria	Other
Project costs less than 50%	✓ Guarantees ✓ Direct lending ✓ Loans to commercial banks	Above €25m	✓ Private companies ✓ Public investors	✓ Located in EU ✓ Outside EU with mandate ✓ Strong commercial prospects ✓ Project in line with EU priorities for relevant region	✓ Offices in Luxembourg ✓ Offices in EU candidate countries

International Finance Corporation

In 2010 the IFC invested a total of $18bn in projects worldwide. Around 10% ($1.6m) supported climate change businesses. Between 2008 and 2012 the IFC co-financed four wind sector transactions valued at around $300m in central and eastern Europe. These four projects were co-funded by commercial banks (large eastern European banks) and other financial institutions (EBRD, EIB). IFC engagement has, so far, varied from €20m (combined with a commercial bank investment of €35m) to finance a 44 MW wind project in Croatia to €31m to finance wind energy developments in the Kavarna region in Bulgaria.

IFC financing is available where commercial banks cannot provide loans by themselves due to the level of risk. The IFC's criteria are that financing should go to projects that enable private sector investment that would otherwise not happen. The IFC focuses increasingly on renewable energy and energy efficiency projects and aims to increase its investments in climate change businesses to 20% of all investments in 2013.

TABLE 2.4 SUMMARY OF IFC FINANCING

Loans	Other financing tools	Eligibility	Criteria	Other
Project costs between 25% (if loan is less than $50m) and 35% (if loan is more than $50m)	✓ Equity ✓ Local currency loans ✓ Trade finance	✓ Large private companies	✓ Located in IFC developing country ✓ Strong commercial prospects ✓ Technically sound projects ✓ Project benefits local economy ✓ Environmental and social standards ✓ Strong wind region, one year measurement campaign	✓ HQ in Washington, regional office in Istanbul

2.3 EU financing and support

The regional policy of the EU — also known as the cohesion policy — is one of the most important instruments for increasing economic prosperity in the regions of the EU. The EU's 2007-2013 budget earmarked €347bn for cohesion policy, the second largest sum after agricultural policy.

EU cohesion policy aims at strengthening economic and social cohesion by reducing regional disparities in income, wealth and opportunities. The cohesion policy budget has three specific funds:

- European Regional Development Fund (ERDF)[18]: €201bn
- European Social Fund (ESF)[19]: €76bn
- Cohesion Fund (CF)[20]: €70bn.

Over half of the funds (52%) were earmarked for newer Member States[21]. According to the Commission[22], around €4.8bn was allocated to renewable energy sources, out of which €498.8m (10.5%) was used by 2009.

Around €786m of cohesion policy funds were allocated for financing wind projects between 2007 and 2010 €420m of this in the newer Member States. Poland, the Czech Republic and Romania represented 47% of the latter. However, of the funds allocated to wind energy financing across the EU, only €23m were actually spent (2.9%), none in the newer Member States.

The EU's Cohesion Policy is carried out at national, regional and local level. Each Member State develops a National Strategic Reference Framework (SRF), outlining its strategy for the cohesion policy. In this document each country illustrates the relevant financing needs, areas with difficulties, disadvantaged social groups, and sets priorities for support. On the basis of their SRF, Member States apply for funds to the European Commission. The Commission and the Member States agree on thematic operational programmes (OPs), to which the former allocates the funds.

Funds are allocated by a given formula to the Member States and have to support the OPs. The Member States determine a managing authority (usually ministries or regional authorities), which is the contact point for applicants.

TABLE 2.5 COHESION FUNDS ALLOCATED, SPENT AND ABSORPTION RATE 2007-2010

	Allocated	Spent	Absorption rate
Total	€344,306m	€93,444m	27.1%
Renewable energy	€4,759m	€499m	10.5%
Wind energy	€786m	€23m	2.9%

Source: European Commission

18 http://ec.europa.eu/regional_policy/thefunds/regional/index_en.cfm
19 http://ec.europa.eu/regional_policy/thefunds/social/index_en.cfm: Since ESF main focus is employment; it will not be discussed in greater in the context of wind energy
20 http://ec.europa.eu/regional_policy/thefunds/cohesion/index_en.cfm
21 Bulgaria, Cyprus, Czech Republic, Hungary, Estonia, Latvia, Lithuania, Malta, Poland, Romania, Slovakia and Slovenia
22 COM(2010) 110, Cohesion policy: Strategic report 2010 on the implementation of the programmes 2007-2013 (http://ec.europa.eu/regional_policy/archive/policy/reporting/cs_reports_en.htm)

The European Parliament analysed the low absorption[23] rate of cohesion funds in September 2011, and identified six principle hurdles:

- difficulties in completing the compliance assessment procedures;
- budgetary restraint measures on public budgets and difficulties in obtaining internal financing;
- insufficient resources to co-finance projects;
- delays in transposing EU rules, and determining national guidance rules;
- inconsistent guidance from the Commission;
- over complicated, excessively strict and frequent changes to national procedures.

The upcoming EU budget for the 2014-2020 period takes account of the difficulties and is expected to introduce changes. Funding will be more closely linked to the EU's 2020 priorities including meeting climate and energy targets. This means that over the coming years the amount of EU funds allocated to wind energy project financing is expected to increase.

European Regional Development Fund

In the 2007-2013 budget period the ERDF had €183bn available for financing projects to enhance development and reduce disparities between regions. The fund operates across the EU, but the main focus is on EU enlargement countries in central and eastern Europe and south eastern Europe region. So far there has been no direct financing of wind farms, but ERDF funds were used to support wind energy research institutions and competence centres (in Bremen, Germany for example) as well as energy efficiency programmes.

In the 2014-2020 EU budget period, regional development funds will amount to €199bn. ERDF funds are allocated in the form of grants and subsidies, but are also distributed to venture capital funds, loan funds, community finance, development institutions and guarantee funds. Most projects are eligible for financing of up to 50% of total project costs. If they are located in particularly poor regions, this can increase to 80%.

ERDF funds are available for public institutions and local authorities in regions with per capita GNI of less than 75% of EU average.

Cohesion fund

The cohesion fund was allocated €70bn in the EU budget period 2007-2013 and €69bn is available for the 2014-2020 period for projects that enhance development and reduce disparities between regions. The fund is available across the EU, but the main focus is on the newer Member States in the central, eastern and south-eastern region.

The cohesion fund currently offers grants and subsidies for environmental projects and trans-European transport networks. The funds are allocated to thematic operational programmes. Some Member States, such as the Czech Republic and Poland have operational programmes that finance wind energy. So far there has been no direct funding of wind farms, but some educational programmes on renewable energy have been awarded grants.

Support from the cohesion fund can be awarded to public companies, public institutions, non governmental organisations, churches and religious associations in EU regions with per capita GNI of less than 90% of the EU average.

Project eligibility is defined at national level, depending on national and local priorities. Since no wind farm financing has been reported so far, it is not currently possible to identify selection criteria for project financing. However, several types of expenditure —such as recoverable value added tax, land purchases accounting for more than 10% of total eligible expenditure, accommodation — are not eligible.

[23] Absorption capacity is the extent to which a Member State and its regions are able to spend the financial resources allocated from the structural and cohesion funds in an effective and efficient manner

2.4 Support mechanisms in central, eastern and south-eastern countries

Support mechanisms in this region differ from country to country[24]. All countries analysed have set up dedicated support mechanisms for wind energy in the form of feed-in tariffs, feed-in premiums or green certificates. The former two are most common, but the two largest wind energy markets in the region, Poland and Romania, use green certificates.

TABLE 2.6 SUPPORT MECHANISMS IN EU NEWER MEMBER STATES, CROATIA[25], SERBIA, TURKEY AND UKRAINE

Country	Currency	Mechanism	Amount	Duration
Bulgaria	Lev	Feed-in	€67.8 or €76 per MWh depending on Full Load Hours.	12 years
Croatia	Kuna	Feed-in	€95.6/MWh	14 years
Czech Republic	Koruna	Reference price	Difference between hourly electricity market price and reference price still to be determined	20 years
Hungary	Forint	Tender	Case-by-case	Case-by-case
Poland	Zloty	Certificates	Market value (substitution fee €62/MWh in 2011)	10 + years
Romania	Lei	Certificates	Two certificates/MWh with €28 floor and €57.4 cap	2017
Russia	Rouble	Premium and Feed-in	Not in operation	Premium until government targets met. Feed-in for 10 years
Serbia	Dinar	Feed-in	€95/MWh	12 years
Slovakia	Euro	Feed-in	€72.29/MWh	15 years
Slovenia	Euro	Feed-in and reference price	Less than 5MW feed-in €95.38/MWh. Difference to reference price, €50.75/MWh less than 10 MW and €38.76 more than 10 MW	15 years
Turkey	Lira	Feed-in	€56.6/MWh plus a premium for use of local content €0.47 to €1.01/MWh	
Ukraine	Hryvnia	Feed-in	€55.22/MWh multiplied by 1.2 to 2.1 according to wind farm capacity	2030

* Currency exchange date: 24 September 2012 3.1.1 Power market overview

[24] More details on each country's mechanism can be found in the individual country profile sections of this report
[25] Kommunalkredit Austria & PwC: Investing in Wind Energy 2012

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3 FIRST WAVE MARKETS

3.1 Bulgaria

Main findings

Power market overview

- ☺ Electricity consumption is expected to increase in Bulgaria, requiring investments in new generating capacity.
- ☹ There is no day ahead, intraday or balancing market.
- ☹ Electricity prices are lower than the EU average.

Wind energy in Bulgaria

- ☺ Wind energy has reached 5% of total generating capacity.
- ☺ There is a mid-term potential for over 3 GW of wind energy capacity in Bulgaria.
- ☺ At end 2011 there were 607 MW of installed wind energy capacity, 47 MW (+8%) more than foreseen by the NREAP.
- ☹ The NREAP target for wind energy capacity is 1.4 GW by 2020, lower than the estimated 3 GW potential.
- ☹ The particularly unstable support mechanism makes it unlikely for Bulgaria to continue on a positive trend in terms of wind power deployment.

Sites

- ☹ A significant number of the best wind sites are in nature conservation areas. Authorisation procedures in these areas are becoming increasingly restrictive.

Supply chain

- ☺ Independent developers dominate the wind energy sector. There is a local or locally based supply chain, especially of component and service providers.
- ☺ Direct employment in the wind energy industry has more than tripled in three years.

Financing

- ☹ Finance for wind energy has been available in Bulgaria, but terms could be significantly tightened due to the new support mechanism creating major uncertainty and increasing financing risk.

Regulatory framework

- ☺ Although there is a lack of coordination between administrations, obtaining consent is not a major barrier to wind energy development.
- ☹ Grid restrictions are a major concern for the future.
- ☹ Day ahead and futures markets are not open to trading.

3.1.1 Power market overview

The energy generation sector is controlled by seven state owned companies, five of which are currently undergoing a privatisation and restructuring process. Only the Kozloduy nuclear power plant and the lignite based Martiza East 2 plant remain under state control. Conventional thermal fuels are the primary resource in the generation mix, amounting to 54% of total production in 2011, followed by nuclear power with 32% and hydro power with 12%. The contribution of other renewable energy sources increased to 1.8% and is expected to expand further due to the country's substantial geothermal and wind potential. Bulgaria has to meet a binding target of 16% renewable energy in gross consumption by 2020. Its National Renewable Energy Action Plan (NREAP) requires 20.6% renewable energy in electricity consumption to meet the target.

Total electricity generation increased by 5.4% in 2011, reaching 49.2 TWh. In terms of historical trends, electricity production expanded at an annual compound growth rate of 3.2% from 2007-2011, despite a decline of 4.6% in 2009 attributed to the economic downturn. The pattern of production is largely explained by the slight growth in installed capacity that occurred over the same period.

Domestic net electricity consumption increased at a compound annual growth rate of 0.1% over the 2007-2011 period in spite of contractions of 5.4% in 2009 and 3.2% in 2010 due to the economic downturn. The 5.4% increase in consumption recorded in 2011 indicates potential for further growth in line with economic development.

Bulgaria has traditionally had a positive net export balance for electricity. The highest exports were in 2011, when over 12 TWh were delivered to the main export markets — Greece, Romania, Macedonia, Serbia and Turkey — with which the Bulgarian grid is interconnected. Exports were 7.7 TWh in 2009 due to the reduction in foreign demand associated with the economic crisis, but exports picked up in 2010.

TABLE 3.1.1 GROSS ELECTRICITY GENERATION BY TYPE 2007–2011 (TWH)

	2007	2008	2009	2010	2011
Hydro	3.2	3.3	4.1	5.7	2.5
Other renewables	0.0	0.1	0.2	0.7	0.9
Nuclear	14.6	15.8	15.3	15.2	16.3
Conventional thermal	25.4	25.9	23.4	25.0	29.4
Total	**43.3**	**45.0**	**43.0**	**46.7**	**49.2**

Source: Eurostat

TABLE 3.1.2 NET ELECTRICITY CONSUMPTION AND EXPORTS 2007-2011 (TWH)

	2007	2008	2009	2010	2011
Consumption	33.1	34.5	32.6	31.5	33.2
Annual exports	7.5	8.4	7.7	9.6	12.1

Source: Entso-E, Bulgarian National Institute of Statistics

Electricity is traded on the market for bilateral contracts and the balancing ring. Intraday, day ahead and futures markets are unavailable at present. The transmission network is operated by state owned ESO EAD. The company is responsible for the operation of the transmission grid and auxiliary networks, for maintaining, coordinating and developing public electricity infrastructure and the functioning of the electricity markets.

Bulgarian electricity prices are lower than EU-27 average, both for households (-93%) and for industrial consumers (-56%). In 2011, average electricity prices reached €83/MWh and €78/MWh respectively.

Net cumulative installed capacity increased at a compound annual growth rate of 4% between 2007 and 2011 and is expected to rise further, mainly driven by investments in wind, solar and hydro power. In 2011, wind energy capacity was 5% of total generating capacity.

TABLE 3.1.3 NET CUMULATIVE INSTALLED CAPACITY 2007–2011 (GW)

Types of energy	2007	2008	2009	2010	2011
Cumulative net installed capacity	10.5	11.6	11.9	12.1	12.4
Wind installed capacity	0.04	0.11	0.34	0.49	0.61
Wind share of installed capacity	0.4%	0.9%	2.9%	4.1%	4.9%

Source: ENTSO-E, EWEA

3.1.2 Wind energy in Bulgaria

The substantial potential for wind and hydropower in Bulgaria has attracted considerable investment in renewable energy from local and foreign companies. At the end of 2011, installed renewables capacity was 3,920 MW, mainly hydro, wind and solar. The compound annual growth rate of the renewables sector exceeded 9.7% over the 2007-2011 period.

The period was marked by the emergence and rapid growth of the Bulgarian wind sector, whose compound annual growth rate was the second highest among EU countries (96.5%). Cumulative wind energy capacity increased by 24% during 2011 to reach 607 MW, more than what was foreseen in the NREAP.

According to Association of Producers of Ecological Energy (APEE), the country's substantial wind potential could trigger investments of more than €3bn from private sector companies by 2020, an estimated cumulative capacity of over 3 GW. The NREAP has more conservative targets of 1.4 GW[26].

However, even this less optimistic scenario looks challenging in the context of the newly introduced reductions in feed-in tariffs for renewable energy and measures aimed at decelerating growth in the renewables sector. At the end of June 2012, the energy regulator announced that no new capacity will be connected until June 2013. Only micro wind generation with an installed capacity of up to 200 kW and biomass projects of up to 1.5 MW will be permitted in the meantime. These developments have discouraged investors, with China's Ming Yang Wind Power Group and the Bulgarian W Power Ltd. considering cancelling their plans to build a 125 MW wind farm and suing the government for compensation. The particularly unstable support mechanism makes it unlikely for Bulgaria to continue on a positive trend in terms of wind power deployment.

3.1.3 Sites

Bulgaria has a mixed climate with mild continental and Mediterranean influences and significant seasonal variations in wind speed of up to 40%. The highest wind speeds are along the north eastern Black Sea shore, the Rhodope mountains in the south west and the central mountain range.

The vast majority of wind farms in operation are located in the Dobrich, with others in Stara Zagora, Yambol and Burgas provinces, which have an attractive wind potential owing to their proximity to the Black Sea coast and mountainous regions.

Natura 2000 protected areas cover 34.3% of the country and their concentration is greatest in the regions with the highest wind potential. At the time of going to print, wind power producers are not automatically excluded from Natura 2000 protected areas, they are subject to additional environmental impact evaluations. Applications for Natura 2000 permits initially undergo a screening process that determines whether their potential effects on the site warrant further investigation. Projects whose environmental footprint is deemed negligible are granted permits at this point; the rest undergo a secondary evaluation. De facto, wind project development has not stopped within or around Natura 2000 sites and Important Bird Areas (IBAs). However, the Bulgarian authorities are tightening the procedures which could lead to excluding wind energy projects from these areas.

The European Commission launched two infringement proceedings against the Bulgarian government in 2008 and 2009 for failure to designate areas paramount to the conservation of bird species as Special Protection Areas (SPAs) and enforce Environmental Impact Assessments (EIAs) for wind farms in the Kaliakra region. Aside from one project which was stopped, authorities continued to permit wind farms in the Kaliakra and Balchik IBAs. However, stricter controls may be introduced in the future. In July 2012 the environment approval granted to a wind energy project near the Durankulak Lake and Bilo SPAs was revoked by the Ministry of Environment and Water. Moreover, the Ministry of Economy is currently reviewing a recommendation to stop processing requests for project approvals in Natura 2000 sites and other protected areas.

[26] http://www.repap2020.eu/fileadmin/user_upload/Roadmaps/REPAP_-_RES_Industry_Roadmap_Bulgaria.pdf

TABLE 3.1.4 CUMULATIVE WIND INSTALLED CAPACITY, NREAP AND ACTUAL, 2007-2011 IN MW AND CAGR

Types of energy	2007	2008	2009	2010	2011	CAGR
NREAP wind energy capacity	-	-	-	336	370	-
Actual installed capacity	40.7	112.6	335	488	607	96.5%

Source: National Renewable Energy Action Plan, EWEA

3.1.4 Main wind energy developers

The five largest wind energy developers accounted for almost 60% of total installed capacity in 2011. The three developers with the largest installed capacity are independent, the fourth is a financial institution and only one of the top five is a foreign utility.

TABLE 3.1.5 CUMULATIVE CAPACITY OF MAIN WIND ENERGY DEVELOPERS IN BULGARIA 2009-2011 (MW)

Producer	2009	2010	2011
AES & Geo Power	156	156	156
Eolica Bulgaria	-	-	60
Alpiq	-	50	50
Raiffeisen	40	50	50
Enel Green Power	21	42	42
Others	78	190	249
Total	**335**	**488**	**607**

Source: PwC

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3.1.5 Supply chain

The wind power supply chain in Bulgaria is split among a large number of integrated service providers whose scope includes prospecting, design, construction, operational management and maintenance of wind farms. The majority of wind farms use turbines from international manufacturers such as Vestas, Gamesa, Fuhrländer, and Enercon. While the specialised skills and expertise required to build turbines are generally unavailable in Bulgaria wind farm investors can source electrical equipment and sub components, consultants, engineering and construction services locally.

TABLE 3.1.6 WIND INDUSTRY SUPPLY CHAIN IN BULGARIA. ACTIVE COMPANIES PER SUB-SECTOR

Wind turbine manufacturers	2nd/3rd tier suppliers	Wind farm developers	Wind farm construction companies	Operation & electricity generation	Maintenance and repairs	Wind farm de-commissioning
Vestas	Elsewedy (SWEG)	Global Wind Power	Global Wind Power	Proventus Energy BG.	Elsewedy (SWEG)	Juwi wind
Siemens	Intercom Group	Island Ren. Energy	Island Ren. Energy	AES Geo Energy	Enertrag	Windhunter Serwis
Enercon	Litwind	Juwi Wind	Juwi Wind	Alpiq	VGE	
Fuhrländer	Eickhoff Wind Power	VGE	Pro EcoEnergia	Eolica	Egnatia	
Power Wind	EMEK	Egnatia	Iw-concepts	Enel Green Power	Orisol	
	Ecometal	Enertrag	Ventus Bulgaria	ABO Wind	Prenecon	
		Orisol	Long Man Holding AD.	Elektrawinds	Windtechnics	

TABLE 3.1.7 ELECTRICITY, GAS, STEAM AND AIR CONDITIONING SUPPLY EMPLOYMENT AND AVERAGE ANNUAL WAGES AND SALARIES, 2009-2011

Energy sector	2008	2009	2010	2011
Number of employees (000's)	42.0	40.9	42.3	42.1
Average salary of full time employees (€)	6,678	8,020	8,514	9,011

Source: National Institute of Statistics, Eurostat

3.1.6 Local labour market

Between 2009 and 2011 the number of employees in the production and distribution of electricity, steam, gas, water and air conditioning fluctuated around 42,000. The pattern of employment mirrored economic developments, employee numbers contracting in 2009 and returning to prior levels in 2010.

The average annual gross earnings of employees in this sector was €9,011, twice the average earnings for the Bulgarian private sector as a whole (€4,339).

In a 2009 report[27] EWEA estimated that the companies active in the Bulgarian wind power market were directly responsible for the creation of 100 jobs in 2008. BGWEA estimates that direct employment attributable to its members increased to 600 by 2011.

Several private and public organisations such as consultants and the Ruse Chamber of Commerce and Industry offer training on renewable energy. State owned educational institutions, such as the technical universities of Varna, Sofia, Gabrovo and Ruse have included courses on renewables in their curricula and conduct R&D activities in the field.

3.1.7 Financing

Regular commercial loans are the most commonly used and practical financing option for investors. A number of domestic and international banks offer loans for wind investments, including OPIC, IFC, EBRD, the Bulgarian Development Bank (BDB), Unicredit Bulbank, RaiffeisenBank and OTP Group subsidiaries. While banks continue to require a higher premium relative to euro zone countries to mitigate currency risk, the access of wind producers to financing schemes has improved with the increasing track record of projects completed in Bulgaria. Additionally, turbine manufacturers are more willing to provide buyers with easier contractual terms and to cover part of the investment costs themselves. Developers can also attempt to secure finance from third parties such as energy companies through Energy Savings Agreements (GESA). However, financing partners may revert to stricter contractual terms as a result of the increased tariff risk associated with the new feed-in mechanism known as ERSA (see below).

Investors in wind energy may be eligible for investment aid in the form of faster administrative services, streamlined procedures or preferential rates for the acquisition of ownership and building rights over private and public land, and financing for project infrastructure and human resources development. Grants may be awarded to renewable energy projects that lack access to financing under competitive terms or contribute to the progress of economically challenged areas, specific activities and regions. However, high administrative fees and lengthy application reviews mean that very few investors opt for this financing mechanism. Investors in renewable energy facilities may also benefit from the support of the Global Environmental Fund.

3.1.8 Support scheme

In 2007 Bulgaria adopted the Renewables Act that introduced a feed-in tariff support scheme. A new renewable energy law (ERSA) came into force in May 2011, amending the previous version.

[27] Wind at Work – wind energy and job creation, EWEA 2009

Wind power producers may choose to participate in the feed-in tariff system or trade their output on the free market. The public provider and end suppliers are required to purchase the electricity for which the State Energy and Water Regulatory Commission (SEWRC) issued a certificate of origin, except for quantities reserved for self-consumption and the balancing market.

The feed-in tariff used to be calculated by adding a base component equivalent to 80% of the average wholesale price during the previous year with a technology-specific premium of at least 95% of the price component utilised. The April 2012 regulations adjusted the base component downward to 70% and the premium is subject to changes by any amount. A 5% cap on adjustments that helped provide some stability for investors was removed in 2011. The duration of the power purchase agreements under the support scheme has been reduced from 15 to 12 years.

Due to the annual changes to the tariff, its amount is determined once the wind farm is commissioned[28], rather than when it is authorised. Projects built in several phases with different commissioning dates receive the preferential prices effective at the date of commissioning for each of the phases. Developers, therefore, do not have a clear idea of how much the feed-in tariff will amount to until project completion. Finally the tariffs vary depending on the full load hour equivalents.

The feed-in tariff reached €97.6/MWh for a wind farm operating for less than 2,250 full load hours per year and €88.5/MWh above 2,250 full load hours in June 2011. These values have since been reduced to €76/MWh and €67.8/MWh.

The new regulations on the feed-in tariff were prompted by the discrepancy between the large number of connection applications and the capacity of the electricity grid. Grid connections are linked to the development plans of the transmission system operator (TSO), introducing connection schedules for projects. Wind power developers have one month to decide whether they agree with their connection date. In the absence of written confirmation from the developer, the preliminary contracts are revoked.

TABLE 3.1.8 FEED-IN TARIFFS FOR WIND POWER 2009-2012 (€/MWH)

Full load hour equivalents	2009-Mar	2010-Mar	2011-Mar	2011-Jun	2012-Jun
More than 2250	87.9	89.2	88.4	88.5	67.8
Less than or equal to 2250	96.6	97.4	97.6	97.6	76.0

Source: SEWRC

[28] Once the wind farm has received its operating permit from the authorities

3.1.9 Regulatory framework

Key agencies and institutions

The SEWRC is responsible for supervising and regulating the electricity, gas, heating, water and sewage markets in Bulgaria. SEWRC sets regulated prices and tariffs, issues permits and licences and manages the renewable energy incentive schemes, by establishing the feed-in tariffs and issuing the licenses for electricity production and guarantees of origin for projects above 5 MW.

NEK EAD is a state owned company that controls the public electricity generation and transmission infrastructure. The company is primarily responsible for the production and transmission of electricity, the centralised electricity market, electricity imports and exports, the maintenance and development of the national grid and power plants and the promotion of energy efficiency. NEK is also in charge of issuing grid connection permits for wind farms connecting to the high voltage grid. Under current regulations, one of NEK's subsidiaries, ESO, has taken on the role of TSO. The high voltage grid assets remain under NEK's control, however, amendments to the Energy Act provide for future unbundling.

Following the privatisation of state owned enterprises, distribution grids have been organised into three regions controlled by CEZ (west), E.ON (south east) and EVN (north east). Wind farms connecting to the medium or low voltage grids submit applications for grid connection to the distribution system operators (DSOs).

Key documents

Building permit and licence

Prior to the application for a construction permit, developers must submit the operational and technical plans to the chief architect of the respective municipality for approval. When approved the construction permit is awarded by the relevant authorities, which may differ depending on the complexity and location of the project. In addition, developers are required to obtain an operating permit before commissioning the wind farm.

The licence to generate electricity is issued by SWERC if developers prove compliance with environmental, financial, organisational, technical and safety prerequisites and hold ownership rights to the land. Unlike other European countries, Bulgarian legislation allows applications for generation licences both before and after wind farm construction. The licence is granted within three months of application for wind farms that have already been constructed. If the application is filed prior to the start of building works, SWERC makes its decision within three months of receiving the documentation attesting completion of the construction. The licence is valid for up to 35 years.

Grid connection

Connecting to the transmission grid requires submitting an application to the transmission system operator (TSO), NEK EAD. Grid connection applications for small wind farms are submitted to the DSOs.

Upon submitting the applications, producers are required to pay a 'guarantee for participation' equal to 5,000 BGN per megawatt (€2,556/MW). The respective operator considers applications on a first come, first served basis and issues an opinion within 14 days from its receipt. If the opinion is positive, producers have six months to file for a preliminary grid connection agreement. The conclusion of the preliminary agreement requires an advanced payment for connection of 50,000 BGN/MW (€25,556/MW) for projects above 5 MW and 25,000 BGN/MW (€12,780/MW) in other cases. Developers must apply for the final connection agreement within one year of entering a preliminary agreement. The grid connection agreement is valid for a maximum of three years.

Renewable energy producers cover the costs of connecting lines and other facilities necessary for the connection to the grid that are located on their property. Operators support the remaining expenses up to the connection point.

3.1.10 Opportunities and challenges

Over the past years, Bulgaria has had one of the fastest growing wind energy sectors in Europe and has a substantial mid-term wind potential of around 3.4 GW. In the past two years however, the legal framework for wind has significantly worsened with retroactive changes to feed-in tariffs and the implementation of a grid access levy discriminating against wind power producers. This has a significant bearing on the outlook for the Bulgarian market.

The entry into force of the new renewable energy law, ERSA, significantly increases risk for developers at the early stages of a wind project. Developers are required to make upfront payments for the reservation of grid capacity and preliminary contracts. But this is in the absence of information on current or future availability of grid capacity in the project location and on their chances of securing this capacity by a given date. While the advance fee acts as deterrent to speculative projects, it also raises investment costs for small wind project developers.

Whether or not the ERSA provisions simplifying grid connection terms for small facilities will address this problem remains to be seen. A bigger concern is that the feed-in tariffs are fixed upon the release of the usage permit, which can take longer than two years. Given that preferential tariffs are adjusted by SEWRC whenever it considers that significant changes to investments costs (equal to or exceeding 10%) occur, developers may receive substantially lower tariffs than those budgeted at the start of the project. Increasing uncertainty over the cash flows from the generation of wind power is likely to reduce opportunities for bank financing and tighten loan terms.

The limitation of the grid infrastructure in the light of a growing demand for connection permits is a significant barrier to investments. According to the Association of Producers of Ecological Energy the maximum wind capacity determined by the TSO of 1,800 MW has already been exhausted. Preliminary contracts, projects under construction and operational wind farms total approximately 2,800 MW. In response to the large number of applications for pre-contracts, many of which were speculative, the government introduced connection schedules and advanced payment fees through ERSA. The preferential access to the network awarded to renewable energy producers under the previous legislation has been abolished and the authorities are planning to discontinue the support mechanism once the mandatory target established by the EU is met. Despite the stricter regulations, over 80% of pre-contracts concluded in north east Bulgaria were confirmed after ERSA came into effect.

The lack of grid capacity is exacerbated by the absence of a regulatory framework to stimulate grid development for renewable energy integration. Due to a lack of investments in the transmission and distribution systems, the connection of several large projects has been delayed and the capacity of certain operating wind farms has been capped at 50%. Renewable energy producers cannot require investments in distribution grid upgrades, nor are they entitled to compensation for the slow development delaying their connection. The establishment of connection schedules, which function on a first come, first served basis, is expected to divert the TSO's investments further from the areas that require it most. Grid capacity limitations are likely to remain problematic for wind energy developers over the short and medium term.

Bulgaria has one of the shortest lead times for wind projects in Europe — two to three years, although the average number of officials and TSO/DSO representatives that wind farm developers come in contact with slightly exceeds the EU-average. Administrative procedures and grid connection processes officially require a shorter time commitment than in most EU countries. However, in practice deadlines for permits and licences are not always strictly enforced and regulations for local authorities often cause misunderstandings that lead to delays.

TABLE 3.1.9 OPPORTUNITIES AND CHALLENGES BY PROJECT STAGES

Wind assessment, land acquisition, environment and permits

Opportunities	Challenges
Relatively low development and construction costs	Considerable number of Natura 2000 sites and their continuous expansion
Simplified administrative procedures	Permit and licensing procedures with an important local component
Preferential rates/streamlined process of property acquisition	

Grid capacity, connection and wind farm operations

Opportunities	Challenges
Shallow cost approach for grid connections	Outdated and insufficient grid infrastructure
	Introduction of connection schedules and advanced payments
	Grid curtailment
	Lack of legal basis for requesting investments from the TSO/DSO
	Increased allocation and tariff risk
	Unpredictable legal framework for renewable energy

3.2 Hungary

Main findings

Power market overview

- ☹ Electricity generation dominated by state owned utilities.
- ☹ Decrease in renewable energy contribution to energy mix in 2011.
- ☺ Total electricity generation capacity increased by 3% CAGR since 2007.

Wind energy in Hungary

- ☺ Wind energy installations increased by a CAGR of 50% since 2007.
- ☹ Wind installations are currently below the NREAP target.
- ☺ Hungary has a medium term wind energy potential of 1.8 GW up from 330 MW installed at end 2011.

Sites

- ☹ 25% of country is covered by Natura 2000 areas. Obtaining permits in these areas is difficult.

Supply chain

- ☺ There is diversity among the top wind energy developers, utilities, independent developers, local, foreign.
- ☹ Most of the turbine and component suppliers are foreign.
- ☺ Some renewable energy training courses are available locally.

Support mechanism

- ☹ The future of the support mechanism is uncertain.
- ☹ There has been no tendering for grid connection capacity since 2006.

Regulatory framework

- ☺ Building permit procedures are not a barrier to wind energy development.
- ☹ Obtaining permits for grid connection is problematic.
- ☺ Transmission charges are reduced for wind farms.
- ☺ The transmission grid does not require upgrades to meet 2020 wind energy installation targets.
- ☹ Securing viable connection points is problematic; many of the best points are blocked by speculators.

TABLE 3.2.1 TOTAL NET ELECTRICITY GENERATION BY TYPE 2007–2011 (TWH)

Types of energy	2007	2008	2009	2010	2011
Hydro	0.2	0.2	0.2	0.2	0.2
Other renewables	1.5	1.5	1.9	2.3	1.8
Nuclear	13.8	14.0	14.6	14.8	14.7
Conventional thermal	21.8	19.4	15.8	16.5	16.8
Total	**37.3**	**35.0**	**32.5**	**33.8**	**33.6**

Source: Entso-E

3.2.1 Power market overview

Electricity generation is dominated by state owned Magyar Villamos Müvek (MVM), whose nuclear facility in Paks accounted for 43.9% of net electricity generation in 2011. Conventional thermal fuels are the primary resource in the generation mix, accounting for 50.1% of net production in 2011. The contribution of renewables fell from 7.2% to 6% during the same year. Hungary's National Renewable Energy Action Plan (NREAP), however, has a 14.7% renewable energy target for 2020 and a renewable electricity target of 11%.

Domestic power decreased by 0.6% in 2011, reaching 33.6 TWh. In terms of historical trends, electricity production experienced significant contractions in 2008 (6.2%) and 2009 (7.1%) due to the economic downturn and made a slight recovery in the following years.

Similarly, electricity consumption decreased by about 5% during 2009, resulting in a negative compound annual growth rate of -1% over the 2007-2010 period. However, the slight increase in consumption recorded in 2010 indicates potential for further growth in line with economic recovery. According to the NREAP, annual consumption is expected to increase by between 1% and 3% per year to 2020.

While electricity prices for industrial consumers converge with the EU average, household consumers pay 5% more. In 2011, average electricity prices charged to residential customers and businesses reached €168/MWh and €121/MWh, respectively.

Electricity is traded on the market for bilateral contracts — the Hungarian Power Exchange (HUPX) and the Power Exchange Central Europe (PXE). Hungary does not have an intraday market or a balancing ring at present. Hungary's transmission system is interconnected with all its neighbouring countries. The transmission network is operated by MAVIR Hungarian Transmission System Operator Company Ltd (MAVIR Zrt).

Hungary is a net importer of electricity, importing on average almost 5 TWh per year. Net imports increased in 2009 and dropped only slightly in 2010.

TABLE 3.2.2 ANNUAL IMPORTED AND EXPORTED ELECTRICITY 2007- 2010 (TWH)

	2007	2008	2009	2010
Annual electricity imports	14.7	12.8	11	9.9
Annual electricity exports	10.7	8.9	5.5	4.7
Net balance (imports-exports)	-4.0	-4.0	-5.5	-5.2

Source: Eurostat

TABLE 3.2.3 CUMULATIVE INSTALLED POWER GENERATING CAPACITY 2007-2011 (GW)

	2007	2008	2009	2010	2011
Cumulative generating capacity	8.4	8.5	8.6	8.8	9.5

Source: Entso-E

Cumulative installed generation capacity increased at a compound annual growth rate of 3% from 2007-2011 and is expected to increase further due to investments in wind, biomass and other renewable energy projects.

3.2.2 Wind energy sector in Hungary

At the end of 2011, the net installed renewable capacity, excluding large hydro, was 746.6 MW, 44% of which (329.3 MW) was wind power. Wind energy's CAGR from 2007-2011 was around 50%. However, new regulations will enter into force during 2013 that will slow down wind energy deployment, despite the country's NREAP 750 MW target by 2020. To meet the target, 47 MW of new wind capacity needs to come online every year until the end of the decade. Currently, wind energy deployment targets are not being met.

TABLE 3.2.4 WIND ENERGY ANNUAL AND CUMULATIVE INSTALLATIONS AND NREAP TARGETS 2007- 2011 (MW)

	2007	2008	2009	2010	2011
Annual wind installations	4	62	74	94	34
Cumulative wind installations	65	127	201	295	329
NREAP annual installations	-	-	-	63	52
NREAP cumulative installations	-	-	-	330	393

Source: Hungary's NREAP and EWEA

TABLE 3.2.5 MAIN WIND ENERGY DEVELOPERS IN HUNGARY 2009-2011 (MW)

Producer	2009	2010	2011
Iberdrola	50	88	158
Renovalia Energy	24	39	39
Euro Green Energy	-	25	25
Wienstrom	24	24	24
Energy Corp Hungary	24	24	24
MVM Hungarowind	23	23	23
Others	56	72	36
Total	**201**	**295**	**329**

3.2.3 Sites

Hungary has a typical continental climate with seasonal variations in wind speed. The country's geographical location translates into a relatively modest mid-term wind potential of around 1.8 GW. The highest wind speeds are registered along the mountain ranges to the north, exceeding 7 m/s.

The majority of wind farms are located in the north western regions of the country, Gyor-Moson-Sopron, Vas, Veszprém, Komárom-Esztergom and Jasz-Nagykun-Szolnok provinces, which are the most attractive areas in terms of wind potential.

Natura 2000 and nature designated areas cover almost 25% of the country. While wind power producers are not automatically excluded from Natura 2000 protected areas, they are subject to additional environmental impact evaluations. Applications for Natura 2000 permits initially undergo a screening process that determines whether their potential effects on the site warrant further investigation. Projects whose environmental footprint is deemed negligible are granted permits at this point; the rest undergo a secondary evaluation that may result in the permit being granted, refused or subject to mitigation measures. According to the Hungarian Wind Energy Association (HWEA), Natura 2000 and other protected sites pose a significant barrier to investors. Obtaining environmental approvals in the latter can take ten months to a year.

3.2.4 Main wind energy developers

The largest five wind energy developers in Hungary accounted for 82% of total installed capacity in 2011. Of the five biggest companies, only one is a utility (Spain's Iberdrola), the other four are local or foreign independent developers. Nevertheless, the former has almost 48% of the market share.

3.2.5 Supply chain

The majority of installed wind turbines in Hungary are from five major European manufacturers: Gamesa, Vestas, REpower, Enercon and Fuhrländer. Similarly, international companies currently dominate the Hungarian wind energy supply chain.

TABLE 3.2.6 WIND ENERGY SUPPLY CHAIN IN HUNGARY. ACTIVE COMPANIES PER SUB-SECTOR

Wind turbine manufacturers	2nd/3rd tier suppliers	Wind farm developers	Wind farm construction companies	Operation & electricity generation	Maintenance and repairs	Wind farm de-commissioning
Gamesa	Gexpro Services	Iberdrola	Ecowind Constructor	Iberdrola	GES	
Vestas		Renovalia	Iberdrola I&C	Renovalia	Gamesa	
Repower		Acciona	Pannonia Szel	Raiffeisen Zrt.	Vestas	
Enercon		BEVAG	Preciz Kft	Wienstrom	NRG Systems	
Fuhrländer		Hungarian Government		Im Wind		
		MVM Group		MVM Group		
		Gest-Com		SWS Group		

3.2.5 Local labour market

Between 2008 and 2011, 33,000 to 39,000 people were employed in the production and distribution of electricity, steam, gas, water and in the heating and cooling sector. Their average monthly gross earnings were €1,131 in 2011, 60% above the average earnings for the Hungarian private sector as a whole (€708).

Several private and public organisations such as Vincotte Academy, Oktav Training Center, La Vision Studio and European House Adult Education and Training Centre offer training courses on renewable energy. State owned institutions, such as the Budapest University of Technology and Economics (BME), Corvinus and St. Stephen universities also offer courses on renewables.

3.2.6 Support mechanism

In 2007 Hungary adopted an electricity act outlining the regulatory framework for renewable energy sources and introducing a feed-in tariff support scheme. To qualify for the tariff, for projects less than 50 MW, wind energy developers submit an application for an electricity generation license to the Hungarian Energy Office (HEO). The latter determines the amount of electricity eligible for support and the duration of the power purchase agreement. Renewable energy producers apply to the market regulator, specifying any financial support that they already receive, or intend to apply for. The duration of the tariff is calculated on the payback period of the investment, taking into account the site's location, the least-cost principle, the most advanced technology available, the size of the farm and the applicant's financing options. In 2009 a reverse tender system for a capped amount of grid capacity was introduced. A first tender was launched, and subsequently cancelled.

At the time of going to print, changes to the feed-in tariff scheme were being discussed and a new law, METAR, was being drafted. METAR is expected to adjust the current tariffs and categories to which they apply and introduce a fixed 15 year duration. The new scheme is likely to differentiate between small wind farms between 5 MW and 25 MW and larger projects and between wind farms with or without balancing systems.

The grid operator, MAVIR, has a balancing system, renewable energy producers are required to pay a surcharge of 5 HUF/kWh (0.018 EUR/kWh) in case production falls below or exceeds the forecasted quantities by 30%. Wind producers may be exempt from balancing responsibilities for up to six months from grid connection.

3.2.7 Regulatory framework

Key agencies and institutions

The HEO is responsible for supervising and regulating the energy market. HEO also manages the support scheme, issues licenses for renewable energy producers and determines the amount of electricity that can benefit from the feed-in tariff system and the duration of power purchase agreements.

MAVIR Zrt. is the transmission system operator (TSO) while the distribution system is operated by six regional distribution companies controlled by E.ON, RWE and EDF.

Key documents

Building permit and licence

The Hungarian construction law offers wind farm developers two options for obtaining building permits. The first involves applying for a preliminary building permit that provides proof of the developer's compliance with relevant regulations. Developers then receive a building permit automatically, if they apply within a year of obtaining the preliminary permit. The second option is a direct application for the construction permit.

Wind farm developers are required to send their application to a special branch of the Hungarian Trade Licensing Office — the Authority for Standardisation and Technological Safety — which issues the permit within 45 working days of receiving the necessary

documentation. The permit can be revoked if building does not commence within two years and the developer has not applied for an extension. The permit may be extended only once and remains valid for a further two years. Prior to commissioning, developers are also required to apply for an operating permit to the building authority within 90 days of finalising building works.

The licence to generate electricity from a wind power plant is issued by the HEO. Licensing procedures differ according to the capacity of the project. Small wind farms with a generation capacity between 0.5 MW and 50 MW undergo a streamlined evaluation process resulting in the issuance of a licence that remains valid for a period determined on a case by case basis. The validity of the licence may be extended. Licences are revoked if developers miss the deadline for starting construction. Larger wind farms follow a two-step procedure that involves obtaining a license for the establishment and a license for operations from the HEO. Both licenses are valid for a specific period and may be extended upon request.

Grid connection

System operators are responsible for grid connection contracts. Renewable energy producers have priority access to the grid, provided the relevant financial and technical requirements are met and the stability of the system is not threatened. However, there are no legal provisions guaranteeing that renewable energy producers receive priority.

To obtain grid connection, developers are required to respond to a two round tender, run by the HEO. The first round assesses whether the requirements for participation are met and the second evaluates the technical details of the project. The last tender for 410 MW of connection capacity was launched in 2009, but was subsequently cancelled by the authorities.

Wind farms are eligible for a 50% discount in transmission tariffs. The discount is, however, factored into the feed-in calculation.

3.2.8 Opportunities and challenges

Hungary has a mid-term wind potential of around 1.8 GW. While the energy regulator has constrained the pace of development, Hungary continues to attract investment. In May 2012, the Ernst & Young renewable energy attractiveness indices[29] ranked it the 38th most suitable location for wind power projects.

Official permitting lead times are relatively short, even though many authorities are involved. However, official deadlines for issuing permits are, in practice, often overshot. Many developers consider procedural delays in obtaining environmental approvals and grid connections significant hurdles in the permitting process. According to the Hungarian Wind Energy Association (HWEA), environmental licenses are rarely issued within the designated period of one to three months, typically requiring 10 to 12 months and in some cases even two years. Similarly, grid connections that officially require six to 12 months may take up to two years.

Nevertheless, according to the industry the biggest barrier to wind farm development in Hungary is the authorities' lack of ambition and their modest renewable energy targets, despite the country's resource.

Uncertainty over new grid capacity remains a concern. The last successful round of permitting took place in 2006 and resulted in the approval of 330 MW of connection capacity, which was exhausted by mid-2011. A call for tender was launched in 2009 but was cancelled as, according to the authorities, it did not lead to the desired reduction in feed-in tariffs. Additional capacity was not made available before the new renewable energy law (METAR) came into force in early 2013. However, the uncertainty created by these changes is a barrier to investment. Speculation over METAR reducing the feed-in tariff to unworkable levels is blocking wind energy development.

[29] Ernst & Young renewable energy attractiveness, May 2012 (http://www.ey.com/Publication/vwLUAssets/Renewable_energy_country_attractiveness_indices_-_Issue_33/$FILE/EY_RECAI_issue_33.pdf)

Unlike most other countries in the region, transmission grid infrastructure limitations are not a major concern in Hungary at present. According to the transmission system operator (TSO), the 2020 NREAP targets can be met without further grid development. However, the most financially feasible connection points have, for the most part, been occupied. The costs of connections to the high voltage network — which is in a relatively good state — are prohibitive. This pushes developers to look for points along the medium and low voltage lines, where grid reinforcement is still needed. Some of the most attractive connection points have been secured by speculators, pushing many legitimate developers to less viable points. Under national legislation, system operators are under no obligation to reinforce the electricity grid, further exacerbating the lack of viable connection points.

Since 2006, wind power projects have not been eligible for investment subsidies via the Environmental and Energy Operative Programme (KEOP) or other programmes. Nevertheless, wind farms can secure funds from international financing institutions and foreign and domestic commercial banks.

TABLE 3.2.7 OPPORTUNITIES AND CHALLENGES FOR WIND ENERGY DEVELOPMENT IN HUNGARY

Wind assessment, land acquisition, environment and permits

Opportunities	Challenges
Ease and low cost of acquiring land	Delays in obtaining environmental and grid connection permits
	Some complications in Natura 2000 areas

Grid capacity, connection and wind farm operations

Opportunities	Challenges
Reduction of grid connection fees	Uncertainties over grid capacity roll out
Uncertainties over grid capacity roll out	Unpredictable legal framework
	Virtual saturation of financially attractive grid connection points
	Lack of obligation for TSO and DSOs to reinforce/expand the grid

3.3 Poland

Main findings

Power market overview

- ☹ The Polish electricity sector is dominated by four vertically integrated companies.
- ☹ Thermal power accounts for 97% of generation.

Wind energy in Poland

- ☺ Poland is the biggest wind energy market of the new EU Member States and has substantial potential.
- ☺ Wind energy is currently growing faster than the trajectory set out in the NREAP.
- ☹ Uncertainty over revisions to the renewable energy law and support scheme have destabilised the market.

Supply chain

- 😐 Five large developers account for almost half of all installed wind energy capacity. Foreign utilities have a strong presence in the Polish wind energy market.
- ☺ There are numerous players in the supply chain. Local labour force is growing and appropriate training courses are being launched.

Financing

- ☺ Numerous banks, IFIs and multilaterals finance wind energy in Poland.

Sites

- ☹ Many ideal wind farm locations are in protected areas, resulting in a large number of application refusals.

Regulatory framework

- ☹ There can be long delays in obtaining building permits.
- ☹ Procedures to obtain grid connection are unclear.

TABLE 3.3.1 TOTAL ELECTRICITY GENERATION BY TYPE 2007–2011 (TWH)

Types of energy	2007	2008	2009	2010	2011
Renewable	0.4	0.7	0.8	1.3	2.8
Hydro	2.7	2.5	2.8	3.3	2.5
Nuclear	0.0	0.0	0.0	0.0	0.0
Conventional thermal	156.4	152.4	147.3	151.8	157.8
Total	**159.5**	**155.6**	**150.9**	**156.3**	**163.2**
% renewables	**0.3%**	**0.4%**	**0.5%**	**0.8%**	**1.7%**

Source: PSE annual reports

3.3.1 Power market overview

The Polish electricity generation sector is controlled by four vertically integrated companies, the largest of which is state owned. Due to the significant domestic reserves of coal and lignite, the vast majority of production is derived from conventional thermal sources. Thermal power accounted for 96.7% of the total electricity produced in 2011, followed by renewables, excluding hydro, with 1.7%. Hydro generation decreased by 26% over the course of 2011 to reach 1.5% of total electricity production.

In 2011 total electricity production increased by 4% reaching around 163 TWh. Electricity generation declined by 2.7% in both 2007 and 2008, despite a 0.6% increase in installed generating capacity. Generation resumed positive growth in the following years. These fluctuations are largely explained by the decrease in demand during the economic downturn.

Domestic electricity consumption increased at a compound annual growth rate (CAGR) of 1% between 2007 and 2010. It is expected to rise further in line with economic growth expectations and increases in population and electrical equipment usage.

Households are the third largest consumers of electricity, accounting for 19.8% of total demand in 2010. Household consumption increased by 9% in just four years between 2007 and 2010. Businesses account for the remaining demand. The latter is concentrated in five major sectors: industry (29.2% of total consumption in 2010), energy sector (18%), transport (3.2%), agriculture (1.1%) and other consumers (28.7%).

Electricity demand from businesses declined by 6% in 2009 with the contraction of industry. However demand picked up in 2010 and is expected to increase over the coming years.

FIGURE 3.3.1 SHARE OF ELECTRICITY GENERATION BY TYPE IN 2007-2011

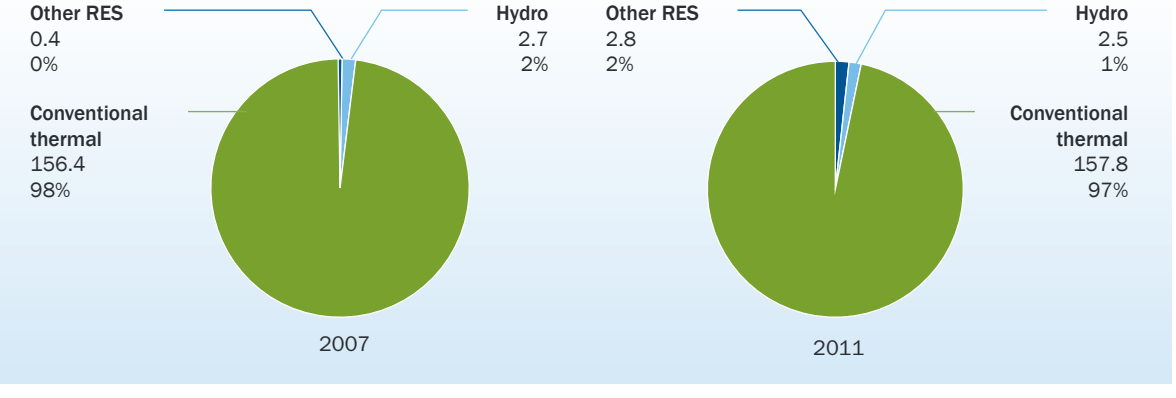


TABLE 3.3.2 ANNUAL EXPORTED ELECTRICITY 2007–2011 (TWH)

	2007	2008	2009	2010	2011
Annual electricity exports	13.1	9.7	9.6	7.7	12.0

Source: ENTSO-E

TABLE 3.3.3 CUMULATIVE INSTALLED CAPACITY 2007–2012 (ESTIMATE) (GW)

	2007	2008	2009	2010	2011	2012*
Cumulative installed capacity	35.1	35.3	35.6	35.8	37.4	38.7*

* Estimate

Source: PSE Operator SA

While domestic consumers pay around 8.1% less for electricity than the EU-27 average industrial consumers pay 2.5% above average. In 2011, the average electricity price for households and businesses reached €147/MWh and €125/MWh, respectively.

Electricity is traded on different markets: the over-the-counter bilateral contracts; the power exchange PolPx including the day ahead, intraday and green certificate markets; the balancing market and the cross-border capacity market. Poland's transmission system is interconnected with most of its neighbouring countries, including Sweden, Belarus, Ukraine, Slovakia, the Czech Republic and Germany, through different kV lines. The transmission network is a monopoly operated by PSE Operator SA, a state owned company.

Poland has traditionally been a net exporter of electricity owing to its coal reserves. In 2007, exports reached a peak of approximately 13 TWh. They subsequently dropped to a low of 7.7 TWh as export markets contracted, but exports picked up in 2011 and are expected to continue growing.

Cumulative installed generation capacity increased at a compound annual growth rate (CAGR) of 1.6% from 2007-2011 and is expected to increase further, mainly driven by investments in wind and other renewable energy projects.

3.3.2 Wind energy in Poland

The substantial potential for wind energy in Poland has attracted investment from local and foreign companies. Poland has the most mature wind market in the central and eastern European region. Cumulative wind energy capacity increased by 37% in 2011 reaching 1,616 MW. An additional 600 MW were installed during the first half of 2012.

Poland's National Renewable Energy Action Plan (NREAP) indicates that cumulative wind capacity should increase by an average of 500 MW per year, to reach 6,650 MW in 2020. The authorities also expect 500 MW of installed offshore capacity before the end of the decade. In both 2010 and 2011, wind energy deployment outperformed the NREAP's forecasts.

However, uncertainty over revisions to renewable energy regulations that came into force in 2013, could slow down wind energy deployment. Investors in wind energy made an effort to complete projects during 2012 in order to benefit from the current framework and they postponed future investments. This would explain the boom in grid connections in early 2012.

TABLE 3.3.4 CUMULATIVE WIND INSTALLED CAPACITY, 2007-2011, AND NREAP OBJECTIVES (MW)

	2007	2008	2009	2010	2011
NREAP	n/a	n/a	n/a	1,100	1,550
Actual capacity	288	451	725	1,180	1,616
% difference	-	-	-	+7.3%	+4.3%

Source: PSE Operator, Polish National Renewable Energy Action Plan

3.3.3 Sites

Poland has a mixed climate with oceanic and temperate influences and significant annual variations in wind speed. The most attractive areas for wind farms are situated along the Baltic Sea coast and the mountainous regions in the south (Lubuskie, West, Warmian-Masurian, Podlasie and the Carpathians), where wind speeds reach up to 10 m/s. Most of the country's large wind farms are located in these regions.

Natura 2000 protected areas cover approximately 32% of the country and their concentration is greatest in the regions with the highest wind potential, acting as a barrier to the installation of wind farms. While wind power producers are not automatically excluded from Natura 2000 protected areas, they are subject to additional environmental impact evaluations which can result in refusals. Applications for Natura 2000 permits initially undergo a screening process that determines whether their potential effects on the respective sites warrant further investigation. Projects whose environmental impact is deemed negligible are granted permits at this point; the rest undergo a second evaluation that may result in the permit being granted, refused or subject to mitigation measures. The development of wind power projects is difficult, if not impossible within and around Natura 2000 protected areas in Poland. Projects have been refused licenses or delayed substantially on environmental grounds.

3.3.4 Main wind energy developers

The largest five wind energy developers accounted for 46% of cumulative installed capacity in 2011. Of the five biggest developers, four are foreign utilities.

TABLE 3.3.5 KEY MARKET PLAYERS BY INSTALLED CAPACITY 2009-2011 (MW)

Producer	2009	2010	2011	2011 Market share
EDPR	20.0	120.0	190.0	11.8%
Iberdrola	147.0*	160.5	184.5	11.4%
Vortex	-	66.0	144.0	8.9%
DONG	30.5	111.5	111.5	6.9%
RWE Innogy	41.4	41.4	108.5	6.7%
Others	485.8	680.9	877.9	54.3%
Total	**724.7**	**1180.3**	**1616.4**	

* Estimate based on unofficial market data

Source: PwC

3.3.5 Supply chain

The Polish supply chain is characterised by a large number of companies that offer integrated services, including the design, construction, operation and maintenance of wind farms. While domestic manufacturing of wind turbines is still in its infancy, companies are increasingly expanding into component manufacturing. A 2010 study[30] by the Polish Wind Energy Association (PWEA) identified 29 essential component manufacturers and 14 producers of non-specialised components established in the local market. The majority were subsidiaries of multinational or foreign companies.

In addition, an estimated 125 firms were producing or importing systems, parts and turbines for small wind farms. The traditional smelting and steel industries offer the most favourable conditions for the development of component manufacturing. The Baltic shipyards such as Gdansk and steel companies have already expanded into the manufacturing business. According to PWEA, such companies could capture a substantial share of the components supply for future offshore installations.

Eight major international turbine manufacturers supply the majority of Polish wind farms: Vestas, Gamesa, GE Energy, Enercon, Fuhrländer, Nordex, REpower, Siemens.

TABLE 3.3.6 WIND INDUSTRY SUPPLY CHAIN IN POLAND

Wind turbine manufacturers	2nd/3rd tier suppliers	Wind farm developers	Wind farm construction companies	Operation & electricity generation	Maintenance and repairs	Wind farm de-commissioning
Vestas	KK Electronics	Silownie Wiatrowe	Green Energy Solutions	Iberdrola	Green Energy Solutions	Global Wind Service
Gamesa	ABB	Martifer	Greentech Energy Syst.	EDP Renovais	Greentech Energy Syst.	
GE	LM Wind Power	Green Bear Corporation	Green Bear Corporation	Vortex Energy	EWG Wind Energy	
Enercon	Euros	Gamesa	EDA Wind	RWE Innogy	Siemens	
Fuhrländer	Gdynia shipyard	Vortex Energy	Eneria	Mitsui / J-Power	Nordex	
Siemens	Alushipp Technology	Iberdrola	Enerco	DONG Energy Power A/S	Vestas	
Nordex	GSG Towers	EPA	Windstrom Polska	Infusion Polska	Windhunter Serwis	
Repower	Promotech	Polish Energy Partners	Sevinon	DONG Energy Power A/S		

[30] Instytut Energetyki Odnawialnej, "Analiza Mozliwosci rozwoju produkcji urzadzen dla energetyki odnawialnej w polsce dla potrzeb krajowych i eksportu", 2010

TABLE 3.3.7 ELECTRICITY, GAS, STEAM AND AIR CONDITIONING SUPPLY EMPLOYMENT 2008–2011 (FIGURES IN THOUSANDS)

Energy sector	2008	2009	2010	2011
Number of employees	173.3	188.5	181.6	177.7

3.3.6 Local labour market

Between 2008 and 2011, on average, 180,000 people were employed in the production and distribution of electricity, steam, gas, water and air conditioning. During this period annual variations in employment in this sector were below 9%.

Direct employment in the Polish wind sector was estimated at 800 full time equivalents in 2008[31]. According to PWEA, the total number of direct and indirect jobs created by the end of 2011 reached 2,000. Unofficial market data suggest that average monthly gross earnings in the sector are approximately €1,500, 70% above the national economy wide average (€880).

Several private and public organisations such as Energia Odnawialna and the Association for Renewable Energy offer courses on renewable energy. State owned institutions, such as the technical universities of Silesia, Warsaw and Wroclaw and the Warsaw University of Life Sciences have included courses on renewable resources in their curricula and undertake R&D activities in the sector.

3.3.7 Financing

A number of domestic and international banks offer loans for wind investments, including EBRD, EIB, Bank Zachodni WBK, Bank Ochrony Środowisko (BOS), ING Bank Slaski, Raiffeisen Bank and Unicredit/Pekao. The average gearing rate for wind projects is 3:4 and the typical loan is 13-14 years. In order to mitigate risk, banks require energy yield studies performed by recognised technical advisors who are capable of providing duty of care[32] arrangements and soft mini-perms[33] in the form of margin increases or cash sweeps.

Capital can also be raised through the stock market (PolPx) and equity funds such as EnerCap Capital Partners, Fusion Invest and Taiga Mistral. Additionally, turbine manufacturers such as Gamesa are increasingly willing to provide buyers with more flexible contractual terms that constitute a form of financing. The range of non-standard financing options is likely to expand to include partnerships with utilities and large business consumers seeking to compensate for the environmental impact of their operations.

The National Environmental Protection and Water Management Fund (NFOŚiGW) is expected to resume preferential funding for small wind projects (<10 MW). Previously, the fund awarded loans ranging from €1m to €12m and covered up to 75% of eligible expenditure per projects. The loan programme offered financing for the preparatory phase, the purchase of real estate, fixed and intangible assets, the acquisition of knowhow – whether technological, managerial or organisational – the payment of investment supervision services, installation and commissioning costs. The loan could be written off upon request from the investor.

NFOŚiGW has announced plans to renew its funding programme for the expansion and modernisation of the electricity grid to connect wind farms. Under the programme, both investors and system operators with projects exceeding €1.95m will be eligible for subsidies of €48,600 per MW connected, covering up to 40% of eligible costs. These include the costs directly related to upgrades and network additions, the purchase of fixed assets and materials, manufacturing, installation, commissioning and construction costs.

[31] Wind energy the facts, 2009. www.windfacts.eu

[32] Duty of care means that the advisors are liable to banks up to a certain amount, if it is determined that their work led the banks to make an incorrect decision about the debt capacity of the borrower

[33] Soft mini-perms are stipulations in a credit agreement that incentivise the borrower to refinance the debt before its maturity. The most common soft mini-perms are margin increases and cash sweeps. Cash sweep is an acceleration of debt repayments when extra cash is available. They reduce cash available for distribution to investors

3.3.8 Support scheme

In 2005 Poland launched a support scheme combining a trading mechanism for green certificates with mandatory quotas for companies generating or selling electricity.

The energy law adopted in 2005 provides wind power with one certificate per MWh fed into the grid. The certificates are issued by the energy regulator based on the volume of electricity produced, calculated by the system operator. Wind power investors can mitigate green certificate price risks by concluding long term purchase agreements of 10 or more years. The agreements can be structured as fixed price contracts or contain only price floors. By lowering price risk, this type of agreement helps investors to secure bank financing. Green certificates may also be traded on the Polish Power Exchange.

Energy companies choose between acquiring green certificates and paying a substitution fee set by Energy Regulatory Office (URE), in order to fill their quota. This is currently set at 10.4%. The substitution fee, which constitutes the upper limit for green certificate prices, is based on a predetermined formula and indexed annually for inflation. The fee reached 274.92 PLN/MWh (€62/MWh) in 2011.

In addition to the income generated by trading certificates, renewable energy producers sell all their energy to the system operators at a fixed price. URE revises the price annually based on the average value of electricity traded on the wholesale market during the previous year. In 2011, the regulated price was 195 PLN (€47.19). Renewable energy producers are exempt from paying excise duty.

However, at the end of 2012 there was the uncertainty about the revision to the renewable energy law. Various drafts have sent negative signals to investors. Among possible changes, the elimination of indexation of the substitution fee, a reduction in the number of years for which wind farms are eligible for green certificates, and exclusion from the support mechanism for wind farms that sell energy at market prices, were considered.

It is feared that the introduction of such provisions will lead to increased price risk and reduce revenues over the project lifecycle, reducing the attractiveness of wind farm investment to financiers. However, developers could benefit from the introduction of a mechanism balancing out the current excess of green certificates in the market. Lack of progress towards meeting the NREAP targets could warrant corrective action on the purchase obligation, driving up the price of the certificates.

3.3.9 Regulatory framework

Key agencies and institutions

The URE[34] is the administrative body that oversees the gas, district heating and electricity sectors in Poland. URE manages the renewable energy incentive schemes, issuing licenses for electricity production and green certificates. Their reference value is determined indirectly through the substitution fee.

PSE Operator SA is a state owned company that acts as a secondary regulating body for the energy sector and the transmission system operator (TSO). PSE is primarily responsible for the operation, maintenance and development of the national electricity grid, the establishment of the infrastructure for the wholesale market and for balancing electricity supply and demand.

The local distribution systems are operated, maintained and developed by 64 companies.

TABLE 3.3.8 MANDATORY QUOTAS FOR ENERGY COMPANIES AND SUBSTITUTION FEES FOR WIND ENERGY

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Mandatory quota	7.0%	8.7%	10.4%	10.4%	10.4%	10.9%	11.4%	11.9%	12.4%	12.9%
Substitution fee (€)	59.8	62.3	64.5	62	-	-	-	-	-	-

Source: OkO Institut

[34] URE establishes and monitors the regulatory framework for energy companies, issues permits and licenses, sets tariffs, approves network development plans, grid codes, and deters unlawful competition.

Key documents

Building permit and licence

Building permits are issued by local authorities within 65 days of receiving all the mandatory documents. These include proof of the right to use the land for construction, copies of the wind farm design and terms of the connection agreement. Once granted, the building permit may only be revoked if construction does not proceed within three years (or is halted for more than three years).

The licence to generate electricity from a wind power plant is issued by URE on receipt of proof that the applicant meets the legal, financial, organisational and technical prerequisites and on the payment of a stamp fee. The licence is granted for a fixed term, a maximum of 50 years and a minimum of 10, unless the application is made specifically for a shorter period. Licence holders are required to pay an annual contribution to the central state budget.

Grid connection

In order to connect a wind farm to the public grid, project developers must submit an application to the transmission or distribution system operator and pay an advance fee of 30 PLN per kilowatt (€7.26/kW) of capacity. This is capped at 3m PLN (€726,818/kW, for connections exceeding 1 kV). Connection terms are issued within 150 days for applicants whose rated voltage is above 1 kV. The connection terms oblige system operators to sign a connection agreement within two years.

Since January 2011, grid infrastructure modernisation and upgrading costs have not been charged to generators. Consequently, the transmission system operator can no longer retroactively modify the terms of connection agreements to take into account changes to its development plans. However, wind farm developers are required to disclose proprietary information, such as control software, in order to enable the grid operator to prepare long term development plans.

3.3.10 Opportunities and challenges

Poland has one of the largest and fastest growing wind sectors in Europe and substantial generation potential estimated at 3,682 TWh by 2030. In May 2012, the Ernst & Young renewable energy attractiveness indices[35] ranked it the 10th most suitable location for wind power projects in the world. Uncertainty over the revision of the support mechanism could, however, negatively impact the country's attractiveness for wind energy investors.

Building a wind farm takes four to seven years of which the first five years tend to be dedicated to the pre-construction phase. Delays are due to the lack of clarity of local laws and lengthy environmental protection procedures stemming from imprecise definition of the requirements, the lack of a uniform methodology for impact assessments and lengthy public consultations.

Other legislation can reduce security for investors. For example, fiscal rules leave room for interpretation over property tax and the treatment of assets for depreciation. As a result, frequent revisions and amendments are made. The instability of the legal climate and lack of clarity over policy is clearly an important hurdle in Poland.

Finally, grid infrastructure and grid connection can slow or halt wind farm deployment. From a procedural perspective, the lack of transparency and inadequacy of grid connection terms is problematic. System operators often create complications by requesting cumbersome supplementary documentation or disputing approvals and permits. An estimated 1,300 applications for a cumulative installed capacity of over 9,700 MW were refused during 2009 and 2010.

Grid infrastructure has insufficient capacity and cannot keep up with the growing demand for connection permits. There is a high recurrence of shortages and losses in the transmission and distribution systems and industry sources suggest that current infrastructure cannot meet the 2020 renewable energy targets. As a temporary solution the possibility of reserving capacity

[35] Ernst & Young renewable energy attractiveness, May 2012 (http://www.ey.com/Publication/vwLUAssets/Renewable_energy_country_attractiveness_indices_-_Issue_33/$FILE/EY_RECAI_issue_33.pdf)

has been limited. Consequently, many investors prefer to acquire or partner with local developers with ready-to-build projects with a grid connection, rather than develop a project from scratch. It is estimated that €14.6bn is required to upgrade the power infrastructure, suggesting that grid connection applications will be increasingly scrutinised in the coming years.

TABLE 3.3.9 OPPORTUNITIES AND CHALLENGES BY PROJECT STAGES

Wind assessment, land acquisition, environment and permits

Opportunities	Challenges
Access to state aid and additional EU programme funding for land acquisition costs and intangible assets i.e. patents, licences	Relatively lengthy process of obtaining building permit
Land purchase and ownership rights for foreign investors	The existence and constant expansion of Natura 2000 protected areas (many of which are located within the regions with the highest winds speeds)
Reduced costs relating to the acquisition of land plots as compared to EU average	Lengthy and complex environmental approval procedures
	Local “on the ground” presence needed (joint ventures with local partners) to win public support
	Environmental rules (except Natura 2000) tend to be less stringent than IFC guidelines

Grid capacity, connection and wind farm operations

Opportunities	Challenges
Wind farms no longer required to contribute to infrastructure upgrades	Outdated and insufficient grid infrastructure
Connection agreements no longer subject to modifications by the system operator	Lack of transparency over decisions concerning grid connections
	Insufficient access to information on the availability of connection capacities and the companies applying for connections to the public grid
	Limited number of situations in which applicants can reclaim the payment made in advance for connection to the grid
	Various connection fees required by system companies for upgrades to the transmission system

3.4 Romania

Main findings

Power market overview

☺ Electricity generation capacity is expected to grow, mainly driven by renewables, of which 70% is wind energy.

Wind energy in Romania

☺ There has been spectacular growth in wind energy capacity over the past couple of years in Romania.

☺ Wind energy is currently growing faster than the trajectory set out in its NREAP.

☺ The Romanian support scheme for wind energy is relatively robust.

Supply chain

😐 Five large developers accounted for 95% of installed wind energy capacity at end 2011. Foreign utilities are prominent in the Romanian wind energy market.

☺ There are numerous Romanian or locally based companies throughout the wind energy supply chain. It is estimated that there are 6,000 direct jobs in the wind energy sector.

☹ The Romanian wind energy sector still lacks domestic skilled labour.

Finance

☺ Numerous banks, IFIs and multilaterals finance wind energy in Romania, but under stricter conditions than in most EU Member States.

Regulatory framework

☹ Permitting procedures can be long and complex. Around 85 permits can be required for a wind farm.

Opportunities and challenges

☹ Grid capacity could become a limiting issue for wind energy in the near future.

TABLE 3.4.1 TOTAL ELECTRICITY GENERATION BY TYPE 2007–2012 ESTIMATE (TWH)

	2007		2008		2009		2010		2011		2012*	
	TWh	%	TWh	%	TWh	%	TWh	%	TWh	%	TWh	%
Conventional thermal	37.2	61.5%	36	56.3%	29.7	52.4%	27.6	46.7%	33.3	53.9%	32.9	51.5%
Nuclear	7.6	12.6%	11.1	17.3%	11.6	20.5%	11.6	19.6%	11.7	18.9%	11.1	17.4%
Hydro	15.7	26%	16.9	26.4%	15.4	27.2%	19.5	33%	15.0	24.3%	16.1	25.2%
Other renewables	-	0%	-	0%	-	0%	0.4	0.1%	1.7	2.8%	3.8	5.6%
Total	**60.5**		**64.0**		**56.7**		**59.1**		**61.8**		**63.9**	

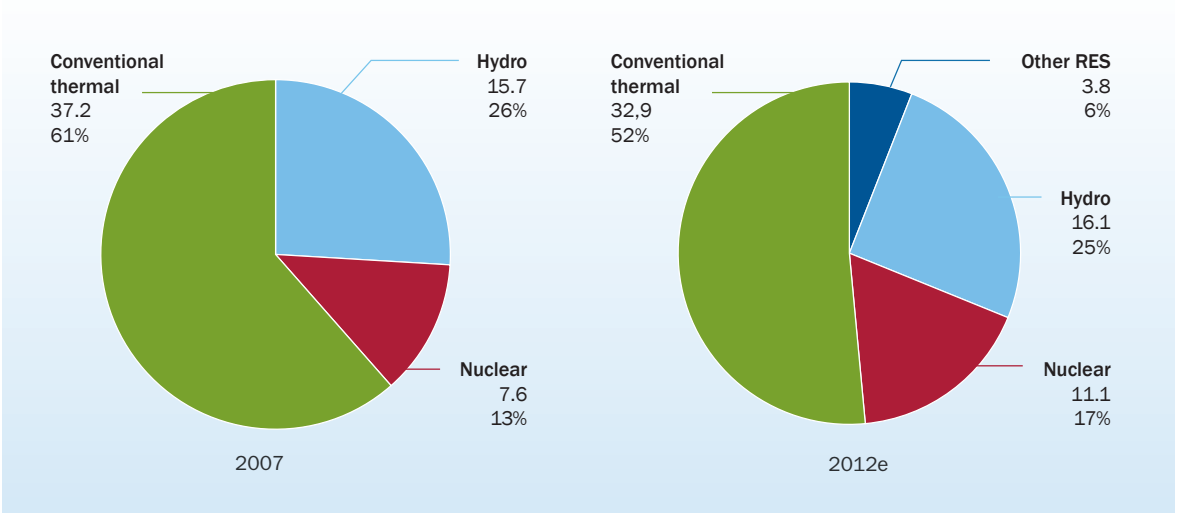
Source: ANRE

* Estimate

3.4.1 Power market overview

The Romanian power market is mainly state owned and dominated by conventional thermal sources, which accounted for 54% of production in 2011, followed by hydro power with 24% and nuclear with 19%. The energy generated from renewable sources other than hydro accounted for approximately 3% of total electricity generation in 2011. It is estimated that by the end of 2012, over 30% of electricity generated in Romania would be from renewables, of which 25% hydro and between 5% and 6% other renewable energy sources, mainly wind energy.

FIGURE 3.4.1 SHARE OF ELECTRICITY GENERATION BY TYPE 2007 AND 2012 ESTIMATE (TWH)



In 2011 electricity generation increased by 5% compared to the previous year, reaching around 62 TWh. Electricity generation declined by 0.7% per year from 2007-2010, despite an increase in installed capacity of 1.4% per year. The downward trend reflected a decrease in demand, mainly from the industrial sector.

The main increase in generation is expected to come from renewables. Since 2007 hydro and other renewable sources have increased their share of the electricity generation mix by 5%, whereas conventional thermal declined by 10%. Although nuclear's share of the generation mix has increased by just under 5% since 2007, it has been declining since 2010.

Household electricity consumption trends have been different. In recent years, consumption rose as a result of strong economic growth, with higher levels of employment and rising incomes boosting demand for household appliances.

Electricity demand in Romania is expected to rise as a result of economic growth and continued improvements in living standards.

In the long term, household consumption is likely to remain stable. Even though several factors, including an improving quality of life, might continue to sustain electricity consumption, others will probably offset these factors: negative demographics, higher electricity prices and more efficient household appliances.

Industrial sector consumption is concentrated in five major industries and is highly correlated with economic growth. After several years of growth, industrial consumption suffered a sharp decline of around 12% in 2009, mainly driven by the decline of the metallurgical industry.

Romanian electricity prices are lower than the EU-27 average for both households (approximately 30%) and industrial consumers (approximately 13%). In 2011, the average household electricity price reached €112/MWh with energy cost acquisition accounting for about 35%.

Generated energy is traded on different markets (centralised market for negotiated bilateral contracts and for regulated bilateral contracts, day ahead market, balancing market, electricity ring) with Opcom acting as an administrator.

Romania's transmission system is currently interconnected with all its neighbouring countries. The transmission network is a monopoly, operated by Transelectrica, a state owned company.

Over the past five years, exports were highest in 2008 (5.4 TWh). Generally, however, annual exports are around 3 to 4 TWh and they are likely to stay within this range until 2013, representing 5%-6% of electricity generated.

TABLE 3.4.2 TOTAL ELECTRICITY NET CONSUMPTION BY SEGMENT 2007–2012 ESTIMATE (TWH)

Type of consumer	2007	2008	2009	2010	2011	2012*	
Household consumers	10.4	10.4	11.0	11.2	11.8	12.0	(22%)
Industrial consumers	42.6	44.2	38.9	40.8	40.7	41.8	(78%)

* Estimate

Source: ANRE, INSSE

TABLE 3.4.3 ANNUAL EXPORTED ELECTRICITY 2007–2012 ESTIMATE (TWH)

	2007	2008	2009	2010	2011	2012*
Annual exported electricity	3.4	5.4	3.2	3.9	3.1	4.0

* Estimate

Source: ANRE, INSSE

TABLE 3.4.4 CUMULATIVE INSTALLED CAPACITY, 2007–2012 ESTIMATE (GW)

	2007	2008	2009	2010	2011	2012*
Installed capacity all technologies	20.0	20.6	20.4	20.9	21.3	21.3
Wind energy capacity	0.01	0.02	0.03	0.4	0.9	2.1
Share of wind capacity	0.05%	0.09%	0.1%	2%	4.2%	9.9%

* Estimate

Source: ANRE, National Commission of prognosis, Energy Strategy Draft 2035, CEE and SEE Renewable Report – Romania (IntelliNews), EU Energy Trends 2030 (EU Commission, DG Energy) and EWEA.

Installed generating capacity has increased in recent years (+6% from 2007-2011) and is expected to increase further, mainly driven by public investment in hydro energy and private investment in other renewables. At the end of 2012 wind capacity reached around 10% of total installed generating capacity, up from just 0.05% five years earlier, a 200% increase.

Generation capacity is expected to continue increasing and wind is set to account for more than 70% of all investments in renewables.

As most of the investment in conventional technologies is under state control, this may be affected by lack of public funds and by private partnerships, changes in the political environment and uncertainties in EU environmental policies. These factors pose considerable risks.

3.4.2 Wind energy in Romania

At the end of 2010 installed renewable electricity capacity, excluding large hydro, was 521 MW, of which 401 MW (77%) was wind energy. The wind energy sector in Romania has one of the fastest growth rates in the EU and the country is poised to become one of the leading users of wind power in Europe.

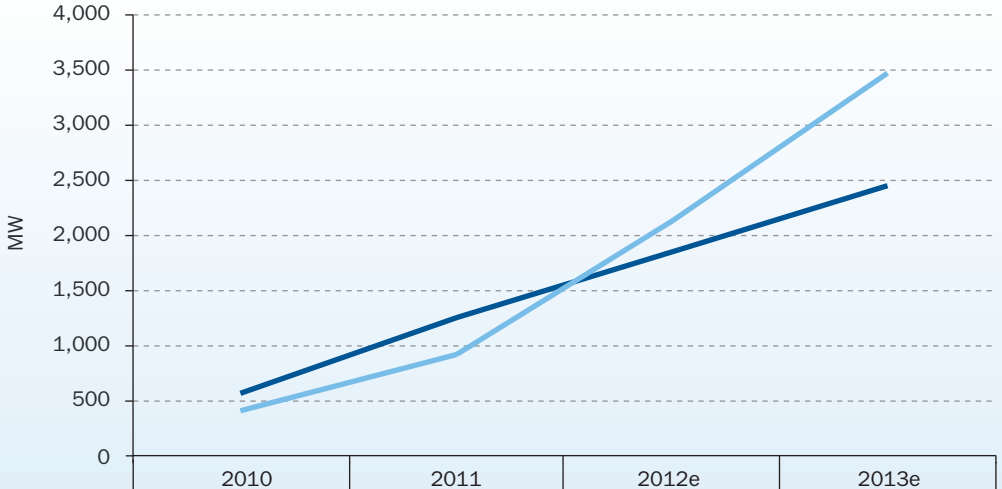
TABLE 3.4.5 CUMULATIVE WIND INSTALLED CAPACITY, 2007-2012 IN MW AND INCREASE ON PREVIOUS YEAR

	2007	2008	2009	2010	2011	2012e
Cumulative installed capacity	10	17	31	401	921	2,121*
Annual increase	-	69%	83%	1,194%	130%	130%

* Romanian Wind Energy Association (RWEA) estimate

Source: EWEA

FIGURE 3.4.2 INSTALLED WIND ENERGY CAPACITY IN ROMANIAN NREAP, ACTUAL AND EXPECTED (MW)



	2010	2011	2012e	2013e
NREAP	560	1,250	1,850	2,450
Actual	401	921	-	-
Expected	-	-	2,121	3,473
Difference	-28%	-26%	+14,6%	+41,8%

A further 1,352 MW of wind energy projects have been announced for 2013. If completed as scheduled, total installed capacity would reach 3,473 MW, over a gigawatt more than expected in the Romanian National Renewable Energy Action Plan (NREAP). In 2010, installed wind capacity was 28% below the NREAP's target.

The NREAP expects renewable electricity, excluding large hydro, to reach 17.6% of gross consumption by 2020 and 15.3% in 2015. If the growth rate of wind power is confirmed, it could meet the 2015 target on its own[36].

3.4.3 Sites

Romania has a mixed climate with temperate and continental influences and seasonal variations in wind speed. The highest wind speeds are along the Carpathian mountains and the Black Sea coast, reaching average annual values up to 8 m/s 100 m above ground.

The majority of wind farms are located in the Dobrogea, Moldova and Banat regions, which have the highest wind potential. Dobrogea is sparsely populated and flat, which makes it ideal for large wind energy projects.

Almost 18% of the country falls under the scope of the Natura 2000 programme and an important share of protected areas are located within the Dobrogea and Banat regions. While wind power producers are not automatically excluded from Natura 2000 protected areas, they are subject to additional environmental impact evaluations that can result in applications being refused.

[36] Calculation based on gross electricity consumption and capacity factor data in the Romanian National Renewable Energy Action Plan

Applications for Natura 2000 permits initially undergo a screening process to determine whether their potential effects on the site warrant further investigation. Projects whose environmental footprint is deemed negligible are granted permits at this point; the rest undergo a secondary evaluation that may result in the permit being granted, refused or subject to mitigation measures.

Records on application approval rates in Natura 2000 areas are not readily available for the majority of Romanian regions, making it difficult to determine whether protected areas are a significant barrier to wind energy deployment. However, there are instances of wind farms obtaining permits in Natura 2000 areas.

3.4.4 Main wind energy developers

TABLE 3.4.6 MAIN WIND ENERGY DEVELOPERS INSTALLED CAPACITY 2011 (MW)

Producer	2011
ČEZ	388
EDP Renewables	228
ENEL	174
Monsson	45
OMV Petrom	45
Others	41
Total	**921**

The largest five wind energy developers accounted for 96% of total installed capacity in 2011. Three of the latter are foreign utilities, one is a national independent developer.

3.4.5 Supply chain

The high value added segments of the Romanian wind energy supply chain tend to be dominated by foreign based companies. Several market players offer integrated services including construction and operation and maintenance services. While there are no domestic turbine manufacturers, the Chinese company United Electric and other investors have announced their interest in setting up operations in Romania. Steel smelting companies and shipyards are well positioned to manufacture components, but currently have limited exposure to projects involving specialised parts such as wind turbines. Electrical equipment, connection work and transport services can, on the other hand, be sourced locally.

In Romania, wind energy investors mainly used turbines from the top ten manufacturers, such as Vestas, GE Energy, Enercon, Siemens and Gamesa.

TABLE 3.4.7 WIND INDUSTRY SUPPLY CHAIN IN ROMANIA. ACTIVE COMPANIES PER SUB-SECTOR

Wind turbine manufacturers	2nd/3rd tier suppliers	Wind farm developers	Wind farm construction companies	Operation & electricity generation	Maintenance and repairs	Wind farm de-commissioning
Vestas	Comelf	Monsson	Wind Turbine Service	CEZ Group	Wind Turbine Service	
GE	Schaeffler	Ventureal	Terra Romania SPV One	EDP Renewables	Wind Power Energy	
Siemens	KLAF Serv	Oxford Sustainable	Elcomex	ENEL	Energobit	
Fuhrländer	Lafarge Group		Electromontaj	Petrom		
Nordex	Somaco Grup Prefabricate		Continental Wind Partner	Monsson		
Suzlon			Martifer Energia			
Enercon			Eraos			
			Energofor			

TABLE 3.4.8 ELECTRICITY, GAS, STEAM AND AIR CONDITIONING SUPPLY EMPLOYMENT 2008–2011 (FIGURES IN THOUSANDS)

	2008	2009	2010	2011
Number of employees	125.2	128.7	125.8	114.7

Source: Eurostat

3.4.6 Local labour market

In 2011 almost 115,000 people worked in the electricity, steam, gas, water and air conditioning sector. This number has not risen during recent years despite the economy's growth, due to industry restructuring and optimisation processes.

The Romanian wind energy sector is expected to attract more than €5bn investment by 2013, creating at least 6,000 jobs.

The average monthly gross earnings of employees in the production and distribution of electricity, steam, gas, water and air conditioning between April 2011 and April 2012 was €906, double the average earnings in Romania in that period (€479).

Several private institutions[37] offer courses on renewable energy. State owned universities, such as the Technical University of Cluj Napoca, Polytechnic University of Timisoara and Bucharest, also teach courses on clean energy, including the construction and maintenance of wind turbines.

3.4.7 Financing

A number of domestic and international banks offer loans for wind energy projects, including UniCredit Leasing Corporation, the Romanian Commercial Bank (BCR), Raiffeisen, EBRD, EIB and IFC. Compared to other countries, projects are subject to stricter bank financing terms due to the higher uncertainty over cash flows. This results from higher unidentified market risk and a lack of project track record to serve as indicator for risk. Capital can also be raised through investment funds such as Clean Energy Development and Enercap.

State aid is available to wind energy investors. It is in the form of non-reimbursable funds covering up to 40% of eligible expenditures for projects located in Bucharest and Ilfov County and 50% in all other cases. The maximum amount awarded per project cannot exceed 30m RON. The programme offers financing for all aspects from technical planning, the purchase of fixed and intangible assets, construction and installation costs, project management, auditing and information related expenses. Both EU and government funded programmes require investors to submit the building permit and a detailed feasibility study with their application. The use of state aid will result in a reduction in revenue from green certificates (a combination of tradable green certificates (TGCs) and investment aid cannot result in a higher internal rate of return than certificates alone).

3.4.8 Support mechanism

In 2005 Romania launched a support mechanism for renewable energy based on green certificates and a quota obligation. Changes were made in 2008[38]. However, the legislation did not come into force until 2012 due to numerous revisions. The uncertainty caused by the delays is one reason why the Romanian wind sector developed more slowly than expected in 2010 and 2011.

Under the new rules, wind energy producers receive two green certificates per MWh up to 2017. From 2018, this is reduced to one certificate. Wind farms receive certificates for 15 years, provided that the turbines used are new. The certificates are issued by the transmission system operator (TSO) based on the amount of energy produced during the previous month.

[37] Such as Ecovolt Group, LP Electric Systems or Phaesun
[38] Act 220/2008 on the promotion system for energy generation from renewable sources

In February 2012 the energy regulator set a floor and cap[39] on green certificate trading prices. On the market, therefore, certificates are traded between 121.89 RON (around €28) and 248.3 RON (around €57.4).

The green certificates are traded on the bilateral contracts market and on the centralised market. These markets run in parallel without any order of priority. Green certificates can be traded solely on the Romanian market, until the national targets set in the renewables law are reached.

In July 2012, two further improvements to the support mechanisms were introduced. Revision of the mechanisms has been postponed to 2015 creating more uncertainty within the market. Secondly, certificate trading takes place quarterly instead of annually, increasing market liquidity.

3.4.9 Regulatory framework

Key agencies and institutions

The National Agency for Energy Regulation (ANRE) is the administrative body responsible for governing the electricity and gas sectors in Romania. The agency issues regulations and ensures the proper functioning of the electricity sector and market in terms of efficiency, competition, transparency and consumer protection. Using the relevant laws, ANRE authorises wind farms, issues licenses to operators, establishes the price range for transacting renewable energy and manages renewable energy incentive schemes.

OPCOM is the electricity market operator in charge of providing the framework for commercial trading on the wholesale electricity market. OPCOM organises, administers and monitors the day ahead market, the centralised market for bilateral contracts, the market for green certificates and the trading platform for greenhouse gas emission certificates.

The Romanian electricity transmission system is operated, maintained and developed by Transelectrica, a state owned company. Transelectrica is responsible for issuing the green certificates and the grid connection permits and contracts, for establishing the grid codes and prices for electricity transmission and developing the infrastructure to support the increase in installed capacity.

Transmission tariffs are established by ANRE and collected by Translectrica and OPCOM. They include distribution and transportation costs, functional services costs and market operator fees. Romania has eight distribution regions, of which five were privatised to three major international players (E.On, Enel, ČEZ, Electrica Transilvania Nord, Electrica Transilvania Sud, and Electrica Muntenia Nord). Distribution tariffs vary according to the region and voltage level. Distribution tariffs currently range from €2/MWh to €5/MWh for high voltage, €6/MWh to €10/MWh for medium and €21/MWh to €33/MWh for low voltage.

Key documents

Building permit and licence

Building permits for wind farms are issued by the local authorities within 30 days of receiving the necessary documents. These include the technical documentation, proof of ownership rights over land and other approvals and permits[40]. The project should comply with the local zoning plan. Amendments to the zoning plan generally require developers to produce a strategic environmental assessment (SEA).

The licence to operate a wind farm is issued by ANRE within 30 days of the submission of documents and the payment of a fee. It is valid for 25 years. Licence holders are required to pay an annual contribution equivalent to 0.08% of their turnover from wind power operations.

Grid connection

Renewable generators have guaranteed access to the grid and priority dispatch. However, the legislation does not provide for sanctions for grid operators if they fail to comply with their obligations. Renewable generators can, however, appeal a negative decision and obtain a final decision within two months. In order to access the public grid, wind farm developers are required to submit an application to Transelectrica

[39] Official Gazette, order No. 4/2012

[40] Depending on the location of the farm these can be urbanism certificate, environmental approval, archaeological approval

(TOS) for a technical connection permit, receive approval and sign a connection agreement. Access may be denied in the event of insufficient grid capacity. The permit is valid for 25 years, if the applicant pays a connection fee (equivalent to the cost of the connection works) and signs the connection agreement with a network operator (within three to six months from the issuance of the permit).

3.4.10 Opportunities and challenges

Romania has, arguably, the most significant wind project pipeline of the newer Member States. The country's substantial wind potential (estimated at 14 GW, according to the Romanian Wind Energy Association) and financial incentives are expected to attract significant investment over the coming years.

In addition to the green certificates, wind power producers can qualify for guarantees of up to 50% of the value of medium and long term loans, accelerated depreciation procedures, tax exemptions/reductions for reinvested profits over the first three years from the start of operations, a 50% reduction in authorisation and permit costs and state budget subsidies for jobs created. Furthermore, authorities are required to provide the road and electric grid infrastructure necessary for the wind energy project. On the other hand, wind farm developers generally end up paying for the full costs of grid connection and necessary grid upgrades.

A wind farm requires approximately 85 permits and licenses. Complex documentation requirements and administrative lead times mean that permitting can take two to three years.

The main barrier to the continued development of wind energy in Romania is a grid infrastructure that appears limited compared to the growing demand for connection permits. The TSO considers that, in its current state, the grid can handle around 2.5 GW to 3 GW of wind capacity[41]. By September 2012, however, technical connection permits have already been signed for 8.8 GW[42] in addition to over 14 GW of connection contracts[43].

The Romanian legislative framework for wind projects is characterised by unpredictability. Laws covering wind power and its associated industrial sectors leave room for interpretation over issues such as the applicability of property tax, the treatment of assets for depreciation purposes and the management of the sale, concession or leasing of plots of land by public authorities. Moreover, legislation is being enforced slowly. The local legislative framework has suffered due to the departure of public sector experts to the better paid private sector. This is not an ideal situation for investors.

Given that the Romanian wind energy sector has developed only recently, local capabilities and resources available to investors are not yet on a par with developed markets. Also, university curricula are not up to date on the latest wind energy sector developments The lack of experience in wind turbine manufacturing and operation and the limited number of specialists require wind project developers to use non local professionals for the highest value added stages of wind farm construction. In most cases investors must train local staff themselves — a significant financial and time commitment.

Nevertheless there are positive trends in the local energy labour market, including the transfer of knowhow from international companies, foreign experts and expatriates to local companies and stakeholders. This is leading to the emergence of local companies across the wind energy value chain.

[41] Transelectrica, Prospectus on the secondary public offering of 10.995.472 shares from the portfolios of M.E.C.M.A. and O.P.S.P.I., 2012
[42] Transelectrica, Avize ATR 2012-Transelectrica, 2012
[43] Transelectrica, Contracte racordare 2012-Transelectrica, 2012

TABLE 3.4.9 OPPORTUNITIES AND CHALLENGES BY PROJECT STAGE

Wind assessment, land acquisition, environment and permits

Opportunities	Challenges
50% reduction in authorisations and permit costs	Incomplete legislation on sale, concession or leasing of land by public authorities and property tax
Land purchase and ownership rights for foreign investors	Lengthy and complicated permitting processes
Reduced costs on the acquisition of land compared to EU average	Expansion of Natura 2000 protected areas in wind energy ideal regions
Access to state aid and additional EU programme funding for land acquisition and intangible assets such as patents and licenses	Time consuming process of application for environmental approval

Grid capacity, connection and wind farm operations

Opportunities	Challenges
Preferential access to the public energy grid	Out-dated grid infrastructure requiring complex and expensive upgrades from public authorities and supplementary investments from wind farm developers
Eligibility for guarantees of up to 50% of the value of medium and long term loans	Lack of transparency grid connection decisions
Tax exemptions/reductions for reinvested profits over a three year period from the start of operations	Excessive number of permits approved by Transelectrica compared to estimated grid capacity
Potential access to state budget subsidies for jobs created	Unpredictable legal framework affecting expected wind farm cash flows

3.5 Turkey

Main findings

Energy sector overview

- ☹ Electricity generation is largely state owned.
- ☺ Renewables account for 25% of electricity generation.
- ☺ Turkey aims to increase electricity from renewables to 30% by 2023.
- ☺ Turkey has one of the fastest growing electricity sectors in the world.

Wind energy in Turkey

- ☺ One of best growth rates for wind capacity in Europe. Wind energy has reached over 2GW of installed capacity and 3.6% of total electricity generating capacity.
- ☺ Significant domestic supply chain, from developers to component manufacturers and construction companies, partially stimulated by local content premiums.
- ☺ Official 20 GW installed capacity target by 2023.
- ☹ Obtaining the full feed-in tariff requires meeting very strict local content rules that can be a bottleneck for development.

Sites

- ☺ Excellent wind resource.

Regulatory framework

- ☺ Siting regulations are less burdensome than in most European countries.
- ☹ Certain local siting regulations require clarification.
- ☺ Certain administrative procedures and access to government lands are eased or discounted.
- ☹ Transmission fees are not transparent.
- ☺ Priority connection.

Opportunities and challenges

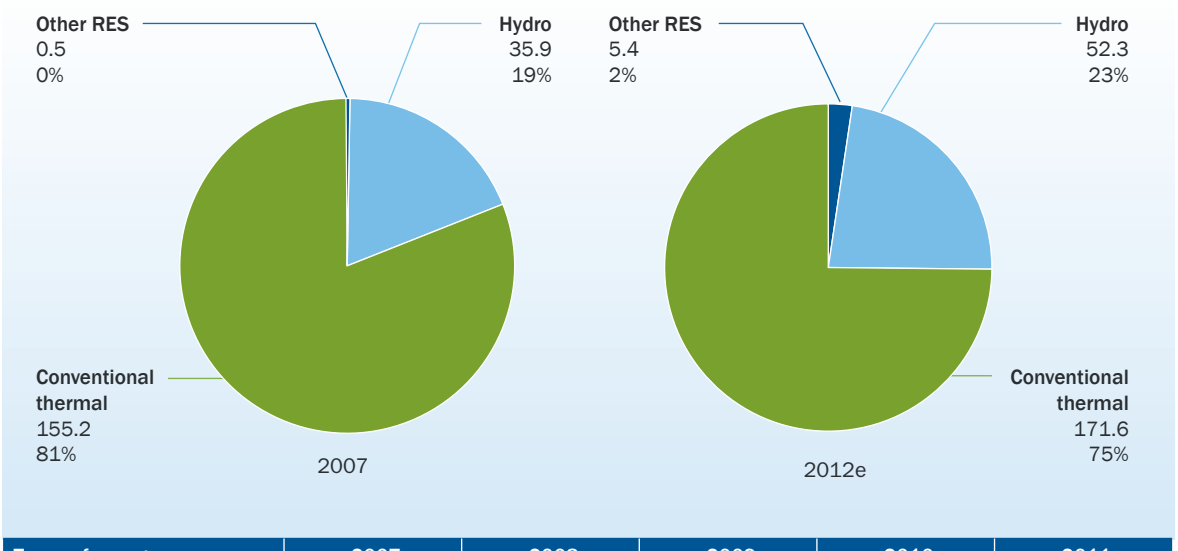
- ☹ Lack of grid capacity, but TSO commitment to develop grid to meet national targets.

3.5.1 Power market overview

Electricity generation is largely in the hands of state owned EÜAŞ and its affiliates. In 2011, the latter controlled 46% of total generating capacity and 40% of electricity production. Conventional thermal fuels are the primary resource in the generation mix representing 74.8% of total production in 2011. Hydro power is second with 22.8%. Generation from other renewable sources increased to 2.4% over the course of the year and is expected to increase further in light of the country's substantial geothermal and wind potential and recent legislative changes. At end 2011, renewables made up 25% of the electricity mix.

In its strategic energy resources plan, Turkey aims to produce 30% of its electricity from renewables by 2023. There are no operational nuclear power plants in Turkey, but the construction of the first plant is scheduled to start in 2014.

FIGURE 3.5.1 TOTAL ELECTRICITY GENERATION BY TYPE 2007-2011 (TWH)



Types of energy	2007	2008	2009	2010	2011
Conventional thermal	155.2	164.1	157.0	155.8	171.6
Hydro	35.9	33.3	36.0	51.8	52.3
Other renewables	0.5	1.0	1.9	3.6	5.4
Total	**191.6**	**198.4**	**194.8**	**211.2**	**229.4**

Source: Teiaş

TABLE 3.5.1 ANNUAL EXPORTED ELECTRICITY 2007–2011 (TWH)

	2007	2008	2009	2010	2011
Annual exported electricity	2.4	1.1	1.5	1.9	3.6

Source: Teiaş

Turkey has one of the fastest growing electricity sectors in the world. In 2011 total production increased by 8.6%, to 229.4 TWh. In terms of historical trends, the total amount of electricity generated declined by 1.8% in 2009 after several years of high growth, resuming its positive trend in 2010 at an average rate of 8.5% per year. The trends in electricity production are largely explained by fluctuations in demand due to the economic downturn.

Electricity prices are lower than the EU-27 average, both for domestic (-24%) and business consumers (-24%). In 2011, the average electricity price for households and businesses reached €112/MWh and €93/MWh, respectively.

Electricity is traded on the market for bilateral contracts, the balancing market and a recently opened market for electricity derivatives. Intraday and over-the-counter markets will be set up over the coming years.

Turkey's transmission system is interconnected with all its neighbouring countries to which it is a net exporter. Turkey's positive electricity export balance is expected to continue.

Cumulative installed generating capacity increased at a compound annual growth rate of 6% from 2007-2011 and is expected to rise further, mainly driven by investments in wind and other renewable energy projects.

3.5.2 Wind energy in Turkey

Turkey has one of the largest wind energy pipelines in Europe with operational, under construction and planned projects adding up to 11GW, according to the Turkish Wind Energy Association (TÜREB). The country's substantial wind potential of around 48 GW is expected to attract significant investment.

At the end of 2011, installed renewable energy capacity, excluding large hydro, reached 5.9 GW. Wind energy was a third of that capacity (1,799 MW). The wind energy sector in Turkey has one of the fastest growth rates in Europe. During 2011, Turkey's cumulative wind farm capacity increased by 36% and growth in 2012 is expected to be a further 13.5%, to reach over 2 GW of total capacity.

By the end of 2012, wind energy installations were expected to account for 3.6% of total electricity generating capacity up from 0.4% five years earlier, an increase of 0.6% a year. In addition a further 518 MW are currently under construction. The industry expects annual installations to reach between 500 MW and 1GW per year and total installed capacity to hit 5 GW by 2015. Turkey's objective is to reach 20 GW of installed capacity by 2023.

TABLE 3.5.2 CUMULATIVE ELECTRICITY CAPACITY AND WIND ENERGY CAPACITY IN TURKEY 2007- 2012E (GW)

	2007	2008	2009	2010	2011	2012e
Generating capacity	40.8	41.8	44.8	49.5	52.9	55.3
Wind energy capacity	0.15	0.46	0.8	1.3	1.8	2.0
Share of wind in total capacity	0.4%	1.1%	1.8%	2.6%	3.4%	3.6%

Source: Turkish Wind Energy Association, PwC analysis and Teiaş

TABLE 3.5.3 MAIN WIND ENERGY DEVELOPERS IN TURKEY 2009-2011 (MW)

Producer	2009	2010	2011	2011 share
DEMIRER Enerji	230	256	302	16.8%
BILGIN Enerji	65	245	245	13.6%
Rotor Elektrik	135	135	135	7.5%
Polat Enerji	31	112	112	6.2%
AKSA Enerji	41	41	109	6%
Others	299	540	897	49.9%
Total	**801**	**1,329**	**1,800**	

3.5.3 Sites

Turkey has a mixed climate with temperate Mediterranean and oceanic influences along the sea coasts and continental influences inland. The highest wind speeds are along the Aegean, Marmara, and eastern Mediterranean shore, reaching 10 m/s on average.

The vast majority of wind farms are located in the Balikesir, Hatay, Canakkale, İzmir and Istanbul provinces, which overlap with the most attractive areas in terms of wind potential and are close to important centres of electricity consumption.

In comparison to EU Member States, Turkey has less burdensome environmental regulations for wind farm siting. Construction may be allowed in natural parks, conservation areas, protected forests and wildlife habitats, national parks and locations with a special environmental status, with authorisation from the relevant national or regional environmental authorities.

3.5.4 Main wind energy developers

The largest five wind energy developers accounted for half of total installed wind capacity in 2011 and were all local companies. Despite large international developers and utilities announcing their interest in entering the Turkish market, foreign companies have a smaller share of the market than in other countries featured in this report.

3.5.5 Supply chain

The Turkish wind energy industry supply chain includes many domestic companies, a similar trend to developers. However, the privatisation of the Turkish distribution companies should help to address the absence of long run power purchase agreements, which has deterred foreign investment in the past.

TABLE 3.5.4 WIND ENERGY SUPPLY CHAIN IN TURKEY. ACTIVE COMPANIES PER SUB-SECTOR

Wind turbine manufacturers	2nd/3rd tier suppliers	Wind farm developers	Wind farm construction companies	Operation & electricity generation	Maintenance and repairs	Wind farm de-commissioning
Vestas	Ates Celik	Tefirom Group	Tefirom Group	Demirer Enerji	RES Anatolia	
Nordex	Alke	Utopya	RES Anatolia	Bilgin Enerji		
Enercon	Çimtaş	RES Anatolia		Polat Enerji		
Suzlon	Enercon	Ataseven Enerji		AKSA Enerji		
Gamesa	Aero Wind			Rotor Enerji		
Siemens	Ayetek Wind			DONG Energy Power A/S		
GE	Alterna Energy			RES Anatolia		
Acciona				Enerjisa		

In Turkey, the majority of wind farms use turbines from eight major international manufacturers: Vestas, Nordex, Enercon, Siemens, GE Energy, Suzlon, Gamesa.

While the specialised skills and expertise required to build turbines are not available in Turkey, local manufacturers produce components such as blades and towers. German turbine manufacturer Enercon is an example of a company setting up manufacturing units, with a blade factory in the İzmir province. Local construction companies, such as ALKE, have diversified into tower construction. Local companies are also increasingly involved in wind turbine erection and transportation.

3.5.6 Local labour market

Between 2009 and 2011, the number of people employed in the production and distribution of electricity, steam, gas, water and heating and cooling increased at an average 12% per year, reaching 81,200.

Several private and public organisations such as Istanbul Kurumsal GeliŞim and the Chamber of Electrical Engineers (EMO) offer training courses on renewable energy. State owned institutions, such as the Istanbul Technical University (ITU), Şirnak, Namik Kemal, Gebze Yüksek and Erciyes universities have also included courses on renewables in their curricula.

3.5.7 Financing

At present, wind farm developers have access to individual and club funds from EBRD, the Industrial Development Bank of Turkey (TSKB) and other local and foreign banks. While international funding is usually provided on a non-recourse basis, Turkish banks require corporate guarantees from controlling shareholders. Given the absence of precedents for legal action against borrowers, commercial lenders are generally willing to ring fence the wind project company in exchange for pledges of shares, bank accounts, licences, commercial enterprises, shareholder support guarantees or assignments of receivables.

With intensifying competition over the financing of a large share of the total 11 GW project pipeline, a substantial number of mergers and acquisitions are expected in the near future.

3.5.8 Support scheme

In 2005 Turkey introduced a renewable energy support scheme based on feed-in tariffs and additional investment incentives. Following the amendment of the initial law on renewables in December 2010, producers currently receive $73 per MWh and a bonus for using locally manufactured components ranging from $6 to $13 per MWh (see table 3.5.4).

Besides selling their output to the market operator through the feed-in tariff system, wind energy producers can engage in trading on the day ahead market and the market for bilateral agreements. As enrolment in the support mechanism is not mandatory or permanent, wind energy producers choose the type of market they want to trade on every year.

In addition to the feed-in tariff, several other measures are taken in Turkey to promote wind energy development, notably priority access to the grid, facilitation and discounts to obtain leases and authorisations and rights to use state owned land.

3.5.9 Regulatory framework

Key agencies and institutions

The Energy Market Regulatory Authority (EMRA) is the administrative body responsible for supervising and regulating the energy market in Turkey. TEIAŞ is the state owned transmission system operator (TSO). The local distribution systems are largely operated by TETAS (the Turkish Electricity Trading and Contracting Co).

TABLE 3.5.4 APPROXIMATE ADDITIONAL INCENTIVES FOR USE OF LOCAL COMPONENTS IN USD/MWH

	Blades	Generator and power electronics	Turbine tower	Mechanical components in rotor/nacelle
Additional incentive	8	10	6	13

Source: EBRD

Key documents

Building permit and licence

Building licence holders are exempt from paying a licence fee for the first eight years of operation and their contribution is reduced to 1% of the regular fee thereafter. Additional licences are required prior to the start of production, such as the operation certificate from the district office of the Ministry of Labour and Social Security and the workplace opening and operation licence from the relevant provincial administration.

The licence to generate electricity from a wind farm is issued by EMRA based on the opinion of designated authorities on the grid connection, the environmental impact assessment (EIA), and other permits and approvals. The submission of applications takes place on specified dates, in accordance with government strategy.

Grid connection

In order to connect a wind farm to the public grid, project developers must submit an application to the transmission system operator (TSO). For applications competing over the same substation, TEIAŞ organises tenders ranking companies according to the transmission fees they offer to pay. The fees vary between 0.01 Krs[44]/kWh and 6.52 Krs/kWh (€0.043 to €28.1) for a 20 year period.

3.5.10 Opportunities and challenges

Bureaucracy and complicated administrative procedures in Turkey are a significant hurdle for wind energy developers. Moreover, numerous regulations require clarification, such as local content requirements, planning procedures in certain protected areas (watersheds) and how to address potential conflicts between wind turbines and radar installations.

Grid capacity is also an area of concern as it is unclear whether the distribution and transmission systems can connect the 11 GW of new wind installations currently planned. It is possible for developers to carry out the necessary substation and grid infrastructure upgrades, deducting the costs from the tariffs paid to the operator over ten years. However, very few opt for this approach due to its prohibitive costs. To ensure the target of 20GW by 2023 is met, the transmission system operator (TSO) has announced investments in grid reinforcements between 2013 and 2020.

TABLE 3.5.5 OPPORTUNITIES AND CHALLENGES

Wind assessment, land acquisition, environment and permits

Opportunities	Challenges
Exemption from the payment of a licence fee for the first eight years of operation and reduced fee thereafter (1% of regular fee)	Licensing applications accepted only on specific dates determined by the government
Leases, authorisations, servitude or usage rights over forests and state owned land, and reduced fees for the usage of property owned by the Turkish treasury	Lack of transparency over certain local environmental regulations and proximity to radar installations
Ability to construct wind farms in protected areas, subject to approval	

Grid capacity, connection and wind farm operations

Opportunities	Challenges
Priority access to the grid	Outdated and insufficient grid infrastructure
Commercial lenders generally willing to ring fence the wind project company	Lack of transparency over procedures for allocation of grid connection contribution fees
	Obtaining full feed-in tariff requires procurement of local components

[44] A Krs is one hundredth, or cent, of a Turkish Lira (TRY)

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4 SECOND WAVE MARKETS

4.1 The Czech Republic

Main findings

Wind energy in the Czech Republic

☹ Wind energy development in the Czech Republic boomed up to 2010, then declined sharply due mainly to the sudden imposition of grid restrictions and difficulties in obtaining EIA approvals.

☹ Wind energy deployment is now lagging below the growth trajectory set out in the NREAP.

Sites

☹ Only 15% to 20% of the most suitable wind farm sites in the Czech Republic are unaffected by environmental planning restrictions.

Supply chain

☺ The Czech Republic has a significant national wind energy industry, covering manufacturing, construction and services.

😐 The Czech wind energy sector is dominated by independent developers and financial institutions. There are fewer domestic and foreign utilities than in most other European markets.

Financing

☺ Numerous commercial banks are experienced in wind energy financing.

Regulatory framework

☹ Obtaining permits is generally a long and cumbersome process.

TABLE 4.1.1 OVERVIEW OF ELECTRICITY GENERATION AND CONSUMPTION IN THE CZECH REPUBLIC (GWH)

	2009	2010	2011
Total gross electricity generation	82,250	85,910	87,561
Thermal	48,457	49,980	49,973
Nuclear	27,208	27,998	28,283
Gas	3,225	3,600	3,955
Hydro	2,983	3,381	2,835
Solar	89	616	2,118
Wind	288	336	397
% of wind in total gross electricity generation	0.35%	0.39%	0.45%
Domestic gross electricity consumption	68,606	70,962	70,517
% of wind in total gross electricity consumption	0.42%	0.47%	0.56%
Total CR import/ (export) balance	**(13,649)**	**(14,948)**	**(17,044)**

Source: Energy Regulatory Office

4.1.1 Power market overview

The Czech Republic has been a long time electricity exporter. Most electricity generation comes from thermal and nuclear power plants. Despite the growth in wind power over recent years, its share in total gross electricity generation reached only 0.5% in 2011 and represented 0.6% of total consumption.

4.1.2 Wind energy in the Czech Republic

With the adoption in 2005 of a renewable energy law, wind power capacity increased significantly in the Czech Republic. The first wind turbine was installed in 1993 and another seven were added in 1994. Total installed capacity reached 13.5 MW in 2004. From 2005-2011 it increased more than six times. However, since 2010 installations have all but stopped.

Wind energy in the National Renewable Energy Action Plan

The EU renewable energy directive[45] set the Czech Republic a target of 13% renewable energy in final energy consumption by 2020. In the country's National Renewable Energy Action Plan (NREAP) the authorities have set their target at 13.5%. Renewable electricity is expected to increase its share of the power mix to 14.3%. The intermediary 2010 indicative target was set at 8% renewable energy in final energy and was officially overshot by 0.3%

The wind energy target in the action plan for 2020 is 743 MW. The NREAP indicates that from a cumulative capacity of 243 MW at end 2010, 50 MW of new installations are foreseen annually to meet the objective. However, wind energy installations have not increased as planned. Installed capacity at end 2011 was 217 MW, almost 26% below the target.

TABLE 4.1.2 INSTALLED WIND ENERGY CAPACITY IN THE CZECH REPUBLIC

	2005	2006	2007	2008	2009	2010	2011
Total installed capacity MW	28	50	116	150	192	215	217
Annual installed capacity MW	9	26	63	34	44	23	2
Total electricity generation GW	21.3	49.4	125.1	243.9	288.1	335.5	396.8

Source: EWEA and Energy Regulatory Office

TABLE 4.1.3 CZECH REPUBLIC WIND ENERGY NREAP TARGET AND ACTUAL INSTALLATIONS

Year	2005	2010	2011
NREAP	22	243	293
Actual figures	28	215	217
% difference	+27.3%	-11.5%	-25.9%

Source: Ministry of Industry and Trade of the Czech Republic, Energy Regulatory Office and EWEA

[45] 2009/28/EC of the European Parliament and of the Council of 23 April 2009

4.1.3 Sites

The Czech Republic has a typical continental climate with significant seasonal variations in wind speeds. The most suitable locations for wind farms are in highlands and mountains. The largest concentration of wind farms is, consequently, in the north western regions of Ústí and Labem and Karlovy Vary. Approximately 60% of the country's capacity is installed here. The regions are characterised by particulary favourable wind conditions.

However, approximately 60% of these sites are located in nature protection areas such as national parks, protected landscape areas or are part of the Natura 2000 network. National rules on health protection and noise/vibrations emitted by wind turbines also considerably reduce the number of areas available for wind energy development. Locations where wind farms could be readily permitted are estimated at 15% to 20% of suitable sites[46].

TABLE 4.1.4 MAIN WIND ENERGY DEVELOPERS IN THE CZECH REPUBLIC

Company	Installed capacity (MW)
ecoenerg Windkraft GmbH & Co. KG	42
APB - PLZEŇ a.s.	20.9
Thirty Invest S.a.r.l.	18
Wintus GmbH	13.8
WIND FINANCE a.s.	10
ČEZ Obnovitelné zdroje, s.r.o.	9.7
REN Power CZ a.s.	8
Větrné elektrárny Strážný Vrch, a.s.	8
Green Lines Rusová, s.r.o.	7.5
WEB Windenergie AG	6.3
S & M CZ s.r.o.	6.1
EAST HOUSE LIMITED	6
Energetický a průmyslový holding, a.s.	6
WSB Neue Energien GmbH	6
DROBIL-ENERGO s.r.o.	4.5

Source: Energy Regulatory Office, March 2012

4.1.4 Main wind energy developers

The largest 15 wind energy developers account for 79% of the country's total installed capacity. The market is dominated by financial investors rather than utilities. ČEZ and EPH, the two largest electricity producers in the Czech Republic, produced 73.6% of gross electricity in 2009 but own a mere 15.7 MW of wind capacity.

4.1.5 Supply chain

Vestas is the largest supplier of wind turbines to the Czech market, in terms of units. Enercon has the largest share of installed capacity. Czech wind turbine manufacturers Wikov Wind and Vitkovice Heavy Machinery installed three turbines totalling 4 MW and 315 kW respectively.

TABLE 4.1.5 WIND TURBINE MANUFACTURERS' SHARE OF THE CZECH MARKET (MARCH 2012)

Turbine producer	No. of turbines	% installed turbines	Capacity (MW)	% installed capacity
Enercon	44	28.6%	77.7	35%
Vestas	50	32.5%	74.5	33.6%
Repower	12	7.8%	22.4	10.1%
DeWind	16	10.4%	16.9	7.6%
Nordex	7	4.5%	12.8	5.8%
WinWind	2	1.3%	6	2.7%
Tacke	9	5.8%	5.1	2.3%
Wikov Wind	2	1.3%	4	1.8%
Fuhrländer	6	3.9%	1.3	0.6%
Siemens	4	2.6%	0.6	0.3%
Vitkovice Heavy Machinery	1	0.6%	0.3	0.1%
WindWorld	1	0.6%	0.2	0.1%
Total	**154**		**221.8**	

Source: The Czech Wind Energy Association

[46] Source: The Association of Entrepreneurs in Renewable Energy Sources

The Czech Republic has a national manufacturing base for wind turbines and their components. Several companies also provide services for wind farms. Some of the latter are subsidiaries of international companies with part of their manufacturing capacity in the Czech Republic.

Importantly, Czech companies produce gearboxes for turbines up to 5 MW, shafts for turbines up to 2 MW and subsidiaries of German companies produce towers and other steel components.

TABLE 4.1.6 WIND TURBINE COMPONENTS PRODUCED AND EQUIPMENT SUPPLIED IN THE CZECH REPUBLIC

Turbine components
Main shafts
Steel components
Towers and construction
Turbines
Hydraulic cooling systems
Structural manufacturing, electrical equipment supplies
Towers
Steel components
Machine works & welding
Main carriers
Convertors
Construction

Source: PwC analysis

Czech Engineering Procurement and Construction (EPC) companies have so far been contracted for over a third[47] of total installed wind capacity. To date the majority of wind energy projects have been built on a multi contract basis or by foreign engineering, procurement and construction (EPC) contractors.

4.1.6 Financing

Wind farms in the Czech Republic have been financed by Czech commercial banks on a limited recourse project finance basis[48]. Banks have gained experienced in funding renewables over recent years. Their internal credit approval procedures follow the same principles as those used by leading European banks. Wind energy investors typically achieve 70% gearing and obtain long term loans with tenors ranging from 10 to 15 years. As of July 2012, Czech banks confirmed that they have further appetite for financing wind energy projects. Banks generally perceive the wind power potential of a wind farm location to be the main project risk. Some require two energy yield (technical) studies to determine the financial feasibility of a project.

4.1.7 Support scheme

Up until the end of 2012, generators could choose between a feed-in tariff and a feed-in premium. However, a new law on renewable energy passed in May 2012 came into force on 1 January 2013[49]. Now the feed-in tariff is only applicable for small and micro generation: new hydro power plants with installed capacity of up to 10 MW and other renewable energies with installed capacity of less than 100 kW.

All other generators are supported by a feed-in premium. The premium varies every hour and is equal to the difference between a determined tariff, known as “shadow”, and the wholesale electricity market price. This tariff is equal to the feed-in tariff and is determined by the Energy Regulatory Office (ERU). The premium is increased by 2% per year.

The new law also stipulates that if national targets for a specific renewable technology are achieved two years earlier than planned, the support for newly connected generators can be cancelled.

Before the entry into force of the new renewable energy act, the feed-in tariff in 2012 was 2,230 CZK/MWh and the premium 1,790 CZK/MWh[50] (€72.8).

4.1.8 Regulatory framework

Key agencies and institutions

The ERU is the administrative authority responsible for energy sector regulation in the Czech Republic. The ERU sets the feed-in tariff and premiums, approves price proposals in certain subsectors, devises measures for supporting renewable energy sources, issues licences, implements competition rules and supervises the energy market.

47 Figures are not available for juwi s.r.o. and soleg s.r.o.
48 Based on interviews with industry representatives and selected Czech lenders
49 This new Act No. 165/2012 Coll. will supersede the Act No. 180/2005 Coll
50 Energy Regulatory Office

The Czech electricity transmission system is operated, maintained and developed by the Czech Transmission System Company (ČEPS), a state owned company under the Ministry of Industry and Trade. ČEPS also transmits electricity between large producers and distributors and is involved in allocating available transmission capacity on interconnectors.

The local distribution systems are operated, maintained and developed by three privately owned companies. These operators have concluded contracts with ČEPS for electricity transmission that impose limits on installed capacity of renewable energy connected to the distribution systems.

Key documents

Building permit and licence

As a precondition, the land plots on which the project will be built have to be classified appropriately in the relevant zoning master plan. For the construction of a wind farm, the developer needs a building permit in line with the relevant zoning master plan issued by the municipal authority. In order to obtain the permit, it is necessary to submit a noise study. An authorisation for the construction of an electricity generating plant must also be requested at the Ministry of Industry and Trade. If the planned installed capacity exceeds 0.5 MW or the turbines are higher than 35 meters, an environmental impact assessment (EIA) also has to be prepared. Once obtained, the EIA approval is valid for five years.

It usually takes more than a year and significant effort to obtain the appropriate classification of the land plots required for the wind farm in the relevant zoning master plan. Moreover, the building permit approval procedure is complicated and takes more than a year to conclude.

The licence to operate a wind farm is issued by the ERU for 25 years. The latter must be requested after construction of the wind farm.

Grid connection

Renewable energy generators have guaranteed access to the transmission and distribution grids[51]. Obtaining grid access requires an application to the relevant operator, approval and a connection contract. System operators can refuse approval only where connection poses a threat to the system's stability or where they can prove that their system lacks sufficient capacity. Upon signature of a contract, grid capacity is reserved for the generator for two or three years. The connection contracts are, therefore, renewed on a regular basis allowing for renegotiation of their terms.

4.1.9 Opportunities and challenges

Public perception of the renewable energy industry in the Czech Republic has been affected by the generous support to solar photovoltaic (PV). As a result of a generous feed-in tariff, the 2020 solar PV target was reached as early as 2010 with consumer electricity prices increasing more than wholesale prices.

In February 2011, due to the steep increase in PV installations, ČEPS limited the grid connection capacity for variable renewable energies, including wind power. Throughout 2011, grid approvals for variable renewables were also restricted at distribution system level.

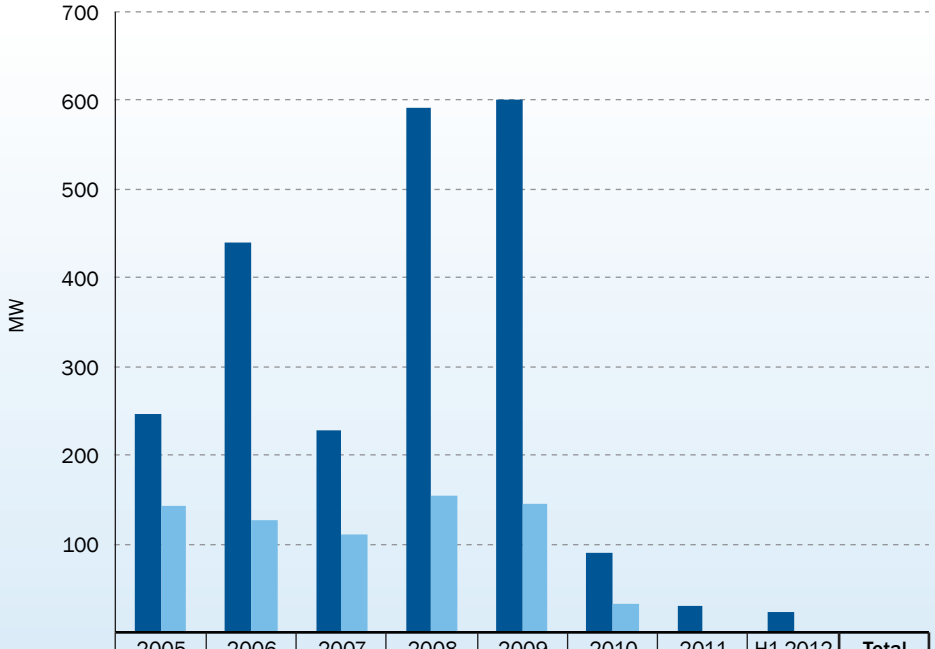
The Czech Republic will continue supporting renewable energies as indicated by the adoption of the new renewable energy Act in May 2012, in spite of calls by the ERU to discontinue support from 2013.

Since 2012, ČEPS only allows distribution system operators to conclude further connection contracts with new PV plants and wind farms for a total of 65 MW of capacity. However, approximately 600 MW of grid connection capacity for renewable energy has been made available by the new act.

Beyond the grid and support mechanisms, obtaining approval on an EIA can take considerable time. The procedure usually takes two or three years and involves the same stakeholders as the building permit procedure. By June 2012, none of the applications submitted by wind farm operators in 2011 and 2012 were approved. Over the past eight years, EIA approvals for 709 MW of wind energy capacity have been obtained for almost 2,250 MW of applications — a success rate of 31.6%.

[51] By law (Act No. 180/2005 Coll), where connection capacity is limited, RES generators have priority over conventional generators

FIGURE 4.1.1 WIND FARM EIA APPLICATIONS, SUBMITTED AND APPROVED



	2005	2006	2007	2008	2009	2010	2011	H1 2012	Total
EIA application submitted	246	439	227	591	600	90	30	24	**2,247**
Approved	142	126	110	154	145	32	0	0	**709**

Source: Czech Wind Energy Association

TABLE 4.1.7 OPPORTUNITIES AND CHALLENGES BY PROJECT STAGES

Wind assessment, land acquisition, environment and permits

Opportunities	Challenges
A new renewable energy law will guarantee continued support for wind energy	A large part of the best wind farm sites are located in Natura 2000 areas, further regulations on noise and vibrations further reduce increases the number of areas where much tighter permitting rules apply
	Environmental Impact Assessments are required as of 0.5 MW or 35m hub height
	A precondition to obtaining a permit is the appropriate designation of the plot of land in the zoning master plan

Grid capacity, connection and wind farm operations

Opportunities	Challenges
System operators are obliged to connect wind farms to the grid	Grid connection contracts are valid for two or three years, requiring terms to be renegotiated regularly

4.2 Croatia

Main findings

Wind energy in Croatia

☺ Wind energy has grown rapidly in Croatia since 2004. A 35% renewables target in electricity consumption by 2020 and a 4.7 GW project pipeline are promising indicators of further growth.

☹ The use of locally sourced components can increase the feed-in tariff by up to 15%. These provisions could be challenged once Croatia joins the EU in July 2013.

Supply chain

☺ There is a significant local supply chain covering wind farm development, construction and turbine components.

Finance

☺ With a 14 year guaranteed feed-in tariff, access to finance is not problematic.

Regulatory framework

☹ Obtaining permits is lengthy and bureaucratic, taking three to four years on average.

Opportunities and challenges

☺ The TSO limits wind energy capacity to 400MW, but plans to upgrade the system should free up more capacity by 2014.

TABLE 4.2.1 OVERVIEW OF ELECTRICITY GENERATION AND CONSUMPTION IN CROATIA (GWH)

	2009	2010	2011
Total gross electricity generation	12,015	13,272	9,999
Thermal	5,178	4,787	5,179
Hydro	6,767	8,309	4,581
Wind	45	138	201
Industrial	25	38	38
% of wind on total gross electricity generation	0.37%	1.04%	2.01%
Domestic gross electricity consumption	17,697	17,947	17,703
Total Croatia import/ export balance	**5,682**	**4,676**	**7,704**

Source: HEP- Operator prijenosnog sustava d.o.o.

Note: The net electricity import balance figures include 50% of electricity generated by the Krško nuclear power plant

4.2.1 Power market overview

Croatia has been a long time electricity importer. The electricity mix is mainly thermal and hydro. HEP Group, the Croatian national electricity company, owns a 50% stake in the Krško Nuclear Power Plant located in Slovenia. Wind energy has grown significantly in Croatia and, in 2011, had a 2% share of total gross electricity generation.

National wind energy plan

As a country that will accede to the EU[52], Croatia must comply with the renewable energy directive. Consequently Croatia has a 2020 target of 20% renewable energy in final energy consumption. Renewables are expected to meet 35% of electricity consumption. The target for installed wind energy capacity in 2020 is 1,200 MW. To meet the target, installed capacity needs to increase by 119 MW per year on average. In 2011, 42 MW of new wind energy capacity were grid connected in Croatia and 61 MW in 2010, a record year.

4.2.2 Wind energy sector in Croatia

The first wind farm was connected to the grid in August 2004 on the island of Pag. Since then, installed capacity has increased significantly, especially after the adoption of regulations supporting renewable energy in 2007[53]. From 2005 to 2011 installed capacity increased more than twenty fold, from 6 MW to 131 MW. Finally, there is an official pipeline of over 113 wind farms totalling 4.8 GW[54]. In line with global trends, the average size of newly installed turbines has increased from 850 kV to 3 MW over the period.

TABLE 4.2.2 OVERVIEW OF INSTALLED WIND ENERGY CAPACITY IN CROATIA (MW)(GWH)

	2005	2006	2007	2008	2009	2010	2011	CAGR
Annual installations (MW)	0	11.2	0	1	9.6	61.3	41.8	301%
Cumulative capacity (MW)	6	17.2	17.2	18.2	27.7	89	130.8	-
Generation (GWh)	13e	37.5e	37.5e	40	45	138	201	-

Source: EWEA, HEP- Operator prijenosnog sustava d.o.o.

[52] Croatia will become the 28th Member State of the EU on 1 July 2013
[53] OG 33/07 and OG 67/07
[54] Ministry of Economy, Labour and Entrepreneurship, July 2012

4.2.3 Sites

Approximately 70% of total installed capacity in Croatia is located along the southern Adriatic coast. Most of Croatia has a continental climate while the Adriatic coast is characterised by Mediterranean climate and higher wind speeds.

There are, however, many nature protected areas in the most suitable regions for wind energy development. Croatian legislation defines two main types of nature protected areas — national parks and nature parks. Croatia has eight national parks and eleven nature parks. The national parks have the strictest regulations that forbid wind farm construction. But they are permitted in nature parks unless they pose a threat to the parks' essential characteristics. Beyond national and nature parks, Croatia has also designated 47% of its continental area and 39% of its maritime area as Natura 2000 sites. These areas are subject to stricter protection, in line with EU rules, but it is possible to build wind farms under certain conditions.

4.2.4 Main wind energy developers

Seven investors own the majority of wind farms in Croatia. Dalekovod d.d. is the biggest developer with three farms totalling 45 MW. The second biggest is Selan d.o.o., a special purpose vehicle that operates the largest wind farm in Croatia totalling 42 MW. German developer wpd is the third largest player in the market and the only foreign company in the top seven.

TABLE 4.2.3 MAIN WIND FARM DEVELOPERS IN CROATIA

Company	Total installed capacity in MW
Dalekovod d.d.	45
Selan d.o.o.	42
wpd AG (Germany)	20.8
TEC Obnovljivi izvori d.o.o.	10.5
KONČAR - Elektroindustrija d.d.	6
ADRIA WIND POWER d.o.o.	6

Source: PwC analysis, July 2012

4.2.5 Supply chain

Enercon has the largest share of the Croatian wind turbine market in terms of units, whereas Vestas and Siemens have the first and second largest share in terms of installed capacity. The Croatian producer Končar supplies wind turbines with installed capacities of 1 MW and 2.5 MW. It has so far produced wind turbines solely for its two wind farms one of which is operational (table 10.3) and the other under construction (17.5 MW).

TABLE 4.2.4 WIND TURBINE MANUFACTURERS' SHARE OF CROATIAN MARKET

Turbine producer	No. of installed turbines	Installed capacity (MW)	Market share
Vestas	21	48	37%
Siemens	20	45	34.5%
Enercon	25	20.8	16%
Leitwind	7	10.5	8.1%
Končar	6	6	4.6%

Source: PwC analysis, July 2012

TABLE 4.2.6 WIND ENERGY SUPPLY CHAIN IN CROATIA. ACTIVE COMPANIES PER SUB-SECTOR

Wind turbine manufacturers	Component suppliers	Wind farm developers/EPC contractors	Wind farm construction companies	Grid operators	Maintenance and repairs
Končar	Končar	Dalekovod	Končar	HEP - OPS	TEC OBNOVLJIVI IZVOR
Vestas	Dalekovod	TEC OBNOVLJIVI IZVOR	Dalekovod	HEP - ODS	
Siemens	Đuro Đaković		TEC OBNOVLJIVI IZVOR		
Enercon					
Leitwind					

Beyond turbine manufacturing, there is a local services and components supply chain in Croatia. The Končar Group, for instance, roduces wind turbine components, and equipment suppliers, including Dalekovod (also a wind farm developer) are local.

Leading Croatian engineering, procurement and construction (EPC) contractors account for slightly over 40% of total installed wind capacity. The Croatian market is, therefore, largely operated by multi contracting or foreign engineering, procurement and construction (EPC) contractors.

4.2.6 Financing

Debt financing in the form of limited recourse loans is typically provided by European banks to investors in wind farms. Where local banks lend directly, the deal generally needs to be approved by the credit committees of the European banks that own them. Wind farm developers have achieved 65%/70% gearing on average and obtained long term loans with tenors of up to 12 years, which was the length of the country's guaranteed feed-in tariff until the end of 2012. From 2013, the feed-in tariff has been extended to 14 years, which should allow wind farm developers to negotiate longer tenors and higher gearing.

Lenders usually insist on soft mini-perms (margin step-ups and cash sweep mechanisms). Hence, it is possible that the loans are refinanced before their legal maturity. Some commercial banks require part of senior financing to be provided or insured by export credit agencies or granted by international financing institutions to make projects bankable. Lenders typically consider the lowest possible feed-in tariff when analysing debt capacity of a project. In other words, they assume the lowest feed-in tariff correction factor (see below).

Private equity funds focused on renewable energy in central and eastern Europe do not usually require higher returns for wind farms in Croatia compared to Poland, the region's most mature market. This stems from the preference of feed-in tariffs over green certificates and the perceived stability of the Croatian currency.

4.2.7 Support scheme

The Croatian market operator (HROTE) purchases electricity from renewables via a feed-in tariff paid on a monthly basis. The power purchasing contract is valid for 14 years. Depending on the amount of domestically sourced components, the feed-in tariff can be multiplied by a "correction factor" that can reach up to 15%. The share of locally sourced components is calculated on the basis of overall investment costs. Developers prove their share by signing a sworn statement. Feed-in tariffs are adjusted every year by the consumer price index.

TABLE 4.2.7 FEED-IN TARIFF FOR WIND ENERGY IN CROATIA

Commissioning year	2007	2008	2009	2010	2011	2012	2013
Feed-in tariff (HRK/kWh) Less than 1 MW	0.64	0.68	0.70	0.71	0.72	0.74	0.72
Feed-in tariff (HRK/kWh) More than 1 MW	0.65	0.69	0.71	0.72	0.73	0.75	0.71

Source: Croatian Energy Market Operator (HROTE)

The local content requirement associated to the feed-in tariff does not comply with EU internal market rules. As a result of full EU accession Croatia will eventually need to amend this provision to fall in line with EU competition rules.

4.2.8 Regulatory framework

Key agencies and institutions

The Croatian Energy Regulatory Agency (HERA) is the administrative authority responsible for energy regulation in Croatia. HERA supervises the application of the feed-in tariff scheme, devises the methodology for setting feed-in tariffs and licences electricity generation assets. Licences are valid for five to 30 years. There are no official criteria for setting specific terms in the licences, so HERA has significant discretionary powers.

HROTE organises the electricity and gas markets and is supervised by HERA. HROTE is in charge of contracting electricity purchases and collecting and distributing incentives.

The Croatian electricity transmission system and the local distribution systems are operated by HEP - Operator prijenosnog sustava d.o.o. (HEP-OPS) and HEP - Operator distribucijskog sustava d.o.o. (HEP-ODS), respectively. HEP-OPS and HEP-ODS are subsidiaries of the Croatian national electricity company HEP, fully owned by the government.

Key permits and licence

Building permit and licence

Obtaining an energy permit and the feed-in tariff requires registering with the Ministry of Economy (MELE) and being listed in the eligibility register (OIEiKPP). Developers then have six months to begin a feasibility study. These steps need to be completed before obtaining a building permit.

Environmental Impact Assessments (EIAs) are mandatory for projects above 20 MW. For projects between 10 MW and 20 MW, the Ministry of the Environment (MENP) may request an EIA. EIA approvals are valid for two years and renewable once. Localisation permits, which give the approval for construction, must be obtained from local authorities whilst the EIA approval is valid. Wind farms above 20 MW require a supplementary building permit.

It generally takes three to four years to obtain all licences and permits necessary for wind farm construction. Procedures in Croatia are seen as overly bureaucratic, leaving room for improvement.

Grid connection

Renewable energy producers have guaranteed access to both the transmission and distribution grids. The operators can only refuse connection if there is limited technical or operating capacity in the system. Costs of grid connection and capacity upgrades are paid by the electricity producer, but the engineering works are carried out by the operators. Responsibility for balancing the electric power system lies with HEP-OPS and HROTE. RES producers do not pay any balancing energy charges.

4.2.9 Opportunities and challenges

According to the grid operators there is insufficient capacity on both the transmission and distribution systems to connect more than 400 MW of wind energy. With 130 MW of wind power connected at end 2011 and a further 235 MW of signed connection agreements, there would only be a further potential of 35 MW. Consequently, obtaining connection agreements is a significant hurdle.

Nevertheless, the transmission system operator (TSO) HEP-OPS, is working on a grid upgrade plan that should raise available capacity for wind farm connections to 600 MW, allowing for an extra 200 MW of connection agreements.

TABLE 4.2.6 OPPORTUNITIES AND CHALLENGES BY PROJECT STAGES

Wind assessment, land acquisition, environment and permits

Opportunities	Challenges
Accession to the EU should guarantee equal treatment, land and ownership rights for foreign investors	The energy regulator has large discretionary powers in awarding electricity generation licences
	Almost half of the country is designated Natura 2000

Grid capacity, connection and wind farm operations

Opportunities	Challenges
Wind farms benefit from guaranteed access to both the distribution and transmission grids	Grid connection and upgrade costs are borne by the wind energy developer

4.3 Ukraine

Main findings

Power market overview

☺ Power consumption and generation are expected to grow to 2030.

Wind energy in Ukraine

☹ Ukraine has set renewable energy targets, but they are low and accession to the European Energy Community requires setting more ambitious targets.

☺ Ukraine has a positive mix of feed-in tariff and tax incentives to support wind farm development.

☹ Local content requirements are a handicap.

Sites

☺ Wind speed and geographic conditions in Ukraine are ideal for wind farm development.

Financing

☹ The lack of liquidity in the Ukrainian banking system means project finance mainly comes from multilaterals such as the EBRD.

Supply chain

☺ Ukraine has industrial potential in wind energy. The country already has significant experience in small and medium sized turbines.

☺ Several European wind turbine manufacturers are looking at investing in production units in Ukraine.

Regulatory framework

☹ Administrative procedures are unclear and/or responsible authorities lack resources to follow them efficiently.

☹ Grid connection rules are inapplicable and, grid connection costs often fall on wind farm developers.

Opportunities and challenges

☹ There is uncertainty over how much wind capacity the electricity system can currently handle.

TABLE 4.3.1 OVERVIEW OF ELECTRICITY GENERATION AND CONSUMPTION IN UKRAINE (GWH)

	2009	2010	2011
Total gross electricity generation	172.9	187.9	193.9
Thermal	71.1	78.0	84.8
Nuclear	82.9	89.2	90.2
Hydro	11.8	13.0	10.8
Other	7.1	7.8	8.1
Domestic gross electricity consumption	169.0	183.9	187.7
Total net exports	**3.9**	**4.0**	**6.2**

Source: Ministry of Energy and Coal Industry

4.3.1 Power market overview

Ukraine is a long time electricity exporter, mainly to Belarus, Hungary, Slovakia and Moldova. Most of the electricity generation comes from nuclear and thermal power plants. In 2011, the shares of nuclear and thermal generation were 44% and 47%, respectively. However, Ukraine is facing an electricity production risk due to obsolete generation facilities, particularly thermal and hydro power plants. Approximately 95% of them have reached the end of their useful lives. Furthermore, the Ukrainian energy sector is heavily dependent on oil and gas imported from Russia. In 2010, 80% of natural gas consumption and 85% of oil consumption came from Russia.

National plan for renewable energy electricity production

In 2006, Ukraine adopted an energy strategy to 2030[55]. It was expected that electricity generation would double over the 2010-2030 period, from 210 TWh to 420 TWh. However, the forecast seems ambitious given that in 2010 gross electricity generation was 16.1 TWh below the 210 TWh forecast.

The strategy's base scenario for electricity from renewables is an increase in production from 13 TWh in 2010 to 21 TWh in 2030. However, due to the strong expected growth in total electricity generation, the share of renewable energy is expected to decline from 6.2% in 2010 to 5% in 2030.

The strategy is expected to be updated every five years. According to the first draft update[56] by the Ministry of Energy and Coal Industry, renewables, excluding large hydro, are expected to produce 4 TWh of electricity in 2020 and 13 TWh in 2030. An indicative target for wind energy capacity in 2030 is 3GW to 4GW.

In February 2011, Ukraine became a member of the European Energy Community. By joining, the country agreed to transpose a number of EU energy directives. Consequently, in light of the renewable energy directive, Ukraine has committed to a binding renewables target of 11% by 2020. This target is significantly higher than the forecasts in the Energy Strategy of Ukraine and its draft update. The strategy update needs, therefore, to set more ambitious goals for renewables if Ukraine is to honour its obligations towards the Energy Community. The State Agency for Energy Efficiency and Energy Savings has proposed a renewable energy installed capacity target of 9 GW, excluding large hydro, by 2020, equivalent to the production of 18 TWh of electricity. By 2030, the target should be 17 GW of renewable capacity, producing 34 TWh of electricity.

4.3.2 Wind energy in Ukraine

In 1996, a state programme[57] for the construction of wind farms was launched. Its aim was to establish domestic production of wind turbines and it set a target of almost 2 GW of installed capacity by 2010. Only a fraction of the planned 2 GW was actually built, but it did allow for some wind energy development and domestic turbine manufacturing.

[55] Resolution of Cabinet of Ministers of Ukraine on Approval of the Energy Strategy of Ukraine until 2030 dated 15 March 2006
[56] Update of the Energy Strategy of Ukraine until 2030 issued by the Ministry of Energy and Coal Industry on 7 June 2012
[57] The State Complex Program for Construction of wind farms in Ukraine was introduced by order of the President of Ukraine No. 159 "On Construction of Wind Power Plants" dated 2 March 1996 and relevant resolution of the Cabinet of Ministers of Ukraine dated 2 February 1997

TABLE 4.3.2 WIND ENERGY INSTALLED CAPACITY IN UKRAINE

	2009	2010	2011
Installed capacity in MW	90	87.5	151.1
Electricity generation in GWh		40.2	89

Source: The Ukrainian Wind Energy Association, UWEA

The US company Kenetech Wind Power granted a licence to the Ukrainian company Windenergo for production of the USW 56-100 turbine with a capacity of 107.5 kW. Due to inefficiency and lack of demand, production stopped in 2010. In 2003, Windenergo started producing the T600-48 turbine with a capacity of 600 kW licensed from Belgian Turbowinds. At the end of 2010, 701 USW 56-100 turbines and 20 T600-48 turbines were in operation totalling 87.4 MW of installed capacity. The wind farms are owned by the state which financed 100% of the programme.

There were 1,560 small wind turbines (300 W–20 kW) in operation at end 2011. Their total installed capacity was 12.5 MW, 8.3% of total wind energy installed capacity. The company Flamingo Aero is the market leader in this segment with a 30% share.

The first private commercial wind farm was built in 2011, which was also the first installation of a modern wind turbine with installed capacity above 1 MW in Ukraine.

4.3.3 Sites

Most wind farms are along Ukraine's Black Sea coast, mainly in Crimea and along the coast of the Azov Sea, which are the country's windiest regions.

Ukraine has mostly a moderate continental climate with favourable conditions for wind energy. According to the National Academy of Sciences of Ukraine, the wind energy potential is estimated at 30 TWh a year and total wind energy capacity could reach 16 GW by 2030: 3.7 GW in the Autonomous Republic of Crimea, 3.6 GW in the Nikolayev region, 3.5 GW in the Kherson region, 3.2 GW in the Zaporozhye region and 2 GW in the Donetsk region.

4.3.4 Main wind energy developers

As previously mentioned, most wind farms in Ukraine are state owned. At the end of 2011, however, a private company, Wind Parks of Ukraine, developed two projects — Wind Park Novoazovskiy in the Donetsk region with an installed capacity of 37.5 MW and Wind Park Ochakovskiy in the Nikolayev region with an installed capacity of 25 MW. Vindkraft Ukraine LLC owns one operational wind turbine in the Kherson region with a capacity of 3 MW.

Several other wind energy projects were under construction during 2012. DTEK, the largest privately owned energy company in Ukraine, is among the new developers and could take a significant share of the wind energy market. Other developers, such as the Ukrainian Konkord Group also have several consented pipelines. Over the next few years wind farm ownership is expected to diversify and installed capacity will increase significantly along with the scale of wind energy projects.

TABLE 4.3.3 KEY WIND POWER PRODUCERS IN UKRAINE

Company	Installed capacity in MW
State owned companies	85.6
Wind Parks of Ukraine	95
Vindkraft Ukraine LLC	3
Total	**183.6**

Source: PwC analysis, The Ukrainian Wind Energy Association, June 2012

TABLE 4.3.4 WIND TURBINE PRODUCERS IN UKRAINE

Turbine producer	No. of installed turbines	Total installed capacity (MW)
Windenergo (USW 56-100)	500 - 700*	50 - 80*
Fuhrländer AG	25	62,5
Windenergo (T600-48)	20*	12*
Vestas	1	3

* PwC estimate (official data not published), as of end 2011

Source: PwC analysis

4.3.5 Supply chain

The Ukrainian company Windenergo manufactured most wind turbines installed in Ukraine in 2011, both in terms of total installed capacity and number of units. The first modern wind turbine with installed capacity higher than 1 MW was installed the same year. Since then, the German company Fuhrländer AG has supplied 25 turbines with a unit capacity of 2.5 MW. The Danish company Vestas delivered one 3 MW turbine to the Novorossiyskiy Wind Power Plant in 2011 and a further 32 turbines were scheduled for delivery in 2012.

In June 2011, a memorandum of understanding was signed by Vestas and the state owned enterprise YUZHMASH for the production of towers in Ukraine.

Fuhrländer AG entered into a joint venture with a Ukrainian company in Kramatorsk in July 2012. The aim is to produce up to 18 nacelles and rotor hubs for the Fuhrländer 2.5 MW turbine per month. Since August 2012, the majority shareholder of Fuhrländer AG has been Maxim Efimov, a Ukrainian citizen.

As a result of the state complex programme, Ukrainian turbine producers focused on small turbines. Therefore, modern MW-sized turbines are not currently manufactured in Ukraine. The Fuhrländer joint venture could give the Ukrainian turbine manufacturing industry fresh impetus.

Several Ukrainian companies offer services for small turbines. A few domestic companies are also able to provide services to MW-class turbines. YUZHMASH, a state owned company, produces towers for small turbines (up to 60m in height). However, since signing the memorandum of understanding with Vestas, it is also expected that the latter will start manufacturing larger towers. It is, therefore, possible to supply a number of components and services locally (table 4.3.5)

TABLE 4.3.5 WIND TURBINE COMPONENT MANUFACTURING AND CONSTRUCTION IN UKRAINE

Structural manufacturers, electrical equipment suppliers
Design
Maintenance
Construction
Transport and lifting
Towers
Steel production

Source: PwC analysis

Privately owned wind farms were built on a multi contract basis. However, several domestic engineering, procurement and construction (EPC) contractors are active in the Ukrainian wind power market. A number of these are developing Ukraine's pipeline.

TABLE 4.3.6 WIND INDUSTRY SUPPLY CHAIN IN THE UKRAINE. ACTIVE COMPANIES PER SUB-SECTOR

Wind turbine manufacturers	Component suppliers	Wind farm developers/EPC contractors	Wind farm construction companies	Grid operators	Maintenance and repairs
Windenergo	YUZHMASH	Konkord Group	Azovinteks	Ukrenergo	YUZHMASH
Fuhrländer	Energomash-spetsstal	BETEN International	Felbermayr	Oblenergos	Fuhrländer
Vestas		EuroCape			Vestas
		WKN Ukraine			
		Wind Parks of Ukraine			
		Vindkraft Ukraine LLC			
		Wind Power (DTEK)			
		West Crimean Wind Farm			
		Prenecon-Karbon			
		Eco-Optima			

4.3.6 Financing

The Ukrainian banking system is characterised by a lack of liquidity. Consequently, private investors in wind energy rely on the EBRD, the World Bank and the Clean Technology Fund ("CTF") for financing. To stimulate renewable energy projects, the EBRD set up a €50m Ukraine sustainable energy lending facility (USELF) in 2010. USELF provides debt finance and development support to renewable energy investors. Two projects for which international finance institutions granted senior debt financing are described in box below.

The Novoazovskly and Stariy Sambir wind farms: financed by International Finance Institutions

The 57.5 MW Novoazovskiy wind farm was financed by both EBRD and CTF. Total investment costs amounted to €95m and were financed at 70% gearing. EBRD provided €33m, CTF extended €16m and the balance of €17m was granted by other banks on a pari-passu basis. The EBRD loan was denominated in euros and had a variable interest rate equal to EURIBOR plus a margin.

The Stariy Sambir project was financed by both EBRD and CTF. In August 2012, the Ukrainian-Italian joint venture company Eco-Optima was developing this wind farm in the Lviv region with a total installed capacity of 12.5 MW. It was scheduled to be operational by the end of the year. EBRD provided a 10-year €9.5m loan and CTF granted a 15-year €3.8m loan. The sponsors injected €7.2 million as equity into the project.

4.3.7 Support scheme

Renewable energy support scheme

Electricity generation from renewable energy is supported by feed-in tariffs (so-called "green tariffs"), mandatory off-take and tax incentives. The feed-in tariff was introduced in 2009 and is applicable until 1 January 2030. Electricity generated by renewables is purchased by Energorynok at the feed-in and then sold to the distribution operators. The electricity may also be sold directly to consumers on the basis of bilateral contracts. But the latter regime is subject to further regulation and an additional licence is required. The shift of the electricity market to a system of bilateral contracts is not expected to change the three building blocks of the renewable energy support scheme.

Feed-in tariff

The feed-in tariff is determined by the energy regulator. The minimum feed-in tariff of UAH 0.58 per kWh was set at the level of the retail tariff for electricity for the "second voltage class"[58] consumers valid in January 2009. This value is then multiplied by a coefficient.

TABLE 4.3.7 WIND ENERGY FEED-IN TARIFF COEFFICIENT

Wind farm installed capacity	Coefficient
Below 600 kW	1.2
600 kW - up to 2 MW	1.4
Over 2 MW	2.1

Source: The Law of Ukraine "On Electrical Power Engineering"

The amount of the tariff varies depending on when the wind farm comes into operation, on the basis of five year periods up to 2030.

TABLE 4.3.8 FEED-IN TARIFF DIGRESSION

Grid connection	Feed-in tariff decrease from base rate
2015 – 2019	10%
2020 – 2024	20%
2025 – 2029	30%

Source: The Law of Ukraine "On Electrical Power Engineering"

The feed-in tariffs are revised by the regulator every month and adjusted by taking into consideration the UAH/EUR exchange rate established by the National Bank of Ukraine. A ratio between the current exchange rate and the original exchange rate on 1 January 2009[59] is calculated. If this ratio is higher than one, the tariff is amended accordingly. Otherwise the original tariff is maintained. Thus, exchange rate risk is eliminated for foreign investors. The feed-in tariffs are not adjusted for inflation.

Local content

To qualify for the feed-in tariff, renewable energy producers are obliged to use local raw materials, fixed assets, engineering or services during construction. From 1 January 2012, the share of domestic components in total construction costs had to be at least 15%, rising to 30% in 2013 and 50% in 2014. The formula to calculate local content has not been finalised. This means that it is impossible to demonstrate compliance, so that no project can currently benefit from this support.

Tax incentives

Where there is no local equivalent, imports of equipment, materials or components used for renewable projects are exempt from VAT and import duties. The list of such equipment, materials and components is compiled and maintained by the government. Furthermore, 80% of corporate profits from selling equipment, materials and components used for renewable energy projects are exempt from taxation.

Companies producing electricity solely from renewables are exempt from corporate income tax until the end of 2020. However, the tax savings must be used for increasing production volumes, equipment replacement, new technologies or repayment of loans and interest within three years. If the tax savings are not used within the prescribed period, they have to be paid to the tax authorities, including penalties for late payment.

Property tax is cut by 25% for land with renewable installations. In addition, annual lease payments for municipal or government owned land plots may not exceed 3% of the plots' value.

[58] Consumers that receive electricity from points with voltage level of 35 kV or 27 kV
[59] On 1 January 2009 €100 was equivalent of UAH 1,085.55

4.3.8 Regulatory framework

Key agencies and institutions

The National State Energy Regulation Implementing Commission (NERC) regulates the Ukrainian energy sector. It issues licences for electricity generation, transmission and distribution and sets electricity prices.

Energorynok is a state owned company and operator of the Wholesale Electricity Market (WEM). Energorynok also administrates a WEM payment system, manages the WEM funds and is chief operator of the electricity accounting system in Ukraine.

The Ukrainian electricity market is based on a single buyer model — Energorynok is the only buyer. The government approved a shift of the electricity market to a system based on bilateral contracts in 2002. Under this system, electricity producers would have to conclude bilateral purchase agreements with electricity consumers. However, the parliament has not yet passed the corresponding laws and it is unclear when the new system will be adopted.

The Ukrainian electricity transmission system is operated by the state owned company Ukrenergo. It also owns the high voltage network. The Ukrainian electricity distribution networks are managed by 27 distribution companies (Oblenergos), which are regional monopolies.

Key documents

Building permit and licence

Developers of renewable energy projects apply to the NERC for a licence to produce electricity and a licence to sell the electricity on the WEM. Projects less than 5 MW in size benefit, however, from a simplified licensing procedure. Once all requirements are fulfilled, the producer obtains a power generation licence and the level of the feed-in tariff. After signing an agreement, the producer becomes member of WEM.

Ukrainian law[60] sets out five construction categories with different procedures to obtain approval for wind farm construction. It is unclear how to assign wind farms to the various categories. Depending on the category, the right to begin wind farm construction may require a written notification filed by the developer, a declaration on commencement of the construction works or a building permit.

If a public authority requires an environmental impact assessment (EIA), an assessment from the Department of Environment Protection is needed[61]. Generally, once all land-related issued have been cleared, it takes two years to obtain the licence, the permit and begin construction.

Grid connection

The operator of an electricity transmission or distribution system is obliged to connect renewable generators to the grid[62]. A connection agreement is signed between the operator of the transmission or distribution system and the renewable energy electricity producer. Connection can be refused only in case of limited technical or operating capacity of the transmission or distribution system. According to the legislation, grid connection costs should be borne by the grid operators. These costs can then be included in the calculation of electricity transmission tariffs.

4.3.9 Opportunities and challenges

Power plants can only be built on land plots designated for industrial use. Changing the designated purpose of land use is complicated and can take up to two years. It has to be approved by local authorities that are generally unwilling to classify agricultural land for industrial usage. Moreover, this change is prohibited for forest, recreational or nature protected areas.

Local content regulations are problematic as there is, to date, little industrial experience with MW-class turbines in the Ukraine. Only a handful of Ukrainian companies have obtained certification from the NERC to show that their components are domestic. Moreover, the method for calculating the share of domestic components in total construction costs had, at time of printing, not been determined. This prevents wind farm developers securing the feed-in tariff.

[60] Law of Ukraine No. 3038-VI "On Regulation of City Development Activity", in force since 12 March 2011
[61] For projects in the Crimea region, the appropriate authority is the Committee for Environmental Protection of the Region of Crimea.
[62] Law of Ukraine No. 3486-VI “On Electrical Power Engineering”

According to legislation, grid connection costs should be borne by the system operators. In practice, however, the connection costs are usually borne by electricity producers because the grid operators do not have the necessary funds. In addition, wind farm developers regard the grid connection procedure as one of the most complicated and onerous steps in the project.

A large part of the transmission network has already reached the end of its planned service life, especially in Crimea and along the Azov Sea coast, which are the windiest regions in Ukraine. According to the draft update of the Energy Strategy, 6 GW to 7 GW of renewable capacity can be connected to the grid without threatening its stability.

Clear administrative procedures for authorising wind farms are still lacking. Some have been drafted but the responsible authorities do not have the training or know how to enforce them. It is consequently difficult to negotiate project finance.

TABLE 4.3.9 OPPORTUNITIES AND CHALLENGES BY PROJECT STAGES

Wind assessment, land acquisition, environment and permits

Opportunities	Challenges
Further certification for wind turbines imported from Europe is not required	Power plants can only be built on land designated for industrial use. Changing a plot's designation is a complicated process. Agricultural land can seldom be re-designated
Large territories and good wind potentials	There is a lack of clarity over the categorisation of wind farms in the building permit process. Depending on the categorisation more permits may be required

Grid capacity, connection and wind farm operations

Opportunities	Challenges
System operators are obliged to connect wind farms to the grid	Although grid connection costs should be borne by the system operator, in practice they often do not have the necessary funds

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5 FUTURE MARKETS

5.1 Serbia

Main findings

Power market overview

☺ Accession negotiations with the EU will entail renewable energy targets and adopting similar electricity market legislation as Member States.

Wind energy in Serbia

☺ Serbia has an attractive feed-in tariff mechanism.

☹ The feed-in tariff is limited to 450 MW of total wind energy capacity.

☺ There is currently a 2.6 GW wind energy project pipeline.

Sites

☺ Serbia has good wind resource and wind energy potential.

Regulatory framework

☹ Important permitting and land use legislation is incompatible with renewable energy legislation, resulting in wind energy projects being blocked.

Opportunities and challenges

☺ The Serbian grid can connect 900 MW of wind energy capacity and up to 2,000 MW minor upgrades, despite the feed-in tariff limitation.

TABLE 5.1.1 OVERVIEW OF ELECTRICITY GENERATION, CONSUMPTION AND NET EXPORT BALANCE IN SERBIA (GWH)

	2007	2008	2009	2010	2011
Gross electricity generation	34,469	35,079	36,112	35,865	36,061
Conventional thermal	71.1%	72.6%	72.6%	67.8%	78%
Nuclear	0%	0%	0%	0%	0%
Hydro	28.8%	28.5%	30.6%	34.6%	35.4%
Other renewables	0.1%	0.1%	0.1%	0.2%	0.1%
Exports	1,730	1,508	2,720	2,559	2,064
Domestic final electricity consumption	28,558	29,210	28,744	29,588	29,954

Note: Exports and imports include annual contracts and long term contracts with EP Montenegro

Source: AERS

5.1.1 Power market overview

The energy generation sector in Serbia is controlled by the state owned company Elektroprivreda Srbije (EPS) which manages large coal fired production facilities and hydro power plants. Conventional thermal power dominates the electricity generation mix, amounting to 74.5% of total production in 2011. Hydro power accounted for 25.4% of production over the same year, while other renewables contributed less than 1%. Total electricity generated in domestic power plants increased by 0.5% in 2011, reaching approximately 36 TWh. In terms of historical trends, electricity production increased at a compound annual growth rate (CAGR) of 1.1% from 2007 to 2011, despite a 0.7% decline in 2010.

Electricity consumption increased at a compound annual growth rate of 1.3% between 2007 and 2011, in spite of a 1.6% drop in 2008. The successive increases in consumption (2.3% per year) in 2010 and 2011 indicate potential for further growth in line with economic development.

With the exception of 2008, Serbia remains a net exporter of electricity.

National wind power plan

Serbia is a signatory of the Kyoto protocol listed under Annex I but does not have a formal obligation to curb emissions because of its developing country status. However, in light of its accession negotiations with the EU, Serbia needs to adopt the EU's renewable energy legislation and targets. The new Energy Law, which entered into force in mid-2011, has several provisions in line with the EU's renewable energy directive, but does not set specific targets. Nevertheless, Serbia is expected to adopt a mandatory 2020 target for the share of renewable energy in final energy consumption and to develop a National Renewable Energy Action Plan (NREAP) similar to those of EU Member States.

Until the new legislation on renewable energy is fully developed and enforced, the country will continue following the objectives set out in the 2005-2015 Energy Strategy[63] and the 2007-2012 Energy Strategy programme[64]. By 2015 Serbia aims to derive 2% of final energy consumption from new renewable energy capacity (large hydro power excluded) under favourable macro-economic conditions. Should economic conditions be unfavourable, the target will be revised downwards to 0.6%.

TABLE 5.1.2 RENEWABLE ENERGY PRODUCTION IN SERBIA, TARGETS AND ACTUAL FIGURES 2009, 2012, 2015 (MILLION TOE)

	2009	2012	2015
Energy Strategy			
Favourable conditions	0.17	0.18	0.20
Unfavourable conditions	0.06	0.06	0.07

Source: Serbian Energy Sector Development Strategy

[63] Official Gazette of the Republic of Serbia No. 35/05, "Energy Sector Development Strategy of Republic of Serbia by 2015", 2005
[64] Official Gazette of the Republic of Serbia No. 17/07 and 73/07, "Energy Sector Development Strategy Implementation Programme 2007–2012", 2007

The Energy Strategy Implementation Programme envisages a 2.2% increase in the share of electricity from renewables in total consumption from its level in 2007. The programme established a wind energy capacity target of 45 MW by 2012, producing 114.7 GWh. Serbia is unlikely to meet this target due to delays in adopting necessary secondary legislation.

5.1.2 Wind energy in Serbia

While there are no operational wind farms in Serbia at present, the project pipeline reached 2.6 GW in 2011[65]. Unofficial market data suggests that four wind farms are likely to obtain a building permit during 2013. Other projects also seem to have made considerable progress. The Serbian Wind Energy Association (SEWEA) expects the first wind farms to become operational by 2014/2015 if current legislative uncertainties are tackled quickly.

Serbia has a moderate continental climate with significant seasonal and geographic variations in wind speed. The highest wind speeds are in the eastern parts of the country (Stara Planina, Ozren, Vlasina, Rtani, Deli Jovan, Crni Vrh), the mountainous ranges (Pester, Zlatibor, Zabljak, Bjelasica, Kopaonik, Divcibare) and the Pannonia plain. Wind measurements are being carried out in order develop a comprehensive national wind atlas.

Serbia's environmental protection areas fall outside the scope of the Natura 2000 programme. However, the participation in the Emerald network, supplementing Natura 2000 in some non-EU countries, entails specific measures aimed at ensuring the conservation of environmentally sensitive areas. As such, there are only minor differences between Serbian environmental requirements and those of international financial institutions such as EBRD — discrepancies regarding the timing of the Environmental Impact Assessment, for example.

5.1.3 Financing

Investors in the Serbian wind energy sector can access loans offered by numerous commercial banks[66]. The funds are awarded to Serbian enterprises developing small renewable production facilities and adopting measures to increase efficiency in commercial buildings and industrial energy generation. Loans are subject to tighter terms than other projects and compete with investments in other sectors such as agriculture and tourism. Banks require six to eight months minimum from signature for the contract to become operational. Industry sources suggest, however, that banks are generally unable to provide loans exceeding €15m and are unwilling to develop or operate wind farms, due to their lack of experience in renewables.

For large projects requiring higher capital investments, international financing institutions are the only option at present.

5.1.4 Support scheme

In June 2011 Serbia adopted a new energy law that makes the development of the economic, financial and commercial framework for the generation of renewable electricity a priority and sets up a support mechanism for renewable producers. The feed-in mechanism guarantees purchase of electricity from privileged producers at fixed tariff.

The power market operator is legally obliged to conclude a long term power purchasing agreement (PPA) with renewable producers that have obtained privileged status[67]. Feed-in tariffs are guaranteed over a 12 year period and are not indexed to inflation. At end 2012, the feed-in tariff amounted to the equivalent of €95/MWh. A maximum of 450 MW are currently available for support from the feed-in tariff. Due to the limited scope of the feed-in scheme, the PPA is not bankable for large projects as investors would have to undertake numerous costly and time consuming procedures without the certainty of fitting within the cap.

[65] Vattenfall Europe PowerConsult GmbH, Electricity Coordinating Centre Ltd. "Serbia Power Network Analysis for Wind Power Integration: Summary of the study", 2011

[66] Inter alia, Société Génerale Banka Srbija, Cacanska Banka, Erste Bank Serbia, Eurobank EFG, KBC Banka, Komercijalna Banka, OTP Bank, Privredna Banka Beograd,Procredit Bank, Raiffeisen Bank, UniCredit Bank, Volksbank

[67] The status of privileged producer is awarded to renewable energy producers operating plants above 30 MW, which have secured grid connection, a special measuring point and an agreement for the sale of electricity. The accession of wind power producers to privileged status is permitted as long as the nominal capacity of the project is lower than the remaining capacity eligible for the feed-in tariff, set at 450 MW

The transmission system operator (TSO) issues guarantees of origin for every megawatt hour of electricity produced which remain valid for one year from their issuance.

5.1.5 Regulatory framework

Key agencies and institutions

The Ministry of Infrastructure and Energy is the authority that oversees the energy sector. The primary responsibilities of the ministry include the elaboration of the energy strategy and the plans for its implementation, issuing energy permits and approving privileged producers.

The Energy Regulatory Agency of the Republic of Serbia (AERS) is the administrative body responsible for regulating the electricity sector. The regulator establishes the general terms for the electricity market, issues licenses for energy activities, sets prices, settles appeals and implements measures stipulated within ratified international agreements. The regulator plays an important role in the development of renewable energy, issuing the generation licenses and resolving appeals against the failure to release a decision or rejection of connection applications.

The Serbian Energy Efficiency Agency (SEEA) is a special state funded organisation that aims to improve energy conservation and promote the use of renewables.

Elektromreza Srbije (EMS) is a state owned company that acts as the operator of the transmission network consisting of 220 kV and 400 kV lines. EMS is primarily responsible for the functioning and upgrading of the electric power system and the development of the domestic electricity market. The distribution system is currently managed by EPS and its five regional subsidiaries (Elektrovojvodina plc, Elektrodistribucija Beograd plc, Elektrosrbija plc, ED Jugoistok plc, ED Centar plc).

Key documents

Building permit and licence

Building permits are issued by local authorities for wind farms of up to 10 MW and by the Ministry of Environment and Spatial Planning for larger projects. Installations located in the autonomous province of Vojvodina are subject to specific permitting procedures.

Applications for building permits should be processed within eight days from the submission of all required documents, which include an energy permit for projects exceeding 1 MW in installed capacity. However, the official deadline is seldom met in practice. Producers must demonstrate conformity with the provisions of the building permit and with additional technical requirements by obtaining a building use permit from the relevant authority based on an inspection.

The license to generate electricity is issued by the energy agency to renewable energy producers that meet technical, financial, environmental, organisational and legal prerequisites within 30 days of application. Given that government regulations restrict the eligibility for energy licenses to legal entities registered in Serbia, foreign investors must set up a local subsidiary in order to qualify. Licenses are granted for a 10 year period, subject to extension upon request. This license is not required for capacities below 1 MW.

Grid connection

System operators have 60 days to approve connection requests. Among other elements, the approval specifies the connection point, the procedure and technical parameters for the connection, associated deadlines and costs. Once the conditions have been met, the balancing responsibility allocated, the access to the electricity system secured and the use permit obtained by the applicant, operators have 15 days to connect the plant. Prior to finalising the connection, system operators and renewable producers conclude the connection contract.

Privileged renewable energy producers are entitled to priority dispatch, provided that their operations do not compromise the safe operation of the electricity power system. System operators that refuse contracts to privileged producers without valid motive are liable for fines between 1.5m and 3m RSD (€127,330 to €255,669).

5.1.6 Opportunities and challenges

Serbia has a technological wind potential of about 2.3 TWh and several regions whose wind speeds make projects economically feasible even in the absence of support. Given the untapped potential, the country is set to attract investments once legal issues are resolved. The members of SEWEA have announced plans to invest €1.5bn over the coming five years to construct wind farms with a total installed capacity of 1,000 MW.

The lack of an integrated legislative framework and delays in the adoption of decrees that have a major bearing on investment parameters are the main barriers to the development of wind power. Given the relatively recent introduction of incentive mechanisms and adherence to international environmental protocols, authorities have had limited opportunities to assess the effects of different legal provisions. Major adjustments to renewable regulations are still under way.

The necessary secondary legislation for the 2011 energy law is still pending. Authorities are lagging on the adoption of new feed-in tariffs, new terms for the acquisition of electricity from privileged producers, rules to accede to privileged producer status and rules on the usage of agricultural land owned by the state for non-agricultural purposes. Misalignments between the energy law and current decrees have halted project development. Investors would welcome regulations to guarantee the privilege producer status earlier on in the project and the raising of the regulatory threshold for wind installations (according to the power system's capacities). In addition, rules allowing permit connection approval to be signed following the issuance of the location permit would be helpful.

Grid capacity limitations are not an issue at present. According to the Vattenfall study, the transmission system requires minor upgrades and extensions in order to integrate 2,000 MW of wind energy capacity. The power system can support 900 MW of installed wind capacity without any adjustment to operating reserves and unit commitments. However, the regulatory threshold for the total wind capacity that is eligible for feed-in tariff is currently set at 450 MW, much lower than the limits of the transmission and the power systems.

Serbia is preparing to adhere to the Natura 2000 network. Considering that the country is rich in biodiversity, both in terms of ecosystems and species, the inclusion of areas of environmental importance under the Natura 2000 framework will require developers to prepare the necessary Appropriate Assessment.

TABLE 5.1.3 OPPORTUNITIES AND CHALLENGES BY PROJECT STAGES

Wind assessment, land acquisition, environment and permits

Opportunities	Challenges
Environmental licensing procedures similar to those of international financing institutions	Wind measurements still being carried out
	Incomplete legal framework for land acquisition
	Generation license restricted to Serbian legal entities
	Implementing legislation for permits and licenses still pending
	Inclusion in the Natura 2000 framework

Grid capacity, connection and wind farm operations

Opportunities	Challenges
Transmission and power system capacities able to support installations up to 900 MW, up to 2,000 MW with minor upgrades	Incomplete legislation
	Administrative delays
	Uncertainties over future feed–in tariffs

5.2 Slovakia

Main findings

Power market overview

😐 Since the decommissioning of the Jaslovské Behunice nuclear reactor, Slovakia is a net importer of electricity.

☹ Despite its lack of domestic capacity, wind energy deployment has been stopped. Installed wind capacity is currently anecdotal.

Wind energy in Slovakia

☹ Slovakia could move away from feed-in tariff support mechanisms to reverse auctions.

Supply chain

☹ There has been, to date, little scope for the development of a wind industry supply chain.

Regulatory framework

☹ Up to 600 MW of wind energy capacity have completed an EIA process, but are on hold.

Opportunities and challenges

☺ A review of the electricity grid's capacity could lead to connection possibilities for wind farms as of 2013.

TABLE 5.2.1 OVERVIEW OF ELECTRICITY GENERATION AND CONSUMPTION IN SLOVAKIA (GWH)

	2009	2010	2011
Total gross electricity generation	26,074	27,720	28,135
Thermal	4,768	5,023	5,726
Hydro	4,662	5,493	4,006
Nuclear	14,081	14,574	15,411
Other	2,563	2,630	2,992
of which wind	6	6	5.3
% of wind in total gross electricity generation	0.02%	0.02%	0.02%
Domestic gross electricity consumption	27,386	28,761	28,862
Total SK import/(export) balance	**1,312**	**1,041**	**727**

Source: Regulatory Office for Network Industries

5.2.1 Power market overview

Slovakia was a net electricity importer over the past three years due to the decommissioning of the V1 nuclear power plant in Jaslovske Bohunice at the end of 2008. Nuclear power plants generated 54% of electricity on average during this period while thermal and hydro plants accounted for 19% and 17%, respectively. Wind had a negligible share in electricity generation since total installed capacity was constant at 3.1 MW.

National plan of wind power electricity production

In its National Renewable Energy Action Plan (NREAP), Slovakia has set its 2020 target for the share of renewables in total gross electricity consumption at 14%, up from 10.2% in 2010. The indicative target for wind energy capacity is 350 MW generating around 560 GWh, accounting for 7.5% of renewable production and 1.8% of the projected total electricity consumption. Since the authorities stopped granting approvals for wind farms in 2009 arguing that they threaten the stability of the grid, it will be challenging to meet the 2020 target.

TABLE 5.2.2 SLOVAKIA WIND ENERGY TARGETS AND ACTUAL FIGURES

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
National plan											
Installed capacity in MW	5	5	150	150	150	300	300	300	350	350	350
Electricity generation in GWh	8	8	120	240	240	480	480	480	560	560	560
Actual figures											
Installed capacity in MW	3	3									
Electricity generation in GWh	6	5									

Source: Ministry of Economy of the Slovak Republic, Regulatory Office for Network Industries

TABLE 5.2.3 INSTALLED WIND ENERGY CAPACITY IN SLOVAKIA

Year	2005	2006	2007	2008	2009	2010	2011
Total installed capacity in MW	5	5	5	3	3	3	3
Total electricity generation in GWh	n/a	n/a	n/a	n/a	6	6	5

Source: EWEA, Ministry of Economy of the Slovak Republic, Regulatory Office for Network Industries

5.2.2 Wind energy in Slovakia

Installed wind energy capacity in Slovakia decreased from 5.1 MW in 2007 to 3.1 MW in 2008 and has been stable since. Unlike other countries, the adoption of a law supporting renewables in 2009 has not led to a rapid development of wind power as building permit approval procedures were suspended. As a result, the sector has not developed and there are no local suppliers of wind turbine components or local wind farm servicing and construction companies.

The wind industry and potential investors and developers estimate that with the current regulatory framework in Slovakia, revoking the building ban would allow for 500 MW to 600 MW of wind energy capacity to be built. This would not pose a threat to the stability of the grid. Should the ban be revoked, mainly German and Austrian engineering, procurement and construction (EPC) contractors and component suppliers are expected to enter the Slovak market.

5.2.3 Support scheme

Electricity production from renewables is promoted by mandatory off-take by distribution system operators and a feed-in tariff. The latter is applicable only for wind farms up to 15 MW of installed capacity. If the wind farm is bigger than 15 MW, the feed-in tariff is reduced proportionally.

Feed-in tariffs are guaranteed for 15 years and are not adjusted for inflation. The feed-in tariff applicable for projects connected in 2013 is €72.29/MWh.

5.2.4 Regulatory framework

Key agencies and institutions

The Regulatory Office for Network Industries (URSO) is the administrative authority responsible for energy sector regulation in Slovakia. The URSO sets the feed-in tariff, proposes measures to support renewables, issues licences, supports competition and supervises the energy market.

The Slovak electricity transmission system is operated, maintained and upgraded by the Slovak Electricity Transmission System (SEPS), a state owned company controlled by the national property fund. The local electricity distribution systems are operated by three distribution companies, in which strategic investors (E.ON, RWE or EDF) own 49% stakes and have managerial control.

Key documents

Building permit and licence

The licence to operate a wind farm is issued by the URSO. Other necessary approvals and permits are more difficult and time consuming to secure. It is necessary to complete an Environmental Impact Assessment (EIA) procedure for all wind farms, which usually takes two years. A total of around 600 MW worth of wind energy capacity has already successfully undergone the procedure.

The Ministry of Economy has to deliver a certificate before a power plant can operate. A plant will only be certified if the applicant's investment plan is in line with Slovak long term energy policy. An important prerequisite for obtaining this consent is a confirmation by SEPS that the power plant under consideration does not threaten transmission system stability.

In line with any other construction process, it is necessary to obtain a zoning permit and a construction permit. These related procedures can take up to two years as they involve various public authorities and agencies, numerous statements, documents, preliminary approvals and public enquiries.

Grid connection

Renewable energy power plants have priority connection on the distribution systems. Operators can refuse access to the grid only if there is a lack of capacity. Renewable generators are granted both priority connection and dispatch on the transmission grid.

5.2.4 Opportunities and challenges

At the end of 2009, SEPS stopped providing grid connection for wind farms arguing it posed a threat to grid stability. SEPS, the regulator (URSO) and the Ministry of Economy are reviewing Slovakia's transmission grid capacity and the volume of wind power it can manage. The results of the review were not available at the time of printing. Should the review determine that the grid is capable of managing wind power, SEPS will begin granting connection for wind energy projects.

Requests for wind farm approval submitted before 2010 were annulled and new requests have not been accepted since. As a result, it is not certain that the projects which have already obtained EIA approvals will be authorised, should grid capacity be allocated to wind.

However, if the grid capacity review gives the green light to wind energy, the government is expected to revise the support mechanism. A scheme of periodic reverse auctions, already announced in the country's NREAP in 2010, will be launched. Developers would be required to bid for a feed-in tariff in regions where grid capacity has been allocated. This mechanism was scheduled to come into force during 2011, but, in its progress report[68] to the European Commission on the implementation of the NREAP, the Slovak government postponed it to 2013. Nevertheless, the adoption of the auctions is dependent on the grid review freeing up capacity for wind energy. Should this not be the case, legislation will remain unchanged.

TABLE 5.2.4 OPPORTUNITIES AND CHALLENGES BY PROJECT STAGES

Wind assessment, land acquisition, environment and permits

Opportunities	Challenges
If barriers to wind energy deployment are removed, there will be significant scope for new projects to enter the permitting process	There is a multitude of necessary permits requiring contacting numerous administrations. The processes can take several years

Grid capacity, connection and wind farm operations

Opportunities	Challenges
Wind farms have priority connection to the grid and benefit from priority dispatch	Connection of wind farms to the grids has been stopped due to claimed threats to grid stability

[68] Progress report on promotion and usage of energy from renewable energy sources, issued by the Ministry of Economy of the Slovak Republic in May 2012

5.3 Slovenia

Main findings

Power market overview

- ☹ Energy generation is a largely state controlled sector in Slovenia.
- 😐 Although Slovenia is, currently, a net electricity exporter, with increasing domestic consumption exports are decreasing.

Wind energy in Slovenia

- ☹ There is currently no significant wind energy development in Slovenia, the country is, therefore, lagging behind the objectives of its NREAP.
- ☺ A mid-term wind energy potential of 600MW has been identified.
- 😐 Wind energy developers can choose between a feed-in tariff or feed-in premium, above 10 MW a wind energy project is only eligible for the premium.

Supply chain

- ☹ There is no significant wind industry supply chain, but first movers in high value added sub sectors are emerging.

Regulatory framework

- ☹ Administrative procedures both for building permits and grid connection are burdensome and opaque.

TABLE 5.3.1 OVERVIEW OF ELECTRICITY GENERATION, CONSUMPTION AND NET EXPORT BALANCE IN SLOVENIA

In Gwh	2007	2008	2009	2010	2011
Gross electricity generation	15,043	16,398	16,401	16,433	16,056
Conventional thermal	40.4%	37.2%	36.3%	36.9%	37.8%
Nuclear	37.9%	38.3%	35%	34.4%	38.7%
Hydro	21.7%	24.5%	28.7%	28.6%	23%
Other RES	0%	0.01%	0.02%	0.1%	0.4%
(Imports)/Exports	(229)	1,599	3,059	2,119	1,270
Domestic final electricity consumption	13,405	12,945	11,422	12,084	N/A

Source: Statistical Office of Slovenia

5.3.1 Power market overview

The energy generation sector is controlled by the state owned holding Slovenske Elektrarne which manages the largest coal and hydro power plants. Nuclear power and conventional thermal resources are predominant in the generation mix, amounting to 38.7% and 37.8% of gross production in 2011, respectively. Hydro power accounted for 23.1% of production over the same year, while other renewables contributed less than 1%.

Total gross electricity generated in domestic power plants decreased by 2.3% in 2011, reaching approximately 16 TWh. Historically, electricity production increased at an annual compound growth rate of 1.6% between 2007 to 2011, despite a decline of 2.3% in 2011. This contraction was caused by depleted hydro resources due to a prolonged dry spell.

Domestic electricity consumption decreased by 11.8% during 2009, which resulted in a negative compound annual growth rate of -3.4% between 2007 and 2010. However, in 2011, consumption increased by almost 6% indicating potential for further growth in line with improvements in macro-economic conditions.

Slovenia has been a power exporting country since 2007. Exports peaked in 2009 at 3TWh and were 1.3 TWh in 2011, 8% of total generation.

National Renewable Energy Action Plan

The EU renewable energy directive set Slovenia a target of 25% renewables in final energy consumption by 2020. To meet this, the Slovene National Renewable Energy Action Plan (NREAP) has set a target of over 39% electricity consumption met by renewables. The government is aiming for a cumulative wind installed capacity of 106 MW by 2020. The total electricity to be derived from wind farms by 2020 is estimated at 191 GWh, equivalent to 3.1% of the renewable electricity production forecast, meeting 1.3% of the country's consumption.

5.3.2 Wind energy in Slovenia

At end 2011, the only wind capacity in Slovenia was micro generation for a total capacity of around 0.03 MW. Consequently, the country is lagging behind the trajectory it set itself for wind energy in the NREAP.

TABLE 5.3.2 SLOVENIA WPP TARGETS AND ACTUAL FIGURES

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
National plan											
Installed capacity in MW	2	2	2	8	8	60	60	60	60	106	106
Electricity generation in GWh	2	4	4	14	14	109	109	109	109	191	191
Actual figures											
Installed capacity in MW	0	0									
Electricity generation in GWh	0	0									

Source: National Renewable Energy Action Plan, EWEA.

5.3.3 Supply chain

While several pilot projects have been commissioned and in some isolated areas wind is being used to grind feed or pump water, cumulative wind installed capacity in Slovenia remained below 1 MW in 2011. Given that the wind sector is still in its infancy, the number of local component suppliers is limited and few companies have the expertise to construct or operate wind farms. However, it is worth noting the emergence of first movers in the high value added sections of the supply chain — requiring specialised skills such as the development of anemometers and wind turbines.

According to data from UDI[69], wind farms with a cumulative installed capacity of around 40 MW are in the planning phase.

5.3.4 Support mechanism

In 2009, Slovenia adopted two support mechanisms for renewables, a feed-in tariff and a feed-in premium for electricity traded on the market or used for auto consumption, known as "operating support". Whereas the operating support is accessible to all wind farms, the feed-in tariff scheme is restricted to facilities of less than 5 MW. Borzen, organizator trga z električno energijo d.o.o. (Borzen), the power market operator, is required to purchase all the electricity qualified for the feed-in system and carries full balancing responsibility.

The duration of the support is calculated by subtracting the age of the production facility from the maximum regulated period of support (15 years), where the age is the time lapsed from the issuance of the permit for commercial operation or from the connection to the grid[70].

The level of support provided under both systems is commensurate with the reference costs of electricity production: the costs incurred by representative producer groups and across the different size classes of renewable energy plants. Reference costs consist of a fixed component — reflecting investment variables and capital costs — and a variable component indicative of reference fuel prices. The fixed component is adjusted every five years, the variable component annually or more often, depending on the estimated reference prices for energy. Feed-in tariffs are equal to the reference cost, while the operating support is the difference between the reference costs and market price.

In 2012 the feed-in tariff was €95.38/MWh, while operating support was €50.75MWh for wind farms of up to 10 MW and €38.76/MWh for larger projects. Wind farms exceeding 10 MW are not eligible for the feed-in tariff and can only be supported via the premium system.

TABLE 5.3.3 FEED-IN TARIFFS AND OPERATING SUPPORT FOR WIND POWER 2012 (MW)

Plant size	Reference cost (EUR/MWh)	Feed-in tariff (EUR/MWh)	Operating support (EUR/MWh)
Less than 10	95.38	95.38	50.75
10-125	86.74	-	38.76

Source: Borzen

[69] UDI, World Electric Power Plants Database, 2009
[70] Decree on support for electricity generated from renewable sources No.37/2009

To benefit from the incentive schemes, an application must be filed with the Energy Agency. Renewable producers who have the option to choose between schemes are required to communicate their preference in the application for support. The costs associated with the incentive mechanisms are passed on to end-consumers in the form of an added payment per kWh consumed.

5.3.5 Regulatory framework

Key agencies and institutions

The Energy Agency of the Republic of Slovenia is the administrative body responsible for the electricity, natural gas and district heating sectors. The regulator establishes the general terms for the consumption and supply of electricity, grid operations and balancing activities, issues permits and licenses, sets network charges and tariffs and participates in the development of the national energy strategy. The regulator also issues guarantees of origin to renewable generators.

Borzen (organizator trga z električno energijo d.o.o.) provides balancing and settlement services for the electricity market and oversees the renewable energy support mechanism. Through its Centre for RES/CHP support, Borzen awards financial support to qualified producers and purchases electricity from them, performs the settlement of green electricity balances and promotes energy efficiency.

Elektro-Slovenija d.o.o. (ELES) is a state owned company that acts as the operator of the local transmission network consisting of 110 kV, 220 kV and 400 kV lines. ELES is primarily responsible for the operation, maintenance and development of the transmission network, as well as secondary networks and power generation facilities. The company balances electricity supply and demand and oversees interconnections with neighbouring countries.

The local distribution system is currently managed by SODO, the state owned electricity distribution system operator. SODO leases the electricity infrastructure and specialised services of five smaller distribution companies and other closed distribution systems, providing distribution services to end consumers.

Key documents

Building permit and licence

Wind farm building permits are issued by local authorities based on the submission of mandatory documents, including an energy permit, environmental protection consent and other authorisations depending on the location and type of plant. Developers must demonstrate conformity with the requirements of the building permit and building law prior to commissioning the wind farm, by obtaining an operating permit. Wind farms with a nominal capacity below or equal to 50 kW do not require a building permit.

The licence to generate electricity is issued by the energy regulator within one month of the receipt of documentation that proves that the applicant meets all financial, organisational and legal prerequisites. The deadline is extended to two months where special declaratory proceedings are required for the regulator to issue a decision.

Grid connection

In order to connect wind farms to the public grid, renewable energy producers must obtain a number of documents from the transmission or distribution system operator, including the project conditions, the consent to connect, the connection agreement and the grid access agreement, among others.

Project conditions are issued upon submission of relevant permits (such as the energy permit, environmental consent). They define the main parameters of the grid connection, including the connection point and the spatial layout of the connecting lines. To obtain the connection agreement, developers must fulfil all the legal prerequisites for the connection within two years of receiving consent.

Once a connection agreement is concluded, the wind farm can be built. Developers also have to confirm their preferred incentive mechanism to enter into a grid access agreement. Subsequently, producers request a technical inspection of the plant and connecting lines whose results determine whether the operational permit is released. Operators are given eight days from the date of issue of the operational permit to set up the connection of the renewable energy plant.

5.3.6 Opportunities and challenges

Slovenia has a mid-term wind potential of around 600 MW, six times greater than foreseen in the country's NREAP. However, the country's high population density and small size limit the number of suitable wind farm locations. The extensive coverage of the Natura 2000 network and the strong opposition of environmental activists towards project development in protected areas further restrict the choice of location.

The administrative framework for renewable facilities poses significant problems to investors. There is a lack of clarity of administrative requirements, procedures are lengthy and involve a large number of authorities. The general perception in the industry is that administrative bodies tend to oppose the development of renewables[71].

Another important barrier is the obscurity and complexity of the grid connection process. Although information is readily available, the numerous preconditions for the conclusion of access agreements and the absence of a common grid code for all of SODO's subcontractors translate into a time consuming and expensive process. While regulation guarantees connection to renewable plants, *de facto* developers have few legal means of affirming their rights if their application is rejected, with no possibility of claiming compensation.

This problem is exacerbated by the limited legal grounds for obliging network operators to upgrade the grid. The transmission system operator (TSO) and distribution system operators (DSOs) must complete the construction and modernisation works required to connect renewable energy facilities, but their responsibilities only extend to plants for which grid adjustments were budgeted in the ten year network development plan. The connection of plants requiring grid investments that were not accounted for in the long term plan may take up to five years. However, the low nominal capacity and output of new renewable energy projects means that grid reinforcements are seldom needed in practice. According to Eclareon and the Öko-Institut[72], the public grid does not suffer from capacity constraints as far as renewable electricity projects are concerned and curtailment is not an issue for producers.

It is likely that the exclusion of wind farms above 10 MW capacity from the feed-in scheme will reduce the attractiveness of investments to international developers and suppliers specialising in large projects, who have the know-how and resources to jump start the sector.

TABLE 5.3.5 OPPORTUNITIES AND CHALLENGES BY PROJECT STAGES

Wind assessment, land acquisition, environment and permits

Opportunities	Challenges
Generating licenses are issued quickly, generally within one month of application	Obtaining building and environmental permits is cumbersome and wind farm developers face opposition from local authorities
	Slovenia has an extensive Natura 2000 network

Grid capacity, connection and wind farm operations

Opportunities	Challenges
Grid connection costs of wind farms up to 25 MW covered by authorities	Obscurity and complexity of grid connection process
Electricity markets are liberalised	Numerous preconditions and diverging grid code requirements are time consuming and expensive
	Limited legal possibilities to challenge an application rejection or claim compensation

[71] Ecorys Netherlands BV, "Assessment of non-cost barriers to renewable energy growth in EU Member States – AEON", 2010

[72] Eclareon, Öko-Institut, "Integration of electricity from renewables to the electricity grid and to the electricity market – RES-INTEGRATION; National report: Slovenia", 2011

5.4 Russia

Main findings

Wind energy in Russia

- ☹ Wind energy development in Russia is lagging due to a lack of an appropriate regulatory framework.
- ☹ Two different and contradictory support mechanisms have been written into law, but are still not functioning.

Sites

- ☺ Russia has a huge wind energy potential.

Supply chain

- ☹ Regional public utilities own most of the wind energy assets.

Regulatory framework

- ☹ Grid connection costs are unclear.

TABLE 5.4.1 OVERVIEW OF ELECTRICITY GENERATION AND CONSUMPTION IN RUSSIA (TWH)

	2009	2010	2011
Total gross electricity generation	957	1,005	1,019
Thermal	577	621	634
Nuclear	163	170	173
Hydro	166	158	155
Other	52	56	58
Domestic gross electricity consumption	943	989	1,000
Total RU import/ (export) balance	**(14)**	**(16)**	**(19)**

Source: System Operator of the Unified Energy System

5.4.1 Power market overview

The Russian Federation has been a long standing electricity exporter. Thermal power plants accounted for over 60% of total gross electricity generation since 2009, while nuclear and hydro plants produced 17% and 16% respectively. There is very little installed wind capacity in Russia, consequently its share of the generation mix is negligible.

National renewable energy plan

National indicative targets for renewable energy electricity generation have been set in the Energy Strategy of Russia to 2030[73]. According to the strategy, 4.5% of electricity should be generated by renewables[74] in 2020. Afterwards, the share of renewables should not fall below this level. According to the strategy achieving this target requires the connection of at least 25 GW of new renewable capacity to the grid by 2020.

The 2010 target of 1.5% renewable electricity was not met. According to the Energy Forecasting Agency, only about 0.3 to 0.4 GW of new renewable energy power plants will be built by 2020 and the 4.5% target might be met only in 2030. The agency's forecasts are not aligned with the strategy and offer a different view on future development of the Russian renewables sector. According to the latter's reference scenario, 6.1 GW of new renewable energy capacity is expected by 2030. In its maximum growth scenario, the agency forecasts new renewable energy capacity to reach 14.1 GW by 2030, considered sufficient to meet 4.5% of consumption by 2030. Again, this is in stark contradiction with the energy strategy.

5.4.2 Wind energy in Russia

With no regulatory framework or support scheme for renewables, the Russian wind energy sector is underdeveloped. Although Russia is the largest country in the world and has the longest coastline, installed wind power capacity was only 15.4 MW at the end of 2011. Moreover, the majority of the capacity comes from small wind farms that currently dominate the Russian market. Only four wind farms had total installed capacity exceeding of 2 MW.

TABLE 5.4.2 RUSSIAN RENEWABLE ELECTRICITY PRODUCTION TARGETS

	2010	2015	2020	2030
Share of renewables in electricity generation	1.5%	2.5%	4.5%	More or equal than 4.5%

Sources: Resolution No. 1-r "On the Main Areas of Government Policy to Raise the Efficiency of Electric Power from Renewable Energy Sources for the Period to 2020" and the Energy Strategy of Russia until 2030

[73] Decree N° 1715-r of the Government of the Russian Federation dated 13 November 2009
[74] This target includes hydro power plants with installed capacity lower than 25 MW

TABLE 5.4.3 INSTALLED WIND ENERGY CAPACITY IN RUSSIA

Year	2006	2007	2008	2009	2010	2011
Total installed capacity in MW	15.5	16.5	16.5	14.0	15.4	15.4

Sources: PwC analysis and World Wind Energy Association

5.4.3 Sites

Russia has many locations with favourable wind conditions for wind energy. The regions with the highest wind potential are the coastlines of the Pacific and Arctic Oceans, the Caucasus region, the Urals region, the Altai and the Sayan mountains. Currently, the largest wind farms are located in the Kaliningrad Region, Republic of Bashkortostan, Republic of Kalmykia and in Chukotka.

5.4.4 Main wind energy developers

Most wind turbines are owned and operated by state controlled regional utility companies that also operate the local transmission systems.

TABLE 5.4.4 MAIN WIND ENERGY DEVELOPERS IN RUSSIA

Company	Total installed capacity in MW
Kaliningrad Generation Company JSC	5.1
Chukotkommunhoz JSC	2.5
Bashkirenergo OJSC	2.2

Source: PwC analysis, as of August 2012

5.4.5 Supply chain

Most wind turbines installed in Russia began operating before 2002 and are less than 1 MW. The only two larger turbines were manufactured by Vensys in 2011. Cumulatively, however, Vestas is the largest turbine supplier, both in terms of total capacity and number of installations.

TABLE 5.4.5 WIND TURBINE MANUFACTURERS' SHARE OF THE RUSSIAN MARKET

Turbine producer	No. of installed turbines	Total installed capacity (MW)
Vestas	20	4.5
AVE	10	2.5
Vensys	2	2.4
Hanseatische AG	4	2.2
Raduga	6	1.5
Micon	4	1.0
Wind World	1	0.6

Source: PwC analysis, as of August 2012

Since the Russian wind energy sector is underdeveloped, modern wind turbines with capacity higher than 1 MW are not produced in Russia. Moreover, there is a limited local supply chain, as domestic companies do not have experience in manufacturing components for modern wind turbines or in building and servicing wind farms.

5.4.6 Wind energy support scheme

In November 2007, the Russian government adopted a federal law introducing the Electricity Premium Scheme[75], for renewables. According to this law, qualified producers should receive the wholesale electricity market price plus a premium for the electricity generated. The premium should be applicable until the national renewables targets are met. Thus, the period during which the premium will be paid is not fixed and can be shortened at any stage during a wind farm's operating lifetime. Although this renewable support mechanism is legally binding, regulations setting up the scheme and determining how the premium is calculated have not been adopted.

[75] Federal Law No. 250-FZ dated 4 November 2007

The electricity producer is required to sign a capacity market trading system accession contract with the market council. The wholesale market electricity buyers are obliged to purchase a certain amount of electricity produced by renewables at a determined price.

In December 2010, the law introducing the capacity based scheme[76], which does not repeal the electricity premium scheme, was adopted. According to the new law, the market council determines a feed-in tariff for new power plants[77] included in a list prepared by the government. Renewable feed-in tariffs are applicable for 10 years and approved for new facilities until the national renewable targets — calculated in installed capacity — are reached. However, neither the parameters for calculating the tariff nor the national capacity (MW) targets have been determined.

Furthermore, the law requires the government to adopt the list of new power plants which can conclude power purchase agreements at a feed-in tariff but does not specify a mechanism for selecting the assets. It is thought that the government could announce tenders for power plants at a specific location and then approve the assets on the basis of the submitted bids. Nevertheless, it is unclear how the two support mechanisms are meant to coexist.

5.4.7 Regulation overview

Key agencies and institutions

Since the restructuring of the electricity market in 2008, the Ministry of Energy is responsible for energy policy. The Federal Grid Company of Unified System is a government controlled operator and owns the high voltage transmission system. The government is also the largest shareholder in a number of the 11 regional distribution grid companies. The remaining ownership stakes have been privatised.

The market council operates the commercial and technological infrastructure of the wholesale market. In addition, it regulates the market, adopts standard contractual forms for securing trade on the market and approves renewable electricity generation facilities.

Electricity prices have been liberalised. As of August 2012, approximately 80% of electricity was traded on the wholesale market. This competitive market has, however, not been extended to isolated regions, such as the Russian Far East, Kaliningrad and Arkhangelsk regions.

Key documents

Building permit and licence

The Federal government[78] defines the criteria for renewable producers to become a qualified generating facility. Operators have to demonstrate that the facility uses renewables — and thus contributes to the national renewable energy targets — for the market council to officially acknowledge them.

Grid connection

Grid connection costs for renewable energy facilities with installed capacity up to 25 MW should be covered by the government[79]. However, as of August 2012, it was not clear how the installed capacity should be calculated and whether investors have to pay grid connection costs themselves up front, and then ask for reimbursement or whether the government pays the costs directly to the grid operator.

5.4.8 Opportunities and challenges

Although laws promoting renewables have been adopted, the necessary legislation and regulations to launch the support mechanisms have yet to be determined. Progress towards finalising the support schemes is slow. As a result, the Energy Strategy of Russia, adopted in November 2009, has fallen short as investments in renewables are commercially unfeasible. Moreover, the strategy is weak as the renewable energy targets are not mandatory and are unclear beyond 2030. It also does not provide any plan for achieving its objectives.

[76] Federal Law No. 401-FZ dated 28 December 2010
[77] Can be both RES and conventional sources
[78] Resolution of the Russian Federation Government of 3 June 2008 No. 426
[79] Resolution No. 850 On the Approval of Criteria for the Provision of Subsidies from the Federal Budget to Compensate for the Costs of the Technical Connection of Generating Facilities with an Installed Capacity Not Exceeding 25 MW and that have been Qualified as Renewable Energy Facilities

TABLE 5.4.6 OPPORTUNITIES AND CHALLENGES BY PROJECT STAGES

Wind assessment, land acquisition, environment and permits

Opportunities	Challenges
Laws and targets to promote renewables have been adopted	Inapplicability of renewable energy laws
	No regulatory framework or support scheme for wind energy development

Grid capacity, connection and wind farm operations

Opportunities	Challenges
Grid connection costs of wind farms up to 25 MW covered by authorities	Lack of clarity over how connection costs are calculated and are acquitted
Electricity markets liberalised	

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