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Renewable Energy



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Introduction

This renewables guide includes contributions from some of the most active lawyers in the sector. What it shows is that the renewables industry is in a period of major transition. The industry has long looked to governments to help structure power sectors to give renewables preferential access to the system, to provide a strategic vision toward decarbonisation and to provide direct economic benefits to subsidise renewables. The industry is now in the middle of a shift to a new mentality. In the future, the industry will be expected to develop fully merchant plants. The transition is at different stages in different countries and for different technologies. Over the short term, the industry is likely to require governments to continue to smooth the path, particularly in ensuring avenues exist to stabilise long term revenue streams to mitigate the risks. This is particularly important for renewables given the proportionately higher upfront costs of developing projects.

The memory of the retroactive rule changes and wobbling of political support for renewables after the financial crisis a decade ago will mean that the industry will keep an eye on governmental ambitions in the sector. However, the economics and rationale for onshore wind and solar, and possibly offshore wind in the near term, have shifted significantly and so these segments of the industry will look to the future with greater optimism. And with the price falls for commercial scale batteries co-locating with renewables projects, the criticisms of renewables as unreliably intermittent are also fading fast.

Of course, solar PV and wind are not the only renewables technologies that exist. The scale of wider shifts in energy usage could see a sky-rocketing of demand for power, particularly green power. For example, the electrification of the transport sector through electric vehicles and charge points could be a further boost for new renewables developments. However, the extent of political will in the different jurisdictions to catalyse less mature renewables technologies remains an open question at this time.

The International Context

On 12 December 2015, the language of the Paris Agreement was adopted by consensus, requiring its signatories to hold global average temperatures to well below 2°C above pre-industrial levels. The message of the Paris Agreement was clear: it is the shared responsibility of the global community to mitigate the impact of climate change, and those with the broadest shoulders should take on the largest burden. The development of renewable sources of energy remains crucial to achieving that goal, and the potential transformative impact of technology was recorded in Article 10 of the agreement.

Two years on, the subscribers to the Paris Agreement could scarcely have imagined the impact technological developments would have on the energy industry in such a short space of time. The argument for promoting renewable sources of energy has shifted away from environmental concerns to economic ones. Renewable sources of energy are increasingly able to compete with fossil fuels in a free-market environment: the first subsidy-free solar farm, complete with energy storage, was opened in the UK in September, while a raft of subsidy-free bids were received by the Dutch government for offshore wind this year.

The language of the Paris Agreement allows for a two-track approach, whereby developing countries are given more time to transition to a low-carbon economy than their developed counterparts. Our guide shows that how "developed" a country is does not necessarily reflect the role renewables play in its energy industry. Indeed, Morocco has a sophisticated network of fiscal stimuli, pro-business policies and legal frameworks to promote renewable energy that overshadows many of the other countries in this guide. Offshore wind is the notable exception to this rule. All the largest offshore

wind markets are located in Western Europe; in Belgium, for example, offshore wind farms will supply 10% of Belgium's energy consumption in 2020.

Of course, the transformative impact of the last few years should not be overestimated. Many countries have long since benefitted from advantageous climates and topography, which are conducive to the development of renewable sources of energy. Switzerland, Croatia and Colombia all have mountainous regions which give them a clear competitive advantage in hydropower, the UAE's location in the world's "Sun-Belt" facilitates the development of solar panels, and Ukraine's large agricultural sector and available workforce is conducive to the development of biomass and biogas plants.

Equally, the low price of fossil fuels and the emergence of fracking has seen a revival of those industries in some parts of the world, particularly the United States of America. The consumption of energy from fossil fuels still dwarfs that of energy from renewable sources. Nevertheless, renewables are on the rise. In 2016, a staggering 80% of the energy generated in Austria was derived from renewable sources. Other countries are following suit, and not simply to comply with international environmental law, but because the economic argument for renewables is becoming increasingly harder to ignore.

The demise of subsidies

Given the idiosyncrasies of individual countries, it is difficult to discern global trends in the renewables industry; any such trends will inevitably be subject to exceptions and counter-examples. Nevertheless, our guide broadly indicates that direct financial subsidies are reducing dramatically or are in effect falling away.

Many of the countries in this guide have traditionally operated a government-led subsidy system in which Feed-in-Tariffs ("FiTs") or Energy Certificates are granted to renewable energy producers to incentivise the production of renewable energy. Hungary, for example, has recently introduced an offtake regime that offers mandatory FiTs and premium subsidies to newly-built power generation units using renewable energy sources. However, generally, these subsidies are now being amended or withdrawn altogether in favour of a more market-led approach. In June 2016, Italy provided for an annual aggregate cost cap for the number of FiTs that may be granted to non-solar renewable energy sources.

Subsidy regimes that are capped or secured through a selection process have been criticised as sometimes leading to market inefficiency and a policy of "picking winners". For example, the European Commission has recently stated that the Czech government should adopt measures to control "overcompensation" in respect of some of its support schemes. In the UK, Oxford Professor Dieter Helm's scathing assessment of the UK energy industry argued that the UK subsidy system has led to an inefficient culture of lobbying and crystal-ball gazing. Perhaps the clearest manifestation of the overcompensation caused by a subsidy regime is in Portugal. In February 2017, the government ordered that promoters of power plants who had received FiTs and public support funds should return "excessive" amounts to the National Electric System.

The merits of auction processes have also been noted. Those introduced in Slovakia, Spain and Mexico are seen as indicative of a transition to a more competitive energy industry. However, in many countries, this transition is still at an embryonic stage. Although Peru's first renewable energy auction took place in 2009, it was only in 2016 that the guaranteed prices awarded to bidders fell dramatically, and government subsidies could be curtailed. Equally, some countries, such as Slovenia, have avoided the transition to a more competitive renewable energy market altogether, instead choosing to reinforce and renew existing subsidy schemes.

Rather than adopt an auction process, other countries have developed tax incentives to encourage the development of renewable technologies. Luxembourg's income tax law provides for a special depreciation method to encourage investment in assets contributing to energy efficiency in buildings, and exemptions in income tax for the sale of electricity generated from solar PV sources.

Singapore has resisted a subsidy or FiT regime for renewable energy instead generously funding R&D and waiting until technologies are commercially viable under usual market conditions. While the Singapore model may be seen as attractive to many countries, the larger economies will need to show leadership in helping to commercialise immature technologies if momentum on these is to be maintained.

Falling costs

Of the numerous changes in recent years, arguably none has been as impressive as the plunge in solar power costs. The International Renewable Energy Agency (IRENA) has recently stated that it expects solar power costs to fall by another 60% in the next ten years. The fall in these costs has facilitated the rise of rooftop solar panels. In Brazil, for example, the ten year plan projection forecasts 3.5GW of on-site solar PV by 2026 from an existing negligible base. The emergence of rooftop solar forms part of a wider trend that is having a disruptive effect on traditional models of transmission and distribution infrastructure.

Alongside the fall in solar and wind costs, other costs are also falling. For example, the costs of equity, of debt and of operation and maintenance have all fallen considerably over the past few years.

In addition, the costs of managing the intermittency risks of many renewables technologies are also falling, with electricity storage options coming into focus. Storage offers numerous benefits. In the context of renewables, key benefits include optimisation of the revenue stream, reduction in imbalance costs, reduced strains on the grid system and potentially the deferral of some infrastructure costs. Energy storage projects have been installed in the majority of jurisdictions reviewed – although not always at significant scale. The main focus has been in the UK, Czech Republic, Netherlands and Poland. While battery technologies are receiving the bulk of industry attention at present, a range of technologies have been, and are due to be, installed, pumped hydro storage in particular. Obstacles remain in the legal and regulatory frameworks in many jurisdictions before the potential of storage technologies can be fully realised.

Consumers driving the demand for more green power

Renewables technology is likely to be a key beneficiary from the enhanced role consumers will play in the sector in the future. At the larger end, the RE100 includes global brand names, like Microsoft, Google, Unilever, Diageo and Tata Motors, who are committed to becoming 100% fully renewable in their consumption. At the smaller end, smart meters and new interfaces with the sector are allowing more direct consumer engagement. For example, new technologies are entering the sector such as blockchain - a digital platform that allows an individual party to conduct and bill a transaction directly with another party without the need for an intermediary.

The combined effect of low fixed costs and new technologies is that many traditional gatekeepers may be bypassed and a new type of consumer - the "prosumer" who both consumes and produces energy - will emerge. Such prosumers are often driven by a desire to both reduce their costs and their impact on the environment from their energy usage. Existing legal frameworks have not yet caught up with industry developments such as peer-to-peer trading although a number of governments in our guide are belatedly beginning to update existing legislation to accommodate these developments.

Further, the future of transport would appear to be electric. There has been a recent flurry of government announcements, including commitments in the UK and France to ban the sale of new conventional petrol and diesel vehicles by 2040 and the announcement in India that all cars sold from 2030 are to be powered by electricity. A number of countries are already adopting energy strategies that facilitate the transition to electric vehicles. Bulgaria's Energy Strategy outlines the role electric vehicles will play in the "green" cities of the future, and the Bulgarian government is shortly expected to bring forward legislation to encourage the deployment of localised charging stations which are so vital to achieving this goal.

The trend toward localisation of electricity production is inevitable, with more smaller projects (including household projects) embedded in distribution networks. However, it seems likely that the scale of the shift in electricity usage, together with the implicit expectation of consumers that the shift brings broader environmental benefits, will also drive forward new renewables projects.

The challenge for emerging technologies

In many of the countries in our guide, hydropower energy has traditionally been the foundation of the renewables economy owing to their fortunate topography. However, we have recently seen the growth of renewables technologies that are less dependent on geographical circumstance, namely solar and wind, and even countries with a traditional strength in hydropower, such as Brazil, are diversifying their renewables industry.

While some technologies have thrived, others have struggled. Carbon Capture and Storage has not taken off in the way many would have expected, as alternative renewables have become more attractive for investors (a USD 25m prize offered by Richard Branson for the first "commercially viable design" to remove greenhouse gases on a large scale has remained stubbornly unclaimed).

The defining feature of the renewables energy industry in the last two years is the dramatic fall in solar and wind technology costs. For example, in 2010, the unit cost of solar power in China was about 20,000 yuan per kW. It is now roughly 7,000 yuan per kW. This has allowed governments to decrease subsidies while still meeting their obligations under the Paris Agreement. It has also boosted the economic case for renewables to supplement the environmental arguments. Fully meeting our decarbonisation commitments is likely to require even greater diversity in renewables sources than those that are currently commercialising. The challenge is to continue to focus on the long-term goals and help the most promising emerging technologies to achieve technological and economic leaps similar to those demonstrated by solar PV and wind over the past decade.

It is my pleasure to edit and present this renewables guide. For further information please contact any of the authors who have contributed to the guide or your usual contact at CMS.

Munir Hassan



Angola

Author: Filipa Tavares de Lima

1. Brief overview of renewables sector

Between 2008 and 2014 the energy consumption in Angola recorded an annual average growth rate of 15.5%. As a result the Angolan energy consumption reached 9.48TWh in 2014, without considering suppressed demand and self-generation.

The energy consumption in Angola is mostly urban and residential. It is estimated that the residential sector demand accounts for 45% of total generation, followed by services (roughly 32%) and industry (approximately 9%). As per the studies made in 2015 only 30% of the population had access to electricity (46% in urban areas and 18% in rural areas).

A strong growth of energy consumption is anticipated until 2025, foreseeably reaching a load of 7.2GW. This envisaged growth corresponds to the provision of energy to 60% of the population, the increase in residential consumption and the country's industrialization.

In 2013, over 70% of the electricity produced in the country was hydro-based. This has been recently reinforced with an investment on large hydroelectric plants, by building Laúca with 2060MW and Cambambe II with 700MW (an addition to the 200MW of Cambambe I). Various other hydroelectric projects are being developed, particularly Caculo Cabaça (already under construction with 2172MW), Jamba-Ya-Mina, Jamba-Ya-Oma and Baynes.

As one of the richest African countries in natural resources and with the country's hydropower potential among the highest in Africa, Angola is currently a country in which the renewable energy sector is not diverse.

2. Recent developments in the renewables sector

The Angola Government has a very ambitious energy project to be implemented until 2025. Within the "Angola 2025" strategy the Angola Government issued the "National Strategy for the New Renewable Energies", which provides an in-depth look at the goals that the Angolan State wishes to meet until 2025.

This strategy seeks to contribute to the National Energy Security Policy and Strategy (enacted in 2011), promoting the diversification of the national energy, as well as for the Program of Integrated Rural Development and Poverty Combat, and for the promotion of growth and employment. On the international front, Angola considers that this strategy contributes to the climate change and is in line with its participation in SADC and IRENA.

The Government of Angola's target is that in 2025 at least 7.5% of the electricity generated in the country (equivalent to an installation of 800MW) will come from new renewable energies (major hydroelectric projects are not included). In order to reach this goal the Angolan authorities identified the following three goals:

1) Improve access to energy services in rural areas based on renewable energy (e.g. "Solar Villages" program, creation of distribution networks and service providers throughout the territory);

2) Develop the use of new grid-connected renewable technologies (targets and guidelines for each type of renewable energy and the promotion of investment are provided);

3) Promote and accelerate public and private investment (e.g. the creation of specific legislation for renewables, a system of tariffs such as "feed-in" for projects up to 10MW, credit lines to stimulate the private sector initiative in rural areas.

In order to promote the investment in this sector until 2025 the Angolan government is considering implementing the following actions:

1) Approve specific laws for new renewable energies;

2) Approve pre-defined subsidized tariffs for renewable projects to be grid-connected of up to 10MW and review the tax system;

3) Allocate an amount of at least AKz 1,000m per year to the National Electricity Fund (FUNEL) by 2025 to support rural electrification programs based on renewable energies and to the establishment of subsidized credit lines for the purchase of individual systems or launch of productive activities;

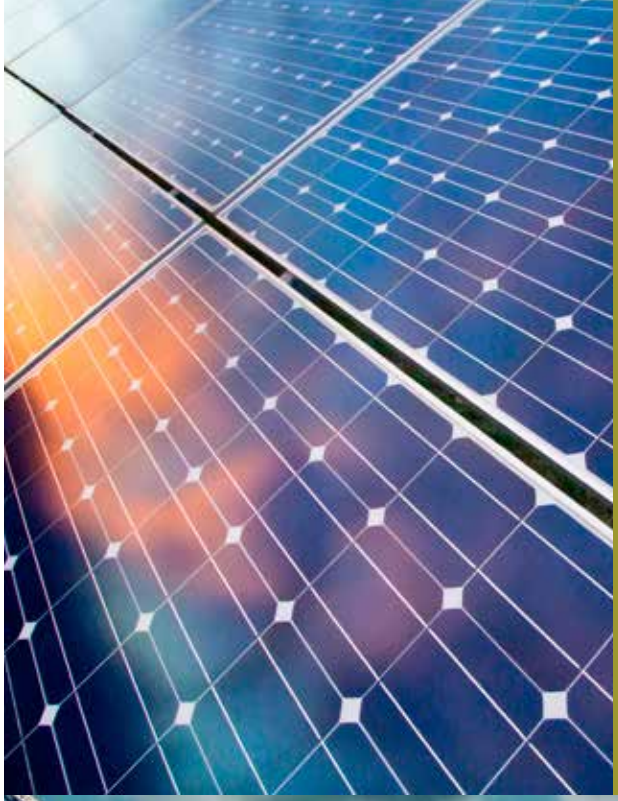
4) Ensure the establishment of at least one training centre for renewable energies;

5) Launch a media campaign about renewable energies and its advantages, particularly as a mean of bringing basic energy services to rural areas and boost solar thermal.

3. Forthcoming developments/opportunities in the renewables sector

As per an extensive work made by the Angolan government in this sector, a thorough assessment was made to the potential of Angola in the renewable energy sector. We highlight the following:

1) Solar energy: Solar radiation is high and constant throughout the territory, having been identified 55GW of generation potential. As per studies made by the Angolan government, Angola has a high







potential of solar resource, with a global annual horizontal solar radiation between 1,370 and 2,100kWh/m²/year.

2) Hydropower (up to 10MW): The hydroelectric potential is currently estimated at 18GW, having been identified numerous rivers with adequate flows and falls to smaller projects (up to 10MW) throughout the territory. The river basins of Kwanza, Cunene, Catumbela and Queve (that represent 86% of the estimated potential) were identified as best targets for this technology. Notwithstanding, several rivers throughout the territory have conditions for smaller size projects.

3) Biomass energy: The forests of the country, the existing forest polygons, the favourable agricultural areas for the planting of sugar cane or other crops with energy potential, the farming of livestock and municipal solid waste, all have the potential to generate energy that can overcome the 3GW. The Central Region (Provinces of Huambo, Bie and Benguela) and the Eastern Region (Provinces of Moxico, Lunda Sul and Lunda Norte) are the most favourable zones in terms of resources (forestry and agro-industry).

4) Wind energy: Recently completed studies concluded that the wind in the Southwest and on the Atlantic slope, along to the north-south axis, present favourable conditions to the installation of more than 3GW of wind farms.

5) The remaining sources of energy: Geothermal signs of average enthalpy in the centre of the country and an extensive ocean coastline also constitute potential resources to be followed.

Rural electrification based on renewable energies

The Angolan government has in place a project to provide power in locations not covered by the national grid or by isolated systems. Rural electrification should be completed through mini-grids or individual systems with different service levels and different levels of involvement of the public sector in order to maximize the number of beneficiaries.

The remote rural areas far from the grid may be subdivided into two main categories:

1) Zones of influence: The communal centres, the larger villages (more than 2,000 inhabitants) and the ones along the main roads. About 500 zones of influence throughout the country were identified;

2) Scattered areas: The smaller villages and settlements isolated and away from main roads, where often farming communities with some organizational and trade skills may be found.

The implementation of renewable energy sources in these remote areas is currently being considered.

The main goal of the Angolan government is to diversify the investment in renewable energy through a growing role of this type of energies, including small hydropower plants.

The Strategic Goals for the Renewable Energy

Three strategic goals were set forth for the renewable energy in order to meet the main challenges identified:

1) Improve the access to energy in rural areas using renewable sources: The goal is to support rural development and relief the population from poverty, as well as to guarantee that communities living in non-electrified areas may access to safer and better quality energy sources.

2) Develop the use of the new renewable technologies connected to the grid, enhancing the establishment of new markets and reduction of regional asymmetries: The goal for grid-connected renewable energies is to develop the national renewable resources that provide electric energy, taking advantage of opportunities for replacing fossil fuels, avoiding investments in grids or enhancing new sectors that will generate wealth and employment.

3) Promote and accelerate the private and public investment in the new renewable energy: The goal is to generate effective conditions of investment in the "new" renewable energy that mitigate the distortion introduced by fossil fuels subsidies, offering a suitable payback to the investment, an appropriate mitigation of risks and a regulation, procedures and communication that ease the implementation and commit investors.





Austria

Authors: Johannes Trenkwalder, Molly Kos

1. Brief overview of renewables sector

Energy sourced from renewables is gaining increasing importance in Austria. According to the Energy Report 2017 prepared by the Ministry of Science, Research and Economy, almost 80% of the energy generated in Austria was derived from renewable sources in 2016. Approximately 35% of this amount stems from hydro-power and 43% stems from biomass. However, wind and solar generation (almost 6%) is also steadily increasing in importance, as is energy generated from firewood (12%).

The country's topography supports the trend towards the generation and consumption of renewable energy, as does the legislative framework, which is mostly based on EU legislation. Austria has committed itself to increasing its share of renewable energy to up to 34% by 2020 and thus set one of the most ambitious national targets on the use of energy from renewable sources within the EU. This target has not been reached so far, but Austria is well on track to doing so.

The main driving force for supporting renewable energy within the legislative framework is the Green Electricity Act 2012 (Ökostromgesetz 2012), which was recently amended to further increase the share of renewable energy.

2. Recent developments in the renewables sector

The subsidy structure of the Green Electricity Act 2012 is based on the Community Guidelines on State Aid for Environmental Protection (2008/C 82/01). The new Guidelines on State Aid for Environmental Protection and Energy 2014–2020 (2014/C 200/01) came into force on 1 July 2014 and set out a general adaptation period lasting until 1 January 2016.

It was however only recently that the legislator agreed on the "Small Electricity Act Amendment" ("kleine Ökostromnovelle"). This amendment is still encompassed by the approved subsidy scheme and thus does not need to comply with the new EU state aid regime. Prices vary between EUR 124/MWh and EUR 129.80/MWh.

The main amendments are set out below:

One-stop-shop for approval procedure

As of 1 January 2018, the Green Electricity Clearing and Settlement Agency ("Ökostromabwicklungsstelle", OeMAG) decides on applications for the approval of solar, wind and small hydropower plants and concludes contracts on subsidies for these plants. Only commodity dependent plants (biomass and biogas) still have to obtain approval from the competent provincial governor first and then apply for a contract with OeMAG.







Measures to reduce current applications backlog
New and additional support payments for the immediate conclusion of contracts with OeMAG were implemented for wind power and small hydropower plants. As of 1 October 2017, OeMAG is obliged to immediately conclude a subsidy contract for the construction of wind power and small hydropower plants, provided the new support payments are available. However, these additional support payments may only be requested for those plants which have already been approved as green electricity plants and have so far not been granted any funding. Those who want to benefit from these additional support payments have to make an application that their contract with OeMAG be concluded in the last quarter of 2017, as later applications do not fall under this short-term subsidy program. Only applications from 1 October 2017 to 31 December 2017 fall within the subsidy period.

No immediate conclusion of contracts with OeMAG is provided for solar power plants that have already been approved but have not been granted any funds.

Extension of the expiry period for applications for the approval of wind, hydropower and commodity dependent plants
The expiry period for applications for approval was extended from three to five years as of the date of lodging the application for approval of wind, hydropower and commodity dependent plants. Further wind power plants only have to come into operation within 48 months (instead of 36 months).

Solar power applicants have to demonstrate to OeMAG that they have ordered the respective (entire) solar power plant within three months of lodging the application. Once the solar power plant has been approved it needs to be put in operation within nine months (instead of twelve months).

Amendments with regard to investment subsidies
Investment subsidies have to comply with the General Block Exemption Regulation (EU) No. 651/2014.

As of 2017 subsidies for small hydropower plants have been extended from EUR 16m to EUR 20m per year. Wind power plants are also additionally subsidised by EUR 30m in 2017 and another EUR 15m in 2018.

In contrast to the above, the investment subsidies for solar power plants were limited to EUR 15m for the years 2018 and 2019.

New renewable plants registry
The amendment of the Green Electricity Act also establishes a renewable plants registry. This is kept by OeMAG and includes all approved plants.

Successive rates for biogas
As biogas subsidies expire after 15 years and old operators were facing financial losses, the Successive Rates Regulation for Biogas came into force on 1 August 2017. It applies to all "old" biogas plants which would otherwise not be entitled to subsidies anymore and stipulates a yearly contract volume of EUR 11.7m until 31 December 2021. Applications can only be lodged between 1 October and 31 December 2017 and at the earliest 60 months before the subsidising term expires.

3. Forthcoming developments/opportunities in the renewables sector

Full compliance with the new state aid scheme is the next task for the Austrian legislator. Thus, the overall reform of the subsidy scheme for the renewables sector is scheduled for December 2017. This reform will take the form of the so-called "Big Electricity Act Amendment" ("große Ökostromnovelle"). The intention is to decrease energy imports and further pursue the integration of renewable energy into the market by implementing a new tariff system based on a cost effective, competitive subsidy system in line with market requirements (e.g. transparent call for tenders).

However, due to the National Council elections in October 2017, it is rather unlikely that the intended schedule will be carried out.

The election campaign has brought about further discussions on changes for the biomass and biogas sector, with the intention of shutting it down entirely due to it being inefficient. This proposal however faces strong pushback from representatives of the biomass sector, who have instead requested that the subsidy contracts be extended, so it remains to be seen whether this discussion is just a brief interlude caused by the elections or whether it has the potential to cause further changes for the renewables sector.







Belgium

Author: Ivan-Serge Brouhns

Offshore wind (federal legislation)

1. Brief overview of the renewables sector (offshore wind)

With several offshore wind farms, Belgium is amongst Europe's top offshore wind markets; only the UK, Denmark and Germany produce more offshore wind energy. The operational wind farms have a total capacity of 877MW and several more are planned and under construction. The offshore wind farms will produce 10% of Belgium's energy consumption in 2020, and are essential to meeting the country's renewable energy target of 13% of final energy consumption by 2020.

2. Recent developments in the renewables sector

At the federal level, the transmission system operator is required to purchase Green Energy Certificates (GEC) at a guaranteed minimum price. One GEC is awarded per MWh produced. The transmission system operator performs this public service obligation and therefore must purchase GECs awarded by the federal energy regulator from the renewable energy operator. For installations with a financial close before 1 May 2014, the guaranteed minimum GEC price is EUR 107/MWh for generation resulting from the first 216MW of installed capacity and EUR 90/MWh for generation resulting from installed capacity above the first 216MW.

For installations with a financial close between 1 May 2014 and 30 April 2016, the minimum price is calculated as follows: EUR 138/MWh – (a reference price for electricity – a correction factor of 10%).

Recently a new regulation came into effect and determines that when the financial close takes place from 4 March 2017, the minimum GEC price will be determined by the Belgian government. Two wind farms where the financial closing took place before this new regulation came into effect were awarded minimum prices at EUR 124/MWh and EUR 129.80/MWh.

3. Forthcoming developments/opportunities in the renewables sector (offshore wind)

The Belgian offshore wind market has significant potential in the short term, with several projects due to reach financial close in 2017/2018. As assets achieve commercial operation, there are likely to be opportunities for investment in generating assets.

Whilst domain concessions for all the existing project zones for wind farms have been awarded, it remains to be seen whether the Belgian government will see fit to designate further zones in the future in order to meet its climate change commitments.

Flanders region

1. Brief overview of the renewables sector

Until now only 6% of the energy consumed in the Flemish region is produced by renewable energy sources (RES). Renewable electricity is mainly produced from wind, solar and biomass.

Flanders still has a long way to go towards meeting the renewable energy target imposed on Belgium for 2020 (13%), and has a particularly low proportion of green heating and cooling.

2. Recent developments in the renewables sector

The region of Flanders uses a quota system and a certificate trading scheme to support renewable energy. In general, all renewable energy generation technologies are eligible for the quota system. The green electricity certificates (GEC) are issued by the Flemish regulatory authority (VREG). GECs issued to production devices with a commissioning date before 2013 represent the supported production of 1MWh net electricity from renewable resources. GECs for production devices commissioned since 2013 represent 1MWh multiplied by a technology-and-capacity-specific banding factor that reflects the amount of support needed to pay back the investment in a reasonable production period without over-subsidising.

3. Forthcoming developments/opportunities in the renewables sector

The government of Flanders recently approved a new ambitious wind energy plan – Wind Power 2020. It aims for the construction of no fewer than 280 additional wind turbines in the region by 2020. Together, these wind mills will generate around 1.563GWh of energy, bringing Flanders' total wind energy supply to 2.913GWh. As such, Flanders wants to reach the climate and energy targets set out in the Paris Agreement of 2015. The Flemish government wants to eliminate as many restrictions as possible to ease the establishment of wind turbines in big industrial areas, as well as at the four seaports in the region: Antwerp, Ghent, Zeebrugge and Ostend.







Brussels region

1. Brief overview of the renewables sector

Around 5% of the energy consumed in Brussels is generated by renewable sources, most of it from biomass production (42%). There are no wind turbines in operation in Brussels due to the urban environment.

2. Recent developments in the renewables sector

As in the two other regions and at the federal level, green certificates (GCs) are granted to the producers of green energy. The transmission system operator, Elia, is required to purchase GCs at a guaranteed minimum price of EUR 65. However, the market price of GCs in Brussels is higher than the guaranteed minimum price – around EUR 82 and up to EUR 110 in 2017. This is because of the increase of the surrendering level of the GC imposed on energy suppliers (8.2% in 2016). To reduce this increase, the government reduced the surrendering level for 2017 to 7.8% and is considering opening the market to GCs issued in the other regions.

3. Forthcoming developments/opportunities in the renewables sector

At the end of 2016, the Brussels Environment Minister launched a master plan for 2020 in accordance with the European 20-20-20 targets, including around 43 measures to be implemented. One of these measures aims to operate photovoltaic (PV) panels on public buildings and to increase electricity production from renewable sources up to 2,500MWh/year. Other measures include: developing an energy management system (demand side management) for SMEs and the non-market sector, with a goal of 3,800MWh/year; and a funding mechanism with a budget around EUR 9m to support individual green production (PV panels) and energy efficiency-oriented building renovations.

Walloon region

1. Brief overview of the renewables sector

In Wallonia around 10% of the consumed electricity is produced from RES, mostly from onshore wind turbines and biomass, with solar PV as the third biggest source. The goal for 2020 is to reach at least 13% of electricity consumption from green energy sources.

2. Recent developments in the renewables sector

A green certificates (GC) market is in place in the Walloon region to encourage the production of electricity from renewable sources. There is a surplus of GCs in the Walloon market due, among other things, to the high allowance of GC for individual PVs and the fast development of onshore wind turbine parks. In order to soothe the system, the Walloon government decided to charge the transmission system operator to set aside GCs via a new company, Solar Chest. The final goal is to release these GCs later, when the GC market is able to absorb them. In addition, the support of each sector is based on actual costs in order to avoid excessive profits and to redress the imbalance between supply and demand as soon as possible.

3. Forthcoming developments/opportunities in the renewables sector

Several onshore wind turbine projects are being developed in the Walloon region.

The development of onshore wind parks is the priority, with an objective of 50 new wind turbines per year by 2020.



Brazil

Author: Ted Rhodes

1. Brief overview of the renewables sector

Brazil has a well-established renewable energy sector. Hydropower is particularly strong, accounting for more than 60% of Brazil's installed capacity. Energy generated from biomass (primarily through the burning of sugar cane waste) accounts for a further 9% of capacity and almost 8% is generated by wind. Perhaps surprisingly due to its location, only a small percentage of installed capacity (around 280MW) comes from solar power generation. Overall, more than 40% of Brazil's energy mix comes from renewable sources.

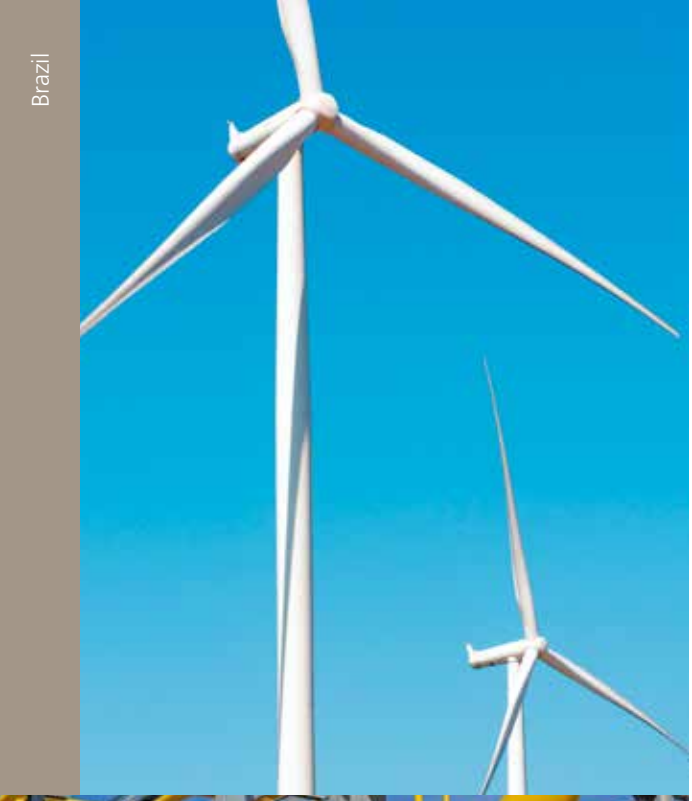
Although Brazil has recently suffered an economic downturn, which has in turn slowed the country's electricity demand growth, rising demand for energy is forecast for the near future. The US Energy Information Association projects that Brazil's energy demand will grow at an average annual rate of 2% between 2014 and 2024.

In recent years, several periods of drought in the south-east of the country have compromised Brazil's hydropower generation capability. This has led the government to take steps to diversify and place greater reliance on other sources of energy. In this context, the Brazilian government has identified the importance of renewables in the country's capacity expansion. With the additional benefits of above-average wind quality and geographical areas that experience up to 6kWh/m^2 of solar radiation, Brazil demonstrates huge untapped potential for further development of wind and solar energy generation.

2. Recent developments in the renewables sector

The past few years have seen considerable levels of M&A activity in the Brazilian power generation sector, including from private equity investment. This demonstrates confidence in the growth potential of the sector, despite relatively few licensing rounds in recent years. For example, UK-based Actis has invested over USD 900m in the Brazilian renewable sector to date, with further investment planned. Other investors in the sector include Canada's Brookfield Energia Renovável, Italy's Enel Green Power, France's Engie, as well as Brazilian domestic energy companies.

The wind sector in Brazil (concentrated in the north-eastern states of Rio Grande do Norte, Ceará and Bahia) has been growing steadily and is encouraging healthy levels of investment. The average capacity factor of Brazilian wind farms is 50%, around double the global average. In 2017, the Global Wind Energy Council announced that Brazil had the ninth-largest installed capacity for wind power in the world (and the largest in Latin America) after increasing capacity by a further







2GW in 2016. Over 450 wind farms provide an estimated installed capacity of 11.6GW, and a further 300 wind farms are currently planned or in development. The government aims to achieve 28GW of wind energy capacity by 2026.

The development of renewable energy sources has also been aided by improvements to the country's energy transmission system and reforms to the process of gaining access to the grid ahead of project development.

3. Forthcoming developments/opportunities in the renewables sector

The Ministry of Mines and Energy (MME), in conjunction with the Energy Research Office, has developed the Ten Year Energy Expansion Plan to 2026 (the PDE). The PDE forecasts an increase in the share of installed capacity contributed by renewable sources, from 125GW in 2016 to almost 174GW in 2026, as part of a medium-long-term national strategy. In contrast to previous projections, a greater share of the increase is projected to come from wind (18.4GW) than hydropower (13.7GW). Increases in biomass (4GW) and solar (9GW) are also projected.

In August 2017, the MME announced forthcoming renewable energy licensing rounds – including wind, solar, small hydropower and biomass generation. Two power auctions were held in December 2017; one A-4 for commencement of generation on 01/01/21 and one A-6 for commencement on 01/01/23. 1,676 projects representing 47.9GW were proposed for the A4 auction and 1,092 projects representing 53.4GW were proposed for the A-6 auction. However, the A-4 auction, held on 18 December suffered from low demand and only contracted 674.5MW, including small hydro, biomass and wind, but mainly solar (85%) at record low prices averaging R$145.78/MWh. The A-6 auction contracted 3.842MW from small hydro, biomass, natural gas and mainly wind sources (76% of the projects), including two large natural gas projects totalling 2.139MW.

The hydropower sector is likely to remain strong, despite the government's aim of diversifying the supply of energy. The PDE forecasts that, by 2026, hydropower capacity in Brazil will increase to 103.4GW (from the 2016 level of 90GW).

Solar power remains an under-developed source of renewable energy in Brazil. This is despite Brazil having an average solar radiation far exceeding that of many of the leading countries that generate solar power. The Brazilian Association for Photovoltaic Solar Energy has projected that, by the end of 2017, Brazil will reach 1GW of solar installed capacity. They forecast that this figure will rise to 3.3GW in 2018, when more solar projects resulting from the last licensing rounds are expected to come online. The MME forecasts that this will reach 7GW by 2024 and 9.6GW by 2026. However, this figure remains very low in the context of an estimated potential generation of up to 28,500GW of solar capacity.

4. Incentives and financing

Unfortunately, despite the aims of the government to increase the percentage of energy generated from renewable sources, no large-scale tax incentives have yet been introduced to encourage the growth of the sector in Brazil. Local content requirements also continue to hinder development. One exception for renewables is the favourable tax regime applicable to producers and importers of biodiesel.

High levels of importation tax remain an obstacle to developing other non-hydro forms of renewable energy. This is particularly the case for solar power generation, which requires highly specialised technology, usually manufactured outside Brazil. In 2011, import tax exemptions for wind power equipment and a reduced import tax for solar photovoltaic (PV) equipment were introduced (provided that there is no equivalent local production). This was later extended to include wind turbine components. State tax exemptions for wind and solar energy are expected to continue until at least 2021. There is also a proposal for a bill bringing in a special tax regime for the development of alternative energies. This has, however, been making slow progress since 2009. Discounts on the Transmission System Usage Rate and Distribution System Usage Rate may also be available for solar energy generation projects.

The Brazilian development bank, BNDES, offers financing for renewable energy projects. In order to qualify, projects must have around 60% local content. It should be noted that, although local content requirements may lead to greater upfront costs, these may be offset by the return afforded by Brazil's favourable geographical features.







Bulgaria

Authors: Kostadin Sirleshtov, Borislava Pokrass

1. Brief overview of renewables sector

In 2002, Bulgaria ratified the Kyoto Protocol to the United Nations Framework Convention on Climate Change, which imposed certain targets on Bulgaria to reduce greenhouse gas emissions by decreasing reliance on conventional energy sources and encouraging renewable energy production.

In 2003, Bulgaria adopted the Energy Act (EA) seeking to develop its renewable energy sector. The EA established general conditions for efficient use and generation of energy from renewable sources, but contained no concrete investment incentives.

Bulgaria joined the European Union on 1 January 2007, and, as part of the accession process, Bulgaria accepted mandatory obligations for the development of renewable energy production. Bulgaria undertook the obligation to achieve an 11% share of electricity from renewable energy sources (RES) in national gross consumption of electricity by 2010.

Accordingly, in 2007, Bulgaria adopted the Renewable and Alternative Energy Sources and Biofuels Act to establish a system for producing electricity from RES and create a favorable investment climate. Under that law, electricity from RES was supported primarily through a feed-in tariff (FiT) scheme. Eligible producers of electricity from RES were entitled to enter into long-term power purchase agreements (PPAs) with the Public Supplier, the State-owned National Electricity Company EAD or directly with end-suppliers. The suppliers were required by law to purchase all RES electricity produced, other than electricity sold on the free market and that was used for the plants' own consumption.

The FiTs were subject to annual review by the Bulgarian Energy and Water Regulatory Commission (EWRC or the Regulator). The law provided a formula by which the Regulator calculated the applicable FiT rate, creating a certain amount of transparency in the system, where FiTs could not decrease by more than 5% from year to year.

Thus, as of 2008, RES investors in Bulgaria were guaranteed long-term PPAs for the purchase of all the electricity they produced at preferential prices that would not decrease by more than 5% per year.
In 2009 the European Parliament and Council issued Directive 2009/28/EC, which provided that 22.1% of overall energy consumption within the EU should be produced from RES. Bulgaria's target was to achieve 16% of its total energy consumption from RES by 2020. The FiT program that Bulgaria had developed under the 2007 legislation had not attracted enough investment in the renewable energy sector for Bulgaria to meet its new EU obligations. Therefore, in the beginning of

2011, the government approved a draft Energy from Renewable Sources Act (ERSA) to create a more favorable investment climate and to achieve the new EU targets. On 3 May 2011 ERSA entered into force and promoted an attractive and stable FiT support program for renewable energy projects. ERSA confirmed that once a particular FiT applied to an eligible plant, that plant was entitled to the specified tariff for the full duration of its PPA (20 years for solar, geothermal and biomass, 15 years for hydro up to 10MW and 12 years for wind). ERSA also specifically provided that suppliers were required to purchase all electricity produced from RES at the fixed FiT, other than the electricity that producers elected to sell on the free market and that used for the plants' own consumption.

Thus, the 2011 incentive program induced substantial investment and enabled Bulgaria to be ahead of schedule to meet its EU targets by 2013, and Bulgaria was ranked second among the top ten emerging markets for renewable energy.

When Bulgaria realized around July 2012 that it reached its target ahead of schedule and that the incentives programme continued to attract more investments in the renewables sector, it decided to take measures to withhold further investments, especially in solar and wind, like many other countries in Europe. This led to the gradual decrease of the FiTs until their final revocation for RES projects to be developed after 27 December 2013, which in practice put an end to the RES boom in Bulgaria.

2. Recent developments in the renewables sector

Starting in the summer of 2012, the Bulgarian government implemented several measures that negatively altered the incentives scheme promised to RES projects under the regulatory framework described above. Changes to the scheme have been made almost every year since, negatively affecting the stability of the legal framework and the confidence of investors in the Bulgarian energy market. Some of the most important changes include:

(a) In September 2012, the Regulator adopted a decision, which introduced a retroactive temporary grid access fee for all RES, where for some projects the fee reached 39% of their FiT;

(b) From 1 January 2014, Bulgaria introduced a fee on the revenues of PV and wind farms at the amount of 20% of their FiT (without VAT); this fee was pronounced unconstitutional by the Constitutional Court in July 2014. However, the producers were unable to recover part of the fees paid after their proclamation as unconstitutional;

(c) Bulgaria also reduced the amount of energy that could be purchased at preferential FiT prices to the quantity of electricity produced on average by the same category of plants minus the producer's own electricity consumption (e.g. 1,188MWh per annum for most PV plants). Thus, electricity produced in excess of that threshold could be sold only at a much lower price approved by the Regulator in comparison to the otherwise applicable FiT rate;

(d) In July 2015 Bulgaria further reduced the investors' FiT payment rights by requiring RES producers to pay a monthly fee to the Security of Electrical Power System Fund amounting to 5% of their revenue, VAT excluded.

The above measures led to numerous court proceedings from RES producers against the competent authorities in Bulgaria, the majority of which ending with a positive outcome for the producers. It is expected that certain larger investors will soon start international arbitration proceedings against the Bulgarian government.

Since June 2014 the operation of a balancing market has started and RES producers are required to become part of a balancing group and pay monthly settlements to the coordinator of their balancing group.

3. Forthcoming developments/opportunities in the renewables sector

The Bulgarian Energy Strategy (2011 – 2020) (the "Energy Strategy") is a key political document with legal and regulatory importance, adopted by the Government and the Bulgarian Parliament, which sets the main priorities for the development of the energy sector until 2020. The Energy Strategy focuses on some future trends such as the development of the electric cars market, as well as systems for energy storage. The use of eco cars, including those charged with electric energy produced from renewable energy sources, is one more step in the building of Bulgarian "green" cities of the future and the infrastructure necessary for them. It is therefore expected that the legislation will develop towards implementation of some obligations for the electricity distribution companies to develop stations for electric cars, as well as further energy storage capabilities for both producers and electricity distributors. Along with that, the efforts of Bulgaria in the years ahead shall also be focused on the "Smart Grid" systems.

Currently, the Bulgarian Government is working on the Energy Strategy until 2030 with a vision to 2050.

Now the opportunities related to RES projects are mainly connected to refinancing a RES projects with view to the decreased interest rates. In 2017, CMS has advised on the largest renewable energy refinancing in Bulgaria.



Chile

Author: Luis Felipe Arze

1. Brief overview of the renewables sector

Chile has the highest concentration of solar radiation in the world, strong winds from north to south, 4,300km of coastline bathed by the Pacific Ocean, and significant potential for developing biogas and geothermal resources along its mountain range. For these reasons Chile's green energy market has become very attractive to investors in recent years, and energy now has the highest investment rate of Chile's economic sectors.

In just five years, non-conventional renewable energy (NCRE) resources have risen to represent more than 14% of Chile's total generation. Low environmental impact, a significant drop in investment costs and the quality and quantity of resources have transformed Chile into the perfect setting for development and investment opportunities in NCRE technologies.

2. Recent developments in the renewables sector

Government goals imposed by successive administrations for energy generation from NCRE sources – 20% by 2025 and 60% by 2035 – are viewed today not just as possible, there are even projections that NCRE could account for "100% of renewable energy by 2050". This makes the investment possibilities in this area very attractive for various international players.

In the last five years alone, there has been massive development in the sector, due in part to legislation that has allowed NCRE to compete for opportunities on equal terms with conventional energy.

However, Chile has barriers to overcome, including a lack of capacity in the transmission system and the inflexibility of conventional plants in adapting to the operating regime required by NCRE. The issue of energy transmission is becoming a more important barrier and is affecting both the entry of new projects and those currently in operation. The country's transmission system has lagged behind the country's needs for many years.

3. Forthcoming developments/opportunities in the renewables sector

Mining industry reactivation

Most of the country's mining industry, including the largest copper reserves in the world, are located in the north of Chile. The mining industry is one of the largest energy consumers in the market. The reactivation of some international markets and recent rises in copper industry prices have led to forecasts of new and increasing demand for the mining sector in coming years. A stronger mining industry is a hidden driver of energy prices and energy demand in Chile.

Ring of fire

Being located in the Pacific ring of fire gives Chile incredible potential for geothermal generation. A legal and institutional framework for geothermal activity has been in place since 2000, establishing the social, environmental, technical and economic requirements for developing geothermal projects. Chile developed the first geothermal installation in South America, and the first large-scale high enthalpy geothermal plant in the world – built at an elevation of 4,500 meters above sea level in the Atacama Desert (Cerro Pabellón plant). This demonstrates the great untapped potential for geothermal development in the rest of the region. However, the costs involved in producing geothermal energy are still disheartening for larger investments. With the support of the World Bank and the Inter-American Development Bank, Chile is exploring alternatives to lower geothermal development prices and is promoting competition in the sector. In the 2016 tender process, the lowest recorded energy price for geothermal projects was USD 66/MWh.

Wave energy

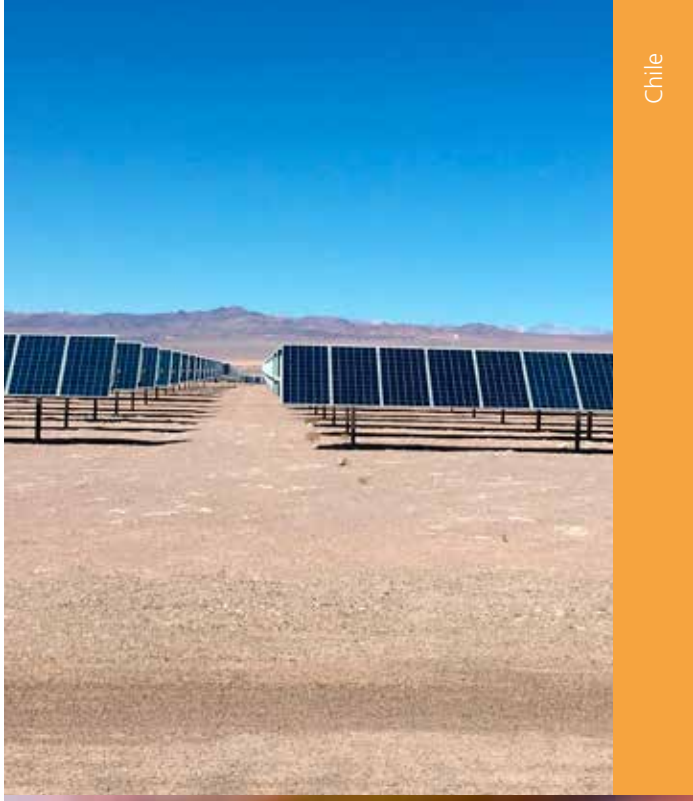
Ocean energy is a prospective renewable resource. With its long coastline of over 4,300km, powerful waves and tidal currents, Chile is one of the world's leading locations for the development of wave energy and will have a competitive marine energy market in the coming years. The Chilean government created the national Marine Energy Research and Innovation Centre in 2015, the first in Latin America.

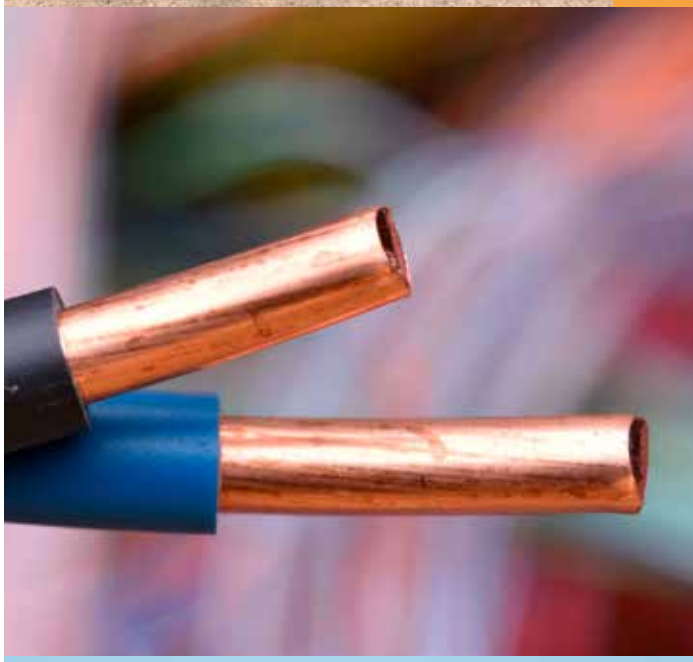
Studies by the Inter-American Development Bank showed that Chile has a gross potential in tidal power – in wave energy alone – of about 164GW, a unique potential in the world. If it only used 10% of its available tidal power, Chile could match the installed capacity of the entire Central Interconnected System (SIC), and avoid the construction of unsafe and polluting plants such as coal-fired, nuclear or hydroelectric power plants.

On target for a growing economy

Experts say that Chile will surpass 20% of clean energy in 2020. The Ministry of Energy's goal is that 60% will be clean energy by 2035. Solar energy is leading the way: 76% of NCRE projects in development are solar projects, representing 5% of the installed capacity in the SIC.

Political and economic stability have made Chile one of the fastest-growing economies in Latin America over the last decade. As the country's economy expands, Chile's energy requirement for 2015-2030 is forecast to grow in parallel at a rate of 72.98% in the SIC and by 93.76% in the Northern Interconnected System (SING).







4. Favourable climate for investors

The most stable, prosperous and investment-friendly country in Latin America

Chile has a strong position in Latin America due to its sustained economic growth, investment-friendly environment and free and dynamic market. This has made Chile a regional leader in competitiveness, income per capita, globalisation and economic freedom. The country also scores well in terms of perceived levels of corruption.

The Economist Intelligence Unit (EIU) placed Chile first among Latin American countries for the 2011 – 2015 period in its rankings of the best places to do business. Chile operates a sound fiscal policy and is an internationally integrated country. It has the strongest sovereign bond rating in South America leading to the region's lowest yields on government debt (4.16% yield-to-maturity on 10-year sovereign bond). The country has low levels of public debt, a healthy financial system and solid financial institutions. Chile has an extensive network of free-trade agreements, involving more than 60 countries, including the US.

The country enjoys one of the lowest tax burdens in the 35-member OECD, with a corporate tax rate of 25.5% for commercial year 2017, and 27% for commercial year 2018 onwards.

The increasing participation of renewables in the energy mix is a game changer for Chile. The country is succeeding in adding value to its primary energy sources and it is expected that Chile will become an exporter of electricity in the near future. Indeed, in February 2016, the country made its first transmission of electricity to Argentina. By 2021, Chile expects to interconnect its National Transmission System with Peru, Ecuador and Colombia. International interconnections will further promote competition by enabling transmission capacity for the participation of new players in the energy sector.



China

Authors: Louis Peng, Vera Zhang

1. Brief overview of the renewables sector

Energy production is key to China's economic development. Coal and oil-based energy consumption has raised serious energy security and environmental concerns. In recent years, China has actively promoted the optimisation of energy structures. With medium- and long-term goals and policies in place, the renewable energy industry has developed rapidly in China. China has become the world's largest renewable energy market, cutting its coal dependence.

The renewable energy industry is gradually improving. China passed the Renewable Energy Law in 2005 and revised the legislation in 2009, and has published a series of supporting policies to establish a standardisation committee in the hydropower, wind power and photovoltaic fields. The ability to certify, construct and explore has been continually strengthened to support the large-scale development of renewable energy industries such as hydropower.

The economy of renewable energy is also improving. During the 12th FYP period (2010–2015), solar power saw the fastest costs reduction and the most significant economic improvement within the sector. The unit cost of solar power in 2010 was about CNY 20,000 per kW, and in 2012 it lowered to about CNY 11,000 per kW. In 2017, it is about CNY 7,000 per kW. The feed-in electricity price was reduced from CNY 1 to CNY 0.6 per kWh, illustrating a drastic improvement.

By the end of 2016, the total hydropower capacity of the country reached 330m kW, of which the conventional hydropower station was 305.42m kW. The pumped storage plant capacity was 26.69m kW, and it ranked No.1 in the world. By the end of 2016, China had a feed-in wind power capacity of 149m kW and generated a total of 241bn kWh electricity, accounting for 4% of the total power consumption in China. Since 2013, China's solar energy industry has become the largest solar power market in the world. The solar thermal utilisation area exceeded 400m m^2 and generated more than 60bn kWh of electric power. In addition, the scale of biomass consumption increased up to 35mt of standard coal, signifying a dramatic increase in both development and construction.

2. Recent developments in the renewables sector

China launched its programme for the trading of green certificates for solar and wind power on 1 July 2017. The programme is initially on a voluntary basis, but it is expected to become mandatory in 2018, depending on its success. Offshore wind farm and distributed photovoltaic (PV) Power Generation Projects are excluded from this programme.







The certificates issued under the programme are the only identification of non-hydro renewable power generation and consumption of green power. Each certificate represents 1MWh of green power generated from solar or wind generation. In June 2017, the first batch of green certificates was issued for around 20 renewable generation projects in China. Later in June, the second batch of green certificates was issued for 15 new energy projects, including 3 PV and 12 wind power projects. Under this programme, all the electricity consumers – including government agencies, private enterprises, public institutions and individuals – are encouraged to buy green certificates on a voluntary basis, via the national trading platform. If the solar or wind producer sells its certificate, the producer no longer receives the subsidy for electricity production. The price of green certificates will be determined by bilateral negotiation or competitive bidding, and is capped at the level of the subsidy currently received by power producers. The certificates are not allowed to be resold.

The programme aims to facilitate the efficient use of clean energy, and to ease the subsidy burden on China's government for renewable power projects, the shortfall of which is believed to have exceeded CNY 60bn. Delay in collecting the subsidies has become a big concern for many investors who are interested in the solar and wind industries. It should be noted, given its voluntary nature, that the programme is regarded as complementary to the financial subsidy at this initial stage, rather than as a total replacement. However, the programme is expected to promote social consensus for the consumption of green power and may prepare the ground for possible mandatory action in the future.

The programme fits in with the Chinese government's plan to increase the share of non-fossil fuel in its power mix from 12% to 15% by 2020, when power producers will be required to generate at least 9% of their energy from such sources.

3. Forthcoming developments/opportunities in the renewables sector

China is at the centre of global energy transformation. Renewable energy plays a vital role in China's plan to solve the challenges of energy security, climate change and severe air and water pollution.

In January 2017, the Chinese government announced the 13th Five-Year Plan (2016–2020) for Energy Development (13th FYP). As a guideline for promoting an "energy revolution" in China, the 13th FYP sets up short-term goals for limiting reliance on coal in favour of oil and gas. Total energy consumption in 2020 will be limited to 5bn t of standard coal, and total coal consumption will be less than 4.1bn t. Non-fossil energy will account for 15% of total energy consumption by 2020 and 20% by 2030.

The 13th FYP also suggests gradually shifting from traditional high energy-consuming industries to service industries and household consumption. The plan makes it clear that major energy projects will include development and commercialisation of smart grids, distributed energy resources, low-speed wind power, solar energy materials, and biomass and geothermal energy. Furthermore, China will increase cooperation with other countries on energy technology, equipment, engineering services, and capacity development by encouraging Chinese companies to participate in foreign electricity projects. The 13th FYP also promised that other supportive policies – including energy resource pricing mechanisms, monetary and tax incentives, and financing support – and methods for evaluation and supervision will be in place to support energy development in the next five years.





Colombia

Author: Daniel Rodrigues Bravo

1. Brief overview of the renewables sector

Colombia is rich in renewable energy sources. Some 70% of the country's primary energy supply comes from hydropower. However, despite its plentiful hydropower resources and generation capacity, the energy sector continues to experience many challenges – including security of supply and carbon emissions due to climate change, drought seasons (Fenómeno del Niño) and the use of diesel, coal and gas-based generation.

According to various studies, Colombia is endowed with significant potential for:

- hydropower energy – 56,000MW,
- solar energy – 4.50kWh/m^2/day throughout the year, across the country
- biomass energy – 5,000–7,000MW
- wind energy – 50,000MW, with 80% in the Caribbean coastal region.

The country has moderate geothermal energy reserves – approximately 50–70GW of potential, in two regions.

Notwithstanding its strong potential for non-conventional sources of energy generation, there is a distorted perception of the capacity and reliability of non-hydro renewables compared to hydro, and of the high costs of installing and maintaining these technologies compared to conventional fuel generation. In general terms, Colombia has a low level public awareness and knowledge of the benefits of renewable energy and energy efficiency.

2. Significant efforts to change the energy mix and promote efficiency

In recent years the Colombian Government has enacted several laws, regulations and commitments intended to significantly increase awareness, development and use of renewable energy in the energy mix and promote the efficient management of energy. The main renewable energy and energy efficiency regulations and incentives include:

- Law 1665 of 2013 – adoption of the International Renewable Energy Agency (IRENA) statute;
- Law 1715 of 2014 – renewable energy law which creates the Fund for Renewable Energy and Efficient Management of Energy;
- Generation-Transmission 2016-2030 Reference Expansion Plan – establishes guidelines for energy generation and transmission;
- Indicative Action Plan (PAI) 2017-2022 to develop the Energy Rational and Efficient Use Programme (PROURE) – promotes energy efficiency and other forms of non-conventional energies.

3. Incentives to encourage renewable energy use and development

To raise the competitiveness of renewable energy in the country, the Colombian government has adopted measures and incentives to promote independent power producers (IPPs).

Annual income tax reduction

Individuals and entities subject to income tax that make investments in the investigation, development, production and consumption of renewable energy are eligible for annual income tax reduction up to 50% of the total investment value within the next five (5) fiscal years after the investment is made.

VAT exemption

The acquisition of equipment, elements, machinery and services required for the pre-investment and investment in renewable energy production and consumption, as well as the assessment and evaluation of potential resources, are exempt from VAT.

Tariff exemption

Individuals and entities that import equipment, machinery, material and other supplies required and exclusively destined for renewable energy projects are eligible for a fee waiver on import customs.

Accelerated depreciation

Renewable energy-based power producers that invest in equipment, machinery and construction work required for pre-investment, investment and the operation of renewable energy projects after the enactment of Law 1715 of 2014 are eligible for the accelerated depreciation regime incentive for an annual rate of up to 20%.

4. New projects are a reality

Government incentives, together with other benefits, have had a significant impact on the sector in the last few years. By May 2017, more than 200 projects were registered at UPME, the Colombian Mining and Energy Planning Agency. These projects include projects in the renewables sector, specifically in hydraulic, solar, thermic, wind and geothermic energy. Total investment exceeds USD 6bn.







5. Forthcoming developments/opportunities in the renewables sector

A significant number of new projects and developments are expected in the near future. Some of these projects have already been registered at the UPME and represent investment opportunities in the renewables sector:

(i) Proyecto Fotovoltáico Celsia Solar Yumbo
(ii) Jemeek WS/Irrapia
(iii) Jemeek WS/Carrizal
(iv) Jemeek WS/C. Eléctrica
(v) Parque Eólico Apotolorru
(vi) Parque Eólico Guajira II
(vii) Wayuu S.A.
(viii) Bengoa 80
(ix) Bengoa 200
(x) Acacia
(xi) Camelia 1
(xii) Camelia 2
(xiii) Atlántico Solar I Baranoa
(xiv) Atlántico Solar II Polonuevo
(xv) Cesar Solar II
(xvi) Cesar Solar II Bosconia
(xvii) Cesar Solar II Cascajales
(xviii) Awarala Central Eléctrica S.A.
(xix) Manantial.

In addition, the Colombian government has approved the Generation-Transmission 2016-2030 Reference Expansion Plan which establishes guidelines for energy generation and transmission. The plan estimates that, over the next 15 years, Colombia will incorporate an additional 5,362MW to the system, 2,025MW of which will be produced with renewable energies.

As well as these specific projects the Colombian government has also established a fund to promote, at an aggregate level, investment in non-conventional renewable energy sources, plans, programmes and projects through different financing mechanisms. This fund is called the FENOGE (Fondo de Energías Renovables y Gestión Eficiente de la Energía). FENOGE was created by article 10 of Law 1715 of 2014 to finance renewable energy and energy efficiency programmes, with the aim of reducing greenhouse gas emissions. FENOGE will be regulated by Colombia's Ministry of Mines and Energy and will be administrated and managed by a trust company duly authorised by the Colombian Finance Superintendence, selected by the Ministry of Mines and Energy. CMS Colombia advises the Ministry of Mines and Energy based on an advisory contract with the Global Green Growth Institute – a treaty-based international, inter-governmental organisation dedicated to supporting and promoting strong, inclusive and sustainable economic growth in developing countries and emerging economies.





Croatia

Authors: Marija Mušec, Mia Kanceljak

Introduction

Croatia has adopted the EU renewable energy directive's binding targets through the National Action Plan for Renewable Energy Sources by 2020 and the Energy Development Strategy. These documents set binding targets of 20% of final energy consumption from renewable energy sources (RES) by 2020 and 35% of electricity generation from RES, including large hydropower plants, by 2020.

Croatia is also required to source at least 10% of its transport fuels, and 20% of final energy consumption for heating and cooling from RES by 2020.

1. Brief overview of the renewables sector

Key statistics

In recent years, Croatia has produced more electricity from renewables than from fossil sources. The share of renewables varies depending on hydrological conditions, as most electricity in Croatia is generated from large hydropower plants.

Croatia will probably review its goal of 20% renewable energy in final energy consumption, since the country has already exceeded this target. The European Commission's 2016 clean energy "Winter Package" proposes increasing the RES share to at least 27% by 2030; Eurostat's data shows that Croatia achieved a 29% share in 2015.

In 2011, 45% of electricity was produced from RES, including large hydropower plants. This share increased to 49.5% in 2012, rose to 65.2% in 2013, and reached 74.2% in 2014. There was a decrease to 68% in 2015. In these years, large hydropower plants accounted for between 42% and 67.3% of the RES total. Other renewable sources – small hydropower plants, wind energy, solar energy, biomass, biogas and photovoltaic systems – registered an annual share of between 3% and 6.9% of RES electricity.

Lack of a legislative framework

In January 2016 a new Act on Renewable Energy Sources and Highly Effective Cogeneration came into force. It introduced a new incentive system for RES and highly effective cogeneration in Croatia, featuring a market premium and a guaranteed purchase price for RES facilities up to 30kW.

The incentive system envisages that an eligible electricity producer sells electricity on the electricity market, and receives a market premium from the electricity market operator (HROTE) for the net electricity delivered from the production plant to the power grid.







Eligible producers with production plants of installed power up to and including 30kW enter into a power purchase agreement with the HROTE for the purchase of electricity with a guaranteed purchase price.

The right to the incentive depends on the outcome of tenders conducted by the HROTE. Although the new law was introduced in January 2016, the Croatian Government has not yet adopted secondary legislation to implement its RES incentive system and new quotas for renewables have not yet been defined. The quotas for RES projects in the now obsolete feed-in-tariff system have almost fully been met. It is therefore essential that new quotas are defined to enable the further development of RES projects through tenders for incentives.

A further cause of stagnation in the development of renewables in Croatia is a lack of funds for financing the incentives for electricity produced from RES. In Croatia, the end user's monthly electricity bill includes a fee that is used to fund the promotion of electricity from RES. In August 2017 the Croatian Government increased the fee for promotion of renewables from HRK 0.035/kWh to HRK 0.105/kWh (VAT excluded).

Further obstacles to developing renewables include deficiencies in Croatia's distribution and transmission grid and a lack of measures that would enable taking full advantage of EU funds.

2. Recent developments in the renewables sector

In 2016 the installed power of all production power plants in Croatia amounted to 4,894MW, with new RES power plants connected to the grid during 2016 contributing to an increase of 228MW from 2015. Consequently, the total produced electricity shows a growing share of electricity produced from RES and high efficiency cogeneration. The security of electricity supply is satisfactory, and electricity consumption in comparison with 2015 recorded a modest increase (0.2%).

Hydropower plants (45.37%) account for the largest proportion of the installed power of power plants in Croatia, followed by thermal power plants (42.10%), wind power plants (10.05%), biomass power plants (1.32%), and solar power plants (1.16%).

In recent years Croatian local authorities and the Environmental Protection and Energy Efficiency Fund have encouraged and co-financed many residential (off-grid) projects for solar energy and biomass boilers to produce heat and/or electricity. In 2017 the Environmental Protection and Energy Efficiency Fund published two invitations for energy renovation and use of renewable energy sources in public educational institutions and in residential buildings. The Croatian state budget includes HRK 380m from the European Regional Development Fund for financing these projects.

The European Commission approved co-financing of the Croatian and Slovenian transmission and distribution system operators for the SINCRO.Grid project. A sum of EUR 40.5m – 51% of the total project value – is available through the Connecting Europe Facility (CEF). The project was signed in mid 2017 between Croatia and Slovenia and will be finished in 2021.

3. Forthcoming developments/opportunities in the renewables sector

Croatia has great potential to transform to an energy-efficient, sustainable, renewable-based economy. Its small population, relatively low energy demand, ample sun and wind resources, large areas of forest and large existing hydropower plant capacity are all positive factors. However, Croatia is not yet exploiting its potential in renewables, especially in solar and wind energy. The geographical location of the Croatian coast has significant advantages for using solar and wind energy sources. To date, however, there have not been any projects for offshore wind power plants.

The Croatian Energy Development Strategy envisages installation of 100MW in small hydropower plants by 2020. As environmental protection is a big factor in planning a hydropower project, most of Croatia's remaining hydropower potential could be problematic because of biodiversity impacts. For example, almost all Croatian rivers are planned for inclusion in the EU's Natura 2000 system of protected habitats.

As most large hydropower plants were built decades ago, the HEP (national energy company) will invest almost HRK 3.2bn in revitalising the largest hydroelectric power plants, increasing their installed power by around 150MW by 2022. Also, in the next 18 months, energy renewal is planned for 223 kindergartens, schools, faculties and student homes. The value of these works will be HRK 781m, with HRK 348m drawn from EU funds.



Czech Republic

Authors: Lukas Janicek, Lukas Vymola

1. Brief overview of the renewables sector

Key statistics

Energy generated from renewable sources currently represents about 15% of the Czech Republic's energy mix. Around 30% of energy production comes from nuclear, with the remaining 55% from fossil fuels, primarily lignite.

Electricity generation from renewables is led by biogas (26%), followed by water and solar (23% each) and biomass (21%); the rest is covered by wind projects and waste-to-energy projects, which are often treated in Czech statistics as a renewable (or sometimes "secondary") source. When electricity generation is taken into account along with heat generation and transport, biomass represents 65% of all renewable energy sources (RES).

The Czech Republic has committed itself to produce at least 13% of electricity consumed from RES by 2020, in line with the national indicative target set out by the EU Directive on Renewable Energy. In addition, the Czech government approved the National Renewable Energy Action Plan setting out a target of 15.3% of energy from renewable sources by 2020. The country has already practically met this target.

Operational support

Operational support has always been the main incentive for developing RES. The support scheme was introduced in 2005 and its main principles are still in place, although currently the level of support for new larger installations is very limited or effectively non-existent. In the Czech Republic, producers of electricity from RES can choose either the "feed-in tariff" or the "green bonus" scheme. Under the "feed-in tariff", producers sell electricity to obligatory purchasers at a fixed minimum price. Under the "green bonus scheme", producers sell electricity on the electricity market for the market price and are entitled to receive an additional fixed amount. It is possible to switch between the two schemes during lifetime of the project. The feed-in tariff and the green bonus are set annually by the Czech Energy Regulatory Office. The level of feed-in tariff depends on the year in which the project was put into operation and is guaranteed for a certain number of years, as set out in the law. The level of the green bonus is linked to the level of the feed-in tariff, taking into account the market price for electricity in the given year.

2. Recent developments in the renewables sector

Compatibility of the Czech support scheme with EU state aid rules confirmed

In 2016 and 2017 the European Commission (EC) issued a series of decisions approving the support schemes for various types of renewables, including the controversial support scheme for renewables commissioned in years 2006 to 2012, i.e. in the years when a significant portion of existing solar and wind sources was developed. Broadly speaking, the EC declared that, from the state aid rules perspective, the support schemes are compatible with the EU's internal market.

However, the EC's decisions also suggest that the Czech government should adopt measures to control "overcompensation" in respect of some of the support schemes. Specifically, projects put into operation in years 2006 to 2012 would be deemed to be "overcompensated" if their IRR (internal rate of return) is not reasonable, i.e. exceeds the limits indicated in the EC's decision (IRR 6.3 to 7% for hydro and wind; 6.3 to 8.4% for photovoltaic; or 7 to 9.5% for biomass).

Czech government plans to control overcompensation

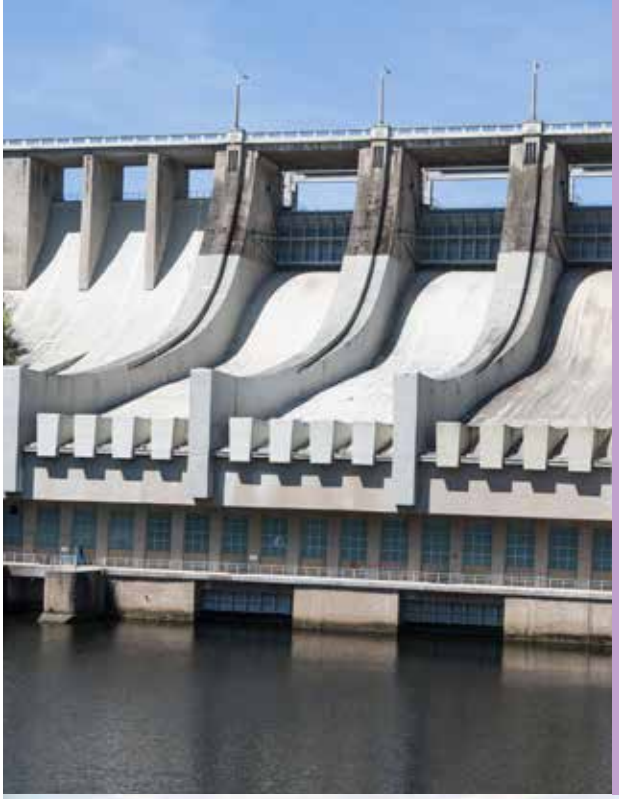
In September 2017 the Czech government adopted a plan for taking measures to control the overcompensation outlined by the EC. The government's plan will be implemented through legislation, which is yet to be drafted and approved by the Czech Parliament. Until such legislation is adopted it will remain uncertain which projects will be assessed individually, and what specific rules will be followed when calculating the "overcompensation".

The EC's decision, along with the documents produced by the Czech government to date, suggest that review of projects to assess potential overcompensation will be performed within ten years of the installation being commissioned. Installations from 2006 to 2008 will be reviewed by the end of February 2019. If overcompensation is discovered, measures will be introduced to either reduce the level of support or the time for which the support is to be paid. In extreme cases, the government may request the return of support already received.

3. Forthcoming developments/opportunities in the renewables sector

Long-term targets

The 2020 targets for the share of renewables in energy production have already been met. The latest version of the Czech government's Energy Conception indicates that by 2040 the share of renewables in total electricity production should be 18% to 25%.







The Czech public generally supports the EU targets for decreasing greenhouse gas emissions. In the Czech context, this can be achieved by supporting renewables, by building new nuclear blocks in the two existing nuclear power plants, and by energy savings. Both nuclear power and energy savings are supported by the Czech government.

Support for new renewable projects
Support for developing larger installations is currently very limited. This fact, together with relatively low electricity prices, suggests that there will not be much activity in the development of larger projects in the near future.

However, two clear current trends have emerged: for developing small-scale renewable sources such as rooftop solar installations, and for investment in energy storage. The Czech government introduced several measures and support schemes for these trends, including subventions for rooftop solar installations used for electricity and/or heat production, and subventions for hybrid solar systems with battery storage. Renewable energy and energy storage are also indirectly supported by subventions on the purchase of electric cars by municipalities or some SMEs.

Secondary market with existing projects
Installed capacity in the Czech renewable energy sector, and in particular the 2000 MW of photovoltaic commissioned in 2009–2010 with the tariff guaranteed for 20 years, represent investment opportunities for infrastructure investors. The EC's long-awaited completion of the state aid notification procedure brought more certainty to the market. Since 2016 there has been increased activity in the sale and purchase of large scale projects or portfolios of smaller photovoltaic projects and wind farms. It remains to be seen how this trend will be affected by the Czech government's recently announced plans to control "overcompensation" of the projects put into operation in previous years.





Egypt

Authors: Dr Fatma Salah, Heba Elkady

Brief overview of the renewables sector

Over the years following the 2011 uprising, Egypt faced power shortages and blackouts. This has alerted the Egyptian government to the need to examine alternative resources of energy, especially renewables.

Egypt's demand for electricity is also growing rapidly and the need to develop alternative power resources is becoming ever more urgent. Demand is estimated to be increasing at a rate of 1,500 to 2,000MW a year due to the rapid urbanisation and economic growth.[1]

Egypt is characterised by a sunny and moderate climate throughout the year, making it a preferable location for renewable energy resources. The average level of solar radiation in Egypt is between 2,000 to 3,200kWh/m^2 a year.[2] There are also promising areas with high wind speeds in the west Gulf of Suez, on both sides of the Nile and in some areas in Sinai. This gives Egypt significant potential for utilising these forms of renewable energy.

The energy sector in Egypt witnessed key changes including gradual lifting of government subsidies on traditional fuels and introduction of a number of legislative reforms as well as incentives and favorable policies to promote and develop renewable energy projects.

1. Recent developments in the renewable sector

In October 2016, the Egyptian Supreme Council of Energy[3] approved the energy strategy of Egypt up to 2035, which aims to have 37.2% of the aggregate electric power generated from renewable energy.[4] The energy strategy will be implemented by all relevant ministries and entities, once it is approved by the Egyptian cabinet and the House of Representatives.[5]

To achieve this goal, the government has taken several steps to reform the legislative environment for the energy sector and increase the investment incentives for renewable energy projects.

[1] The Solar Atlas of Egypt, New and Renewable Energy Authority's website: http://www.nrea.gov.eg/Content/files/SOLAR%20ATLAS%202018%20digital1.pdf, page 82.
[2] Ibid., page 83.
[3] The Supreme Council of Energy was established in 1979. It is responsible for planning and deciding the energy strategy of the country considering the sources of energy and their production and consumption. The council is chaired by the Prime Minister and includes in its membership the first Deputy of the Prime Minister and the Ministers of Electricity and Renewable Energy, Environment, Petroleum, Finance, Investment, Trade and Industry, Planning and International Cooperation, Housing, Transportation, Tourism, Defense and Military Production.
[4] http://www.nrea.gov.eg/About/Strategy
[5] Article 3 of the Prime Ministerial Decree No. 317 of 2014.







These steps included the enactment of Law No. 203/2014 for the Production of Electricity from Renewable Energy Resources. The law aims at encouraging the private sector to produce electricity from renewable energy sources by adopting several schemes for the private development of renewable energy projects, including feed-in tariff, build own operate (BOO) projects, competitive bids, and independent power production through third-party access.

The Egyptian government, represented by the Ministry of Finance (MoF), was also authorised by Law 14 for 2013 to guarantee all financial obligations of the Egyptian Electricity Holding Company and its affiliated companies under all projects they implement in partnership with the private sector.

2015 is considered a turning point in the energy sector in Egypt. A new law for electricity was issued, Law no. 87 of 2015 ("the Electricity Law"). The Electricity Law replaced the previous single buyer model and establish a fully competitive electricity market where electricity generation, transmission and distribution activities are fully unbundled. The law ended the single buyer model for electricity and allowed private generation companies to sell their production to end users.

The Electricity Law allowed third-party access to the grids, and changed the government-owned and operated Egyptian Electricity Transmission Company (EETC) into an independent transmission system operator (TSO).

The Electricity Law created two electricity markets. The first is the competitive market where qualified consumers (high voltage customers) may freely choose their electricity suppliers based on bilateral direct agreements and negotiated electricity prices. The second is the regulated market where unqualified consumers (medium voltage customers and low voltage customers) will pay a regulated tariff and will purchase electricity from the distribution companies who will be supplied by a public trader.

The Electric Utility and Consumer Protection Regulatory Agency (EgyptERA) has been restructured to be an independent institutional champion responsible for supervising, developing and coordinating between electricity producers, transmitters, distributors and end users. It has become the electricity regulator for licensing, designing and approving tariffs, providing a separate dispute resolution mechanism, and developing a competitive market design and structure. It is also responsible for ensuring a reliable long-term supply of electricity with reasonable prices and a stable environment.

A further key step taken by the government towards promoting investment in the renewable energy sector is the allocation of land plots to be developed and used by the New and Renewable Energy Authority (NREA) in developing solar and wind projects, whether by itself or through private sector companies.

The lands allocated to NREA are distributed among several cities all over Egypt, including Aswan in Upper Egypt, Suez in the north-east of Egypt, and Matrouh in the north-west. They also cover existing locations at the Red Sea coast zone, the northern coast and the west and east of the Nile River.

2. Investment incentives for the renewable energy sector

The Egyptian Government is supporting electricity and renewable energy projects through investment incentives and tax reductions. For example, according to the new Value Added Tax Law no. 67 of 2016 ("VAT Law"), the production, transmission, selling or distribution of electricity is exempted from VAT. Also, all machines and equipment needed to establish power plants are subject to a reduced VAT rate of 5% (instead of the regular rate of 14%) whether they are imported (in whole or in part) or locally procured, as well as to a unified customs duty rate of 2%.

The new Investment Law no. 72 of 2017 ("the Investment Law") offers further incentives and guarantees for electricity and energy sectors in general, and for renewable energy projects in particular. For example, a renewable energy project established after the issuance of the Investment Law benefits from a tax reduction from its net taxable profit equivalent to 30% of the project investment costs. Further non-tax incentives are offered to electricity and energy sectors, including:

(i) allocating state-owned land free of charge or at discounted prices.
(ii) subsidising employee technical training programmes and social insurance subscriptions.
(iii) refunding expenses paid to extend infrastructure facilities to the project's land. The refund is made after the commencement of the project.

3. Electricity subsidies reform

In its moves towards a free competitive market, in 2014 the Egyptian government started a scheme for gradually liberalising electricity prices over a five-year period. However, due to the economic impact of the scheme on vulnerable people, the government extended its duration and delayed the full removal of electricity subsidies to 2022 instead of 2018.

4. Forthcoming development in the renewable sector

Solar and wind projects

In 2014, the Egyptian Government launched the feed-in tariff program ("FIT Program") to generate 4.3GW electricity from renewable energy, 2,300MW from solar and 2,000MW from wind. The FIT Program was divided into two rounds: Round 1 announced by the Cabinet Decree No. 1947 of 2014; and Round 2 announced by the Cabinet Decree no. 2532 of 2016.

The applicable tariff in Round 2 for solar projects – with capacity of more than 20MW and up to 50MW – is USD 8.40 cents/kWh compared to USD 14.34 cents/kWh for Round 1. The tariff for wind projects – with operation hours ranging from 2,500 to 5,000 or more – is reduced to 4–7.96 USD cents/kWh compared to 4.6–11.48 cents/kWh in Round 1.

One of Egypt's most ambitious FIT projects is the Benban Solar Park in Aswan. When it becomes operational, this project is expected to be the biggest solar photovoltaic park in the world.

EETC has also announced several tenders for the development of power projects. For example, in December 2017 a tender was announced for the development of 600MW BOO PV Power Project in the West Nile Area for local and foreign developers under the BOO scheme.

On wind power, the government has entered into mega projects to build the largest wind farm in the Middle East, located in the Suez Gulf. One of these mega projects is the wind farm of Jebel El Zeit, located at the Red Sea, with a total capacity of 580MW. The project is believed to be the largest and most advanced project in the world, and includes a radar bird watching system designed to stop the turbines when migratory birds pass, and restart after their passage.

Other projects include construction of a 250MW wind farm in Ras Ghareb at the Red Sea, awarded by tender to a consortium including Orascom Construction, ENGIE and Toyota Tsusho Corporation. The project will be executed on BOO basis under a 20-year Power Purchase Agreement (PPA) with EETC. The Egyptian cabinet has recently approved the consortium's request to construct an additional 250 MW wind farm in the Gulf of Suez.

More projects are under way, located in Zafarana and the west of the Nile.

Waste-to-energy projects

In light of the Egyptian government's commitment to the safe disposal of waste, in 2015 it decided to start producing energy from waste recycling. The cabinet has recently approved a unified waste-to-energy feed-in tariff of EGP 1.40/kWh in an attempt to attract investors and use high technology in waste recycling. The proposed tariff is awaiting the approval of the House of Representative before it enters into force.



France

Authors: Christophe Barthélemy, Céline Cloché-Dubois, Aurore-Emmanuelle Rubio

1. Brief overview of the renewables sector

Key statistics

In the fourth quarter of 2017, the production of primary power was 28.2Mtoe (million tonnes of oil equivalent), the same level as the fourth quarter of 2016. The share of renewable generation increased strongly and reached a year-on-year rate of 15%. In detail: the share of wind power, affected by unfavourable wind conditions in autumn 2016, greatly increased (+47%); solar and photovoltaic power keeps growing (+21 %); and hydro production is now growing after a period of decline due to excess rainfall in December 2017 (+ 0.8%).

Overall primary power consumption was 62.9Mtoe in 2017, a decrease of 1.8% over the year, partly due to the 2017 spring and fall which were warmer than spring and fall 2016.

With consumption decreasing a production remains stable, the energy independence rate progressed by nearly one point over the year, to 44.9%.

2. Recent developments in the renewables sector

Evolution of the support scheme for renewable energy sources

Like many other European countries, France decided at the beginning of the century to support clean electricity generation through a "power purchase obligation" support scheme. The generators benefited from a purchase obligation, at feed-in tariffs laid down by ministerial orders; the State organised public tenders when commercial initiatives were insufficient to reach the national objectives for a specific part of the territory (including overseas territories) or for a particular technology (e.g. offshore wind farms).

Due to the overall cost for the electricity consumer and to the discrepancy between steady purchase price and declining cost of equipment, from 1 July 2014 the EU Commission revised its State aid guidelines aimed at monitoring the support for energy generation sources. Simultaneously, internal litigation led the ECJ to hold that the French power purchase obligation mechanism was a State aid scheme, and that the State had omitted to notify to the EU Commission (CJEU, *Association Vent de colère/ministre de l'écologie,* Case C-262/12, 19 December 2013), even though the Commission decided in the wake of this judgment that it was compatible with the internal market.

Consequently, the current support scheme for renewable energy sources in France is based on Law No. 2015-992 of 17 August 2015 "on energy transition for green growth". Consistent with the new Guidelines on State aid for environmental protection and energy, the new rules are based on the sale on the market of electricity from renewable sources, with a possible upside if the

market price is below the reference tariff. The new rules are gradually replacing the old ones, as they apply solely to new projects – older power purchase agreements were signed for 15 years (onshore wind farms, small hydro power plants) or 20 years (photovoltaic power plants).

Gradual replacement of feed-in tariffs with premium fees ("open window" system)
The power purchase obligation scheme was governed by Article L.314-1 of the French Energy Code. Purchasing agents designated by the law (EDF or, in some cases, local distribution companies) were compelled to enter into a regulated power purchase agreement (PPA) to purchase the entire production of each renewable producer willing to do so. Every renewable producer agreed to this arrangement, as the feed-in tariff has remained beyond the market price. This covered onshore wind turbines, geothermal installations, solar, photovoltaic and thermal facilities. The characteristics of the facilities and the conditions for benefiting from the support schemes were determined by a decree. The feed-in tariffs for each energy source were then defined by specific orders issued by the Ministers of Economy and Energy.

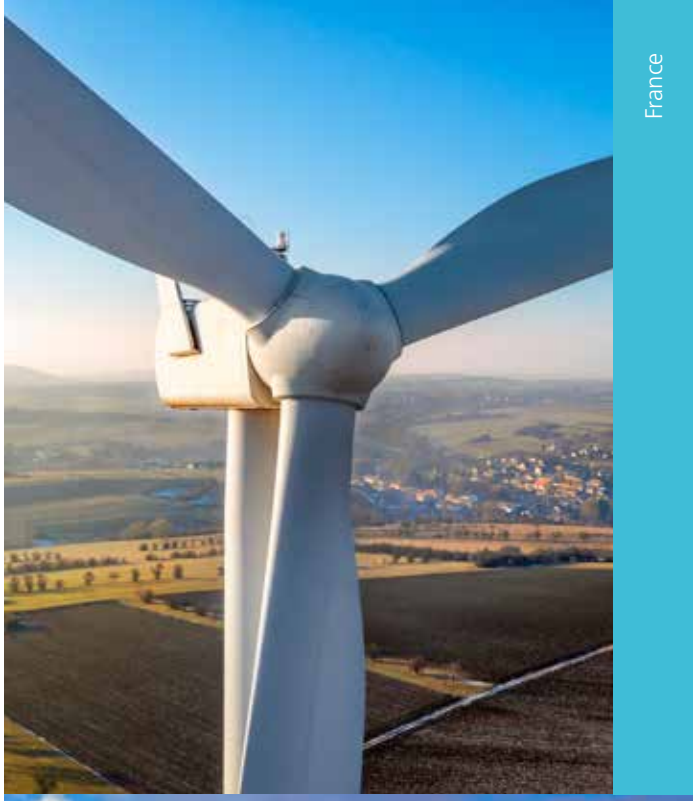
The Law of 17 August 2015, and its implementing decrees, deeply reformed this support system, turning it into a mechanism of contracts for difference, in accordance with the new Guidelines.

Producers must now sell their energy produced on the market, and they receive, through an ex post mechanism, an additional variable remuneration *(complément de rémuneration)* from EDF (the local distribution companies are no longer part of the mechanism) in the form of a monthly premium. The premium is based on a formula which includes a reference tariff set by a ministerial order for each type of energy. This remuneration aims to ensure a reasonable return on invested capital. However, if the market price exceeds the reference tariff, the generators must reimburse the difference to EDF, which acts as a State agency – the premiums and its expenses are reimbursed by the State.

In the middle of 2016, the French government adopted three implementing decrees:

- Decree No. 2016-682 of 27 May 2016, which sets out the conditions of access to the support mechanism provided by the Law on energy transition for green growth (premium fee and power purchase obligation), and establishes the calculation methods.

- Decree No. 2016-690 of 28 May 2016, setting out the terms and conditions of the assignment of power purchase obligation agreements to third parties, subject to prior State approval, as well as the conditions for the delivery of that approval







(to date, only a handful of aggregators have been authorised). This mechanism aims to provide fluidity to the wholesale electricity market (i.e. preventing EDF from benefiting from 100% of this energy).

- Decree No. 2016-691 of 28 May 2016, which specifies which installations will be eligible for a compensatory fee, and which ones will remain within the scope of the feed-in tariff regime. The feed-in tariff regime is maintained for small installations and for wind energy producers that are not eligible for the compensatory fee scheme; the revised feed-in tariffs mechanism only applies to a limited extent.

As a result of this reform, premium fees is now the main support mechanism for renewable energy.

The reform allows aggregators, which may work with electricity producers or electricity consumers, to develop a new business. For renewable electricity producers, the aggregator acts as an intermediary between them and the wholesale market: when buying and aggregating the production of various renewable producers, they bear commercial costs, balancing costs, and prediction risks (in periods of negative prices, the premiums are not paid).

Public tenders (tender procedure and competitive dialogue procedure)
Facilities which cannot benefit from the power purchase obligation mechanism or from premium fees through the "open window" (e.g. offshore wind farms and photovoltaic installations with a power above 100kWp) may benefit from the power purchase obligation or from premium fees through a competitive process. The competitive process may be used by the State when the development of production capacities in the market – including production technologies and the geographical location of plants – is not meeting the target of the energy multi-annual programme ("PPE" in French).

There are two different procedures: the classical tender procedure, and competitive dialogue, the latter inspired from the competitive dialogue *(dialogue concurrentiel)* of the Directives on public procurement, and created by Decree No. 2016-1129 dated 17 August 2016.

- **Classical tender procedure –** tender specifications are drawn up by the Ministry for Energy and published on the website of the national regulatory authority (the CRE). The CRE examines the applications within the time limit set by the specifications and sends to the Minister for Energy the list of offers that meet the tender criteria, the list of those that do not meet the criteria, a proposed ranking of the candidates (including a detailed rating), and the projects that the national regulatory authority proposes to select. The Minister for Energy subsequently selects the successful candidates, but is not bound by the proposal made by the CRE.

- **Competitive dialogue –** intends to foster the development of innovative renewable energies, such as offshore wind farms, by helping the government to better define the projects through a dialogue with the candidates. One of the purposes of this procedure is to allow a reduction of electricity prices paid by the taxpayer. The competitive dialogue starts with a consultation document drawn up by the Ministry for Energy. The Minister selects the candidates allowed to take part the dialogue. At the end of the dialogue, the Minister issues the final tender specifications and invites the candidates who have participated in the competitive dialogue to submit their offers to the national regulatory authority. For the remainder of the proceedings, the classical tender procedure described above applies.

The development of "crowdfunding"
Crowdfunding of energy projects is developing in France. It has a local dimension – the financing community is the local community and the beneficiaries are local citizens, small companies, and municipalities. Crowdfunding is particularly appropriate for the development of distributed energy sources such as solar, wind farms, and small hydro projects.

Until 2014, the implementation of participative funding in renewable energy projects was restricted: complex rules usually governed the offer of securities to the public and local authorities were obliged to contribute only through a local semi-public company, with a public majority.

But several measures relaxing the legal framework for participative funding were taken since 2014:

- Renewable energy actors can now initiate projects with participative funding, thanks to crowdfunding platforms free of the regulatory constraints that apply to the offering of securities to the public (pursuant to Law-Decree No. 2014-559 of 30 May 2014 on crowdfunding).

- Law No 2015-992 of 17 August 2015 on "energy transition for green growth" created in the Energy Code a new Article L.314-18, offering the possibility for renewable energy project companies to propose to "private persons, including those whose residence is close to the location of the project, and local authorities or their groupings the territories of which are used by the project" to take part to the financing. This law modified Articles L.2253-1, L.3231-6 and L.4211-1 14 of the General Local Authorities Code, to allow regions,

departments, towns, and groupings of these corporations, to directly participate in renewable energy projects.

The development of marine energies

Late development of offshore wind energy

France does not yet have an operational offshore wind farm. However, offshore wind energy is one of France's major axes of development of marine energies – offshore wind turbines now, floating wind turbines tomorrow, and possibly tidal current turbines.

The first two sets of projects were awarded in April 2012 and May 2014, further to calls for tenders (round 1 and round 2). Six grounded offshore wind farm projects, representing a capacity of 3,300MW, have been awarded. By comparison, at the end of the third quarter of 2017, 12,800MW of onshore wind farms had been commissioned.

In April 2016, the Minister for Energy launched a third bid for an offshore wind project off the coast of Dunkirk, under a competitive dialogue. The consultation document was published on the regulator's website in December 2016 and 10 qualified candidates were selected in May 2017. The dialogue is currently ongoing, and the award should be made in 2018. Commissioning is planned within seven years.

In November 2016, another tender was launched, again through a competitive dialogue, for the *Ile d'Oleron* project. However, the consultation document has not yet been published on the regulator's website.

On 3 November 2016, the Minister announced the results of the second call for pilot projects for floating wind turbines in the Mediterranean Sea, launched in August 2015 as part of the government's "Investments for the Future" programme. Two projects were awarded, on the Faraman zone and close to Leucate (4.6MW). The first two projects were awarded earlier in 2016 (22 July) for Groix Island (Brittany) and Gruissan (Mediterranean Sea).

Towards a friendlier legal framework for marine renewable energy

Decree No 2016-9 of 8 January 2016 relating to power generation and transportation facilities of marine renewable energy is a first step towards simplifying and speeding up the development of offshore projects.

The offshore wind industry – which is like the onshore industry, but with much bigger amounts per project – is systematically subject to litigation involving local stakeholders and environmental associations, because of acceptability issues concerning the construction and operation of the facilities.

The Decree provides for a specific litigation regime applicable to marine renewable energy authorisations, intended to limit the number of claims and the duration of the proceedings. The Administrative Court of Appeal of Nantes is now the exclusive jurisdiction empowered to settle legal disputes brought against authorisations required to undertake marine renewable energy projects. The court decides at first and last instance: the opponents and/or the developer can only file an appeal before the *Conseil d'Etat,* with recourse being limited to challenging the judgment on matters of law (facts are no longer subject to discussion). The Decree also created new tools to control the length of litigation: first, even if this deadline is merely indicative, the court is required to issue its ruling within one year from the date on which a dispute is brought before it; second, the arguments raised by the parties may be frozen by the court if a party so requests, and if the court finds the request to be appropriate. The Decree introduced new admissibility criteria for the claim: anyone intending to challenge a marine renewable energy authorisation is required to notify its claim, by a registered letter with acknowledgement of receipt within 15 days following the introduction of the claim, both to the administration which delivered the authorisation and the authorisation holder. Non-compliance with this obligation will make the claim inadmissible.

The Decree also provides two modifications of the legal framework applicable to marine renewable energy projects: it lengthened to a maximum of 40 years the duration of the concession to occupy the maritime public domain; and it extended the duration of the operating license in case of late commissioning (16 years for marine energy projects, versus ten years for other generation projects).

To make the modifications provided by the Decree more acceptable to people who may consider their rights to be affected by marine renewable projects, a new complaint procedure *(procedure de reclamation)* has been created. Any interested person may use this procedure to challenge the insufficiency of the mitigation measures (e.g. environmental care) set by the authorisation in order to make the project consistent with the other considerations of general interest. The *Préfet* to whom the claim is submitted has two months to assess the quality of the request and, if necessary, to order additional mitigation measures for the implementation and/or operation of the plant. If the *Préfet* does not answer, or decides that the measures imposed are sufficient within the two-month timeframe, the claimant may challenge this (explicit or implicit) decision before the Administrative Court of Appeal of Nantes.

A second step towards the faster and simpler development of offshore projects comprises Decree No. 2017-628 of 26 April 2017. It sets compensation that applies if the TSO delays connecting an electricity production facility from renewable energy sources at sea to the transmission network beyond the agreed deadline. This Decree implements the Law No. 2017-227 of 24 February 2017 on renewable energy, which provides a specific allowance for offshore wind turbines in case of late connection. Its key provisions include:

- the connection agreement signed between the TSO and the producer may derogate to the provisions of sections D. 342-4-1 to D. 342 -4-6 of the Energy Code, which set a deadline for the TSO to connect offshore wind plants (usually 18 months).

- the Decree's late connection compensation provisions may be superseded by those provided for in the specifications of the competitive tendering procedure launched in application of Article L. 311-10 of the Energy Code.

- Article R. 342-2-10 of the Energy Code sets the list of damages that may be so compensated – the costs and overcosts of financing resulting from the delay, and the additional costs of design, development and realisation of the production facility.

- a cap applies to the compensation, calculated according to new Article R. 342-4-11 of the Energy Code.

However, all these modifications were not considered as sufficient by the offshore industry –the legal framework for offshore projects is under deeper review, to simplify procedures and to achieve greater legal security for the developers. In that respect, Law No. 2017-1839 of 30 December 2017 to stop research and exploitation of conventional and unconventional hydrocarbons sets up provisions which improve the situation of the developers aforesaid. This law transfers to the TSO the responsibility for building and operating the offshore substation, and set the principle of indemnification of the producer in case of unavailability of the connection works during the operation phase. Indeed, it provides that:

- The TSO shall achieve the connection works before the date indicated in the tender specifications. Otherwise, in case of late connection to the grid, the TSO shall indemnify the developer. However, the indemnification amount paid by the TSO is caped (see Article L. 342-3 of the Energy Code).

- The producer, which applies for the connection to the grid, shall bear the connection costs, with the exception of installations selected through a competitive tender bidding procedure when the producer does not choose location of the wind park area (which is the case of all past, present or planned projects, since these projects are carried out on the public maritime domain, at the initiative of the State). In this particular case, which is the most frequent, the TSO bears the connection costs corresponding to the technical conditions laid down in the specifications or defined by the Minister for Energy, including stranded costs in case of abandonment of the call for competition procedure. However, any changes to technical connection conditions at the initiative of the successful candidate are the responsibility of the latter. In case of failure of the selected candidate, the latter assumes the stranded costs under the conditions provided for in the specifications (see article L. 342-7 of the Energy Code).

When the producer selected after a competitive procedure does not choose location of the wind park area and when the connection costs are borne by the TSO, the new article L. 342-7-1 of the Energy Code provides that the TSO must compensate the producer for losses resulting from the total or partial impossibility (when the connection includes several cables) of injecting electricity into the transport grid in the event of damage or malfunction of connecting works. The amount of this compensation, as well as its terms, are defined by decree. Those two lasts provisions apply only to competitive tendering procedure launched in application of Article L. 311-10 of the Energy Code for which a notice has been issued after 1 January 2016.

Moreover, two regulations were adopted to supplement the legal framework :

- Firstly, the Ministerial Order of 10 November 2017 sets the indemnification amount, at the expense of the TSO, and cap in case the latter is late in the connection works of marine renewable generation facilities (indemnity laid down in 4° of the article 341-2 of the Energy Code). Under this Ministerial Order, TSO's contribution shall be capped at 40% of any indemnity paid to any developer and this



first cap set by installation shall be superseded by a second yearly and overall cap of EUR 70m. The tariff ("TURPE") pays the balance. This rule applies only in cases the cause of delay (or limitation) of the production is imputable, at least in part, to the TSO.

- Secondly, the Decree No 2018-22 of 30 March 2018 sets the calculation methods when the TSO bears the cost of connection of the wind farm to the transmission grid, in two distinct cases: (i) the TSO is late in the connection works: the compensation is set at 90% of the loss, paid at the latest six months after the end of the delay (with a monthly payment established at 80% of the expected loss); (ii) there is a damage or malfunction in the cable (offshore or onshore parts): the same ratio applies, 90% of the total loss is compensated, with 80% paid monthly by the TSO).

And finally, recently, Article 58 of the Law No. 2018-727 dated 10 August 2018 establishing a State for a trustworthy society has introduced important changes within the Energy Code and the Code of Environment. The reform concerns the simplification of the law for the construction and operation of offshore wind turbines, the renegotiation of purchase prices resulting from the 2011 and 2013 offshore tenders, and the introduction of a new pecuniary sanction:

- First of all, when the Minister of Energy intends to organize a competition procedure pursuant to Article L. 311-10 of the Energy Code for the realization and the operation of an offshore wind farm, the Minister must seize, beforehand, the CNDP which is the French National Public Debate Commission. This Commission determines the modalities for public participation in the decision-making process for launching the competition process. In particular, the public is consulted on the choice of the potential area(s) of the implantation of wind turbines ;

- In addition, the new article L. 181-28-1 of the Environment Code, created by the Law No. 2018-727 dated 10 August 2018, establishes special provisions for the authorizations necessary for the construction and operation of wind farms. The State will carry out part of the impact study (« étude d'impact »). The authorizations required for the construction and operation of wind turbines will contain variables, with associated requirements(« permis enveloppe »). The variables may relate to the number of wind turbines for example, or their size, or their organization in the defined area, so that the project can evolve after obtaining administrative authorizations, without having to obtain new administrative







authorizations, as the evolution will be integrated in the initial authorizations. The beneficiary of the authorizations will have to inform the administration of the characteristics of the project as it will be finally operated ;

- Moreover, Article 58 lays down the legal framework for the renegotiation of purchase prices resulting from the 2011 and 2013 offshore tenders (points III to V of Article 58);

- Lastly, Article 58 provides for a special sanctions regime in the event that a winner of a competition procedure does not carry out the project without a valid reason. Article L. 311-15 of the Energy Code already provided for a sanction, but this sanction is only applicable when the installation is in operation.

Self-consumption and closed distribution systems

Self-consumption

Article 119 of Law No 2015-992 of 17 August 2015 on energy transition for green growth empowered the French government to provide a statutory framework for the development of self-production and self-consumption schemes by a law-decree.

Law No. 2017-227 of 24 February 2017 ratified Law-Decree No. 2016-1019 dated 27 July 2016 relating to electricity self-consumption. It created a new chapter in the Energy Code, dedicated to self-consumption of electricity. Both "individual" and "collective" self-consumption are now authorised and regulated. Article L.315-1 of the Energy Code defines individual self-consumption as "the fact for an individual producer to consume on the same site the electricity produced by his own facility. The electricity produced can be either consumed immediately or after a storage period". Article L.315-2 defines collective self-consumption as an electricity supply between one or several producers and one or several final consumers within the same legal person. The drawing and injection points must all be located beyond the same substation of the public distribution grid.

Law No. 2017-227 requires public network operators to facilitate self-consumption. It specifies that the French Energy Regulator should establish a network tariff adapted for self-consumption, taking into account the reduced use of public networks and the related costs implied in the long run by self-consumption.

The implementing decree is Decree No. 2017-676 dated 28 April 2017.

Closed distribution systems

Law-Decree No. 2016-1725 of 15 December 2016 concerning closed distribution networks finally gave effect in France to Article 28 of the 2009/72 EU Electricity Directive.

A closed distribution system is a system which distributes electricity within a geographically limited industrial, commercial or shared services site. This network can only supply non-household consumers, i.e. industrial, commercial or sharing services activities, according to Article L.344-1 of the Energy Code. However, the operator of a closed distribution system may supply residential customers if they are employed by or associated with the system owner, and consume the electricity in the area supplied by the system.

To be qualified as a closed distribution system, the system must meet one of the following conditions:

- the production or the operation process of the users of the system is integrated for technical or safety reasons.

- the system distributes electricity primarily to the owner or operator of the system or its related undertakings.

On 12 January 2017, the Paris Court of Appeal adopted a surprising position on privately owned distribution systems, in the context of a dispute between Valsophia, a local operator, and ENEDIS, the main French DSO. The judgment prohibits indirect connections of consumption sites to the distribution grid. The Court of Appeal questioned the decision dated 6 May 2015 of CoRDIS (the Committee for dispute settlement and sanctions of the Energy Regulator) which ruled that there is no legal obstacle to indirect connection to the grid for consumption installations, just as for generation facilities (which had been admitted by the Paris Court of Appeal). According to the Court of Appeal, private facilities supplying electricity to final customers are distribution systems and, before the entry into force of the Law-Decree No. 2016-1725 and the creation of such closed distribution systems, only the companies operating public distribution networks may legally operate a distribution system. This judgment is currently challenged before the Cassation Court.

To counteract one of the effects of this judgment, Article 16 of Law No. 2017-1839 of 30 December 2017 to stop research and exploitation of conventional and unconventional hydrocarbons created "interior building grids", which are a new category of electrical grids, consolidated in Articles L.345-1 to L.345-8 of the Energy Code. This relates to interior grids of office building which belongs to a single owner. The law organizes

in this specific case, the indirect grid connection of final consumers. The implementing decree is Decree No 2018-402 dated 29 May 2018.

3. Forthcoming developments/opportunities in the renewable sector

The review of the PPE

The multi-annual energy programme (PPE), that the French government must publish under Law No 2015-992 of 17 August 2015 on energy transition for green growth, replaced the former multi-annual investment program (PPI) that was limited to electricity, indicative multi-annual gas investment plan, and multi-annual investment plan for heating facilities. It sets out, by energy source, the broad energy policy guidelines in France.

The first (partial) PPE was adopted on October 2016. It will be revised before 1 January 2019. The National Public Debate Commission decided that a public debate on this future PPE should begin during the first quarter 2018: the public debate runs from 19 March 2018 to 30 June 2018.

Carbon tax

A "climate-energy contribution" (CCE) was introduced in France in 2014 in the form of a "carbon component" gradually added to the existing taxes on domestic energy consumption. The carbon tax – which taxes energy based on the CO_2 emissions they cause – is gathering momentum. The Climate Plan foresees that this taxation will increase in the coming years. However, so far the carbon tax has been relatively inefficient because of the substantial drop in oil prices which has offset the increase in taxation.

Smart grids

The development of smart grids guarantees a better integration of renewable energies by: improving the management of intermittence; optimising electricity networks; enabling better integration of electricity storage systems; developing self-consumption and of "consum'actors"; and promoting greater energy independence and security of supply.







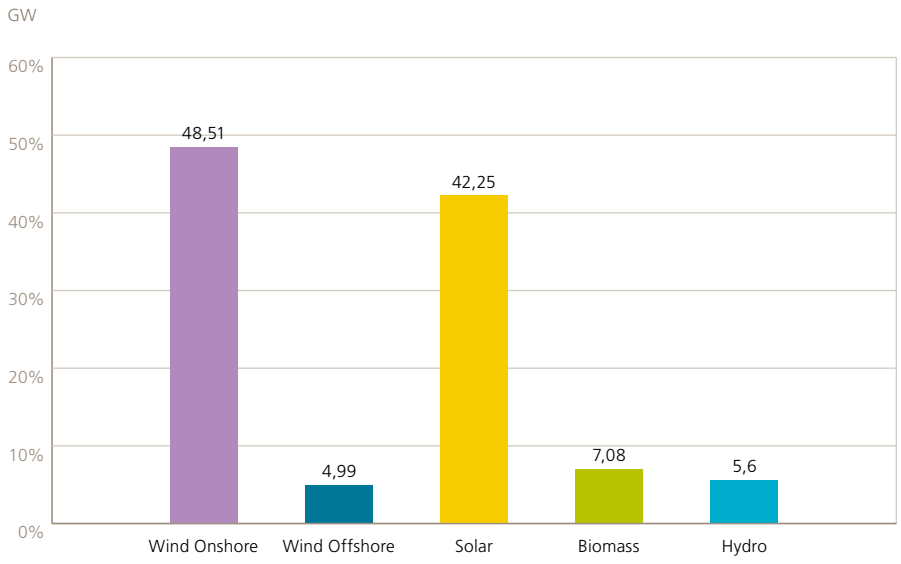
Germany

Author: Dorothee Janzen

1. Brief overview of the renewables sector

Germany's energy transition, the *Energiewende,* has been a major part of the programme of every German government since 1998. After 20 years of adjustments to build a statutory framework, today 33% of Germany's electricity production comes from renewable energy sources. Moreover, Germany aims to increase the percentage of gross electricity consumption from renewable energy sources to more than 40% by 2025 and to 80% by 2050.

Installed capacity of renewables in Germany in 2017:



Source: Federal Ministry for Economic Affairs and Energy (BMWi) and Federal Network Agency (BNetzA).

With an installed capacity of 53.49GW, Germany is still one of the world's largest markets for wind energy. Offshore wind capacity has been growing especially fast in recent years. A key reason for this growth are multiple increases of the statutory offshore tariff between 2009 and 2014 – from 9.1 Cent/kWh up to 19.4 Cent/kWh peak.

The renewable industry in Germany is no longer a market for pioneers. Since 2000, a total of more than EUR 246bn has been invested in renewable energies in Germany.

The Renewable Energy Sources Act *(EEG)* is the centerpiece of the legislative framework supporting renewable energies. It is subject to regular revision and has been complemented over the years by several supporting laws and regulations.

2. Recent developments in the renewables sector

The EEG originally provided for a pure feed-in tariff-based support system. The EEG 2014 first introduced a tender model for greenfield solar projects.

In January 2017, a further revision of the German Renewable Energy Sources Act (EEG 2017) came into force, alongside a separate law regulating the expansion of offshore wind (WindSeeG). Among other changes it replaced the fixed tariff for wind, solar and biomass with a market-based tender model. The financial support for other renewables – hydropower or geothermal plants – and for small plants continues be determined by law.

The legislator expected this systemic change both to decrease the cost of the governmental subsidy and to increase competition and diversity between the players. It also aligned the German support system with the EU Guidelines on State Aid for Environmental Protection and Energy 2014–2020 (2014/C 200/01). The results of the first tenders demonstrate that the renewables industry seems to be able and willing to accept lower support – or, in the case of offshore wind – even no support at all.

Winning prices in Cent/kWh of the latest 2017 German tenders for wind onshore, wind offshore and solar:

	Wind onshore	**Wind offshore**	**Solar**
Tender result (Weighted average)	3.82 November 2017	0.44 April 2017	4.91 October 2017

Notably, the price for offshore wind energy dropped to an average of 0.44 Cent/kWh in the first offshore tender. Four projects were awarded, all in the North Sea. Three of these are Europe's first offshore projects without any subsidy.

The development of remuneration for onshore wind is also remarkable. In the first onshore wind tender, in May 2017, the average price for an overall awarded capacity of 807MW fell to 5.71 Cent/kWh. In the third tender, in November 2017 for 1,000MW, the average price dropped to 3.82 Cent/kWh.

The tenders are organised by the Federal Network Agency which publishes tender dates, volumes and maximum prices in advance and tender results afterwards. Tenders are performed between once and four times a year, depending on the technology. Bidders must provide security and implement the winning projects within a predefined period or pay a penalty.

More than 95% of the projects awarded in the first two onshore wind tenders were won by so-called citizens' cooperatives. These organisations only need to have secured the area of installation, but are allowed to participate in the tenders without first obtaining the necessary permit under the Federal Immission Control Act. They also have more time – 54 instead of 30 months – to build their projects. The fact that most of the awarded onshore projects do not have a permit leads to uncertainty about their implementation within the industry. If many of these citizens' projects fail to be implemented, growth in the wind sector will suffer. Responding to the large number of projects awarded without a permit, the legislator has made a permit under the Federal Immission Control Act a prerequisite for taking part in the first two onshore wind tenders in 2018.

3. Forthcoming developments/opportunities in the renewables sector

The renewables sector in Germany is still growing. The new tender system creates new challenges for the industry but at the same time provides a stable regulatory framework for further investments. As part of the exploratory discussions between the Christian Democrats and the Social Democrats for the formation of a new government coalition, the parties agreed on a goal of 65% electricity production from renewable energy sources in 2030 and an increase in new on- and offshore wind as well as solar capacities through additional tenders in 2019 and 2020.

One crucial question: have the offshore zero-subsidy bids just been a one-off occurrence or will more players be willing to build their projects without asking for any subsidy? The legislator recently reacted to the zero-subsidy bids by disallowing negative bids in the offshore wind tender. This shows that at least the legislator expects more players to be prepared for zero-subsidy or even lower bids.

In the long term, electricity prices and decreased or zero-subsidy bids will have a significant influence on project development and implementation. As well as new challenges in contract design for offshore wind (EPCI vs. multi contracting) and project financing, alternative sales strategies, such as corporate PPAs (power purchase agreements), must be taken into consideration.







Hungary

Authors: Peter Simon, Nora Kondorosi

1. Brief overview of the renewables sector

Electricity generation from renewable sources is a developing sector in Hungary. In 2015, the share of renewables within final electricity consumption was 7.21%, with biomass as the main type of renewable energy source (RES). In its National Action Plan, Hungary's undertaking is to have 14.65% of its electricity consumption from renewable sources by 2020.

Biomass is the most common form of RES for power generation. Even before the current electricity act came into force on 1 January 2008 and the introduction of the mandatory offtake regime for electricity produced from RES, certain generators started considering switching the fuel source of their existing generating stations from coal/gas to waste/biomass and investing in other RES projects (e.g. Veolia's biomass development at Pécs). Some of the bigger generating stations have partially switched to operating on biomass and several smaller biomass-generating stations operate solely on RES.

Waste-to-energy plants are not frequent in Hungary, but the country's capital, Budapest, has a communal waste burning power plant that has substantial capacity and generates steam for district heating and electricity.

There are several geothermal projects already in operation or under development, typically in small or medium sized towns, to provide municipal districts and public buildings with heating. Hungary has considerable potential in geothermal energy, although such reserves are typically used for heating purposes rather than electricity generation.

Approximately 330MW of wind generation capacity has been installed so far. All the currently operational projects were licensed in, or before, 2006. Almost half of the operating wind power generation capacity belongs to one Spanish investor; the rest is operated by smaller operators.

There is increasing demand for solar energy, both on the household and industrial level. A few larger-scale PV plants (stand-alone or as part of an industrial project) are already in operation, with more planned to become fully operational in the 2017–2019 period. The number of household-size PV plants that do not require a license has also been increasing steeply, making solar power the leading source for household renewable electricity production.

Hungary's renewables offtake regime went through a substantial amendment at the end of 2016 and is







currently in a transitional period. Under the new regime (the METÁR system), electricity generated from renewable sources is either taken over from the generator at a pre-determined feed-in tariff by the TSO (in case of smaller power generation units), or a so-called premium subsidy can be awarded by the Hungarian Energy and Public Utility Regulatory Authority (HEPURA) or granted by way of a tender procedure called for by the HEPURA. The mandatory feed-in tariff or the premium subsidy is granted for a period (determined by the HEPURA) that guarantees return of investment, with a maximum duration of 25 years.

2. Recent developments in the renewables sector

New offtake regime

The most important recent change in the renewables sector was the introduction of the new offtake regime, called METÁR. The new system applies to generation of electricity from renewable sources as of 1 January 2017. It introduced an offtake regime that offers mandatory feed-in tariffs and premium subsidies to newly-built power generation units using RES, or existing units that are to be refurbished if the refurbishment costs exceed 50% of the original investment amount.

The mandatory feed-in tariffs are applicable to production units that do not exceed 0.5MW in capacity. The tariffs are determined by way of legislation and indexed annually. Further diversification of the tariffs is based on the time of day and type of RES (solar, wind or other). The TSO is obliged to take over the electricity produced by the production unit admitted to the mandatory feed-in tariff system up to the volume of electricity determined in the respective resolution of the HEPURA and pay the mandatory feed-in tariff to the producer.

Premium subsidies for production units between 0.5 – 1MW of capacity can be applied for from the HEPURA by submitting the respective application form. Premium subsidies for production units above 1MW capacity are granted through a tender procedure called for by the HEPURA upon the instruction of the Ministry of National Development. The aggregate amount of premium subsidies is maximized by the respective legislation and is recalculated on an annual basis based on a formula. Generators receiving premium subsidies must sell their electricity individually on the market. The premium subsidy is paid to the eligible generators by the TSO based on the day ahead prices of the Hungarian Electricity Exchange and a subsidised price set out in the tender application of the producer or, in case of a subsidy granted without a tender, a formula set out in the legislation.

The new legislation specifies that the generators that applied for the necessary regulatory licenses before 31 December 2016 are entitled to remain in the previous

(very favourable) mandatory offtake system. This resulted in the enormous number of applications for solar power plant licenses up to an aggregate amount of 2000MW installed capacity. Some of the applicants are smaller family controlled firms that cannot effectively develop the licensed projects and they are now seeking investors and financiers for their licensed projects.

Changes to rules for the establishment of wind parks

Another recent change in renewables legislation was the introduction of multiple qualifications for wind parks. The new provisions took effect at the end of 2016 and introduced extended government control of potential future wind park projects, effectively making it close to impossible to obtain new wind park licenses.

3. Forthcoming developments/opportunities in the renewables sector

Due to the low proportion of renewables in overall electricity generation, Hungary will need to focus on this sector in the coming years in order to be able to reach its undertaking of 14.65% from RES by 2020.

As a result of the recent restrictive legislative changes regarding wind energy, the areas of renewables most likely to develop are solar and geothermal.

The introduction of the new offtake regime saw a surge in solar power plants applications at the end of 2016, leading the HEPURA to grant multiple licences or issue resolutions setting out the mandatory offtake price for numerous PV projects. Although it is unlikely that all licensed solar projects will be put into operation, solar power seems to be the most promising segment of the renewable generation sector.

Although the geological circumstances of Hungary are very favourable, geothermal projects are not yet frequent, most likely due to the capital requirements of seismic and drilling activities. However, the legislative background for these projects is in place: geothermal concessions have been announced each year since 2013.



Italy

Authors: Pietro Cavasola, Matteo Ciminelli

1. Brief overview of the renewables sector

Italy has always been strongly dependent on energy imports, and approximately 65% of its energy needs are still covered by traditional oil and gas supplies. In recent years, the Italian Government has adopted several measures aimed at developing and fostering energy production from renewable energy sources (RES) with a view to increasing Italy's independence from energy imports.

Since 2010 Italy has been consuming a higher proportion of renewable energy than the target set in the National Action Plan, adopted after the implementation of EU Directive 2009/28/CE. According to the Directive, Italy had to reach 17% of gross final energy consumption from RES by 2020. This target was reached in 2016 and currently the gross final energy consumption from RES is 17.6%.

The Ministry of Economic Development (MSE) and the Ministry for the Environment, Land and Sea (MATTM), are responsible for the promotion and development of renewable energy and energy efficiency. The other main regulatory bodies for general energy policy are:

- AEEG **(Autorità per l'energia elettrica, il gas e il sistema idrico)** – the independent body that regulates, controls and monitors the electricity market in Italy. Its purpose is to protect the interests of users and consumers, promote competition and ensure efficient, cost-effective and profitable nationwide services.
- GSE **(Gestore Servizio Energetici)** – the state-owned company that promotes RES and fosters sustainable development by providing support for renewable electricity generation and by taking action to build awareness of environmentally efficient energy uses.
- Terna manages the Italian transmission grid, is responsible for high-voltage electricity transmission and distribution throughout Italy.

The administrative procedures supporting the development of RES involve the Italian State, the relevant region where the plant is located or, for small-scale plants, the relevant municipality. These administrative procedures are:

- **Single Authorisation:** introduced by legislative decree 387/2003 and required depending on the nominal power of the plant. The single authorisation is granted following a specific procedure which involves the relevant region and all the public administrations and private entities with an interest in the envisaged project.

- **Simplified Administrative Procedure:** applicable to small scale renewable plants, the simplified administrative procedure consists of a request to be submitted to the relevant municipality at least 30 days before the work starting date, together with documentation proving the sustainability of the project and compliance with applicable building regulations and safety provisions.

2. Recent developments in the renewables sector

In recent years, the Italian Government has implemented several incentive schemes to encourage the development of renewable energy production. The most significant ones are those adopted between 2009 and 2016. In particular:

1) Feed-in tariff and premium tariff scheme *(conto energia)* for solar photovoltaic (PV) installations;

2) Feed-in tariff scheme for all RES other than PV.

Feed-in tariff and premium tariff scheme for PV plants

Between 2005 and 2013, five different incentive schemes were introduced for PV projects by ministerial decrees, each setting out different terms conditions and tariffs. The latest applicable PV scheme (Ministerial Decree 5 July 2012 also known as the "Fifth Conto Energia") provides two distinct ways to gain access to the incentives:

- **Direct access** for small plants (i.e. those with a capacity equal to or less than 12kW) and for other specific PV plants (*inter alia,* those up to 50kW which imply the removal of asbestos). Plants meeting these criteria were automatically admitted to the incentive scheme.

- **Enrolment into specific electronic registers** for all other PV plants. These plants had to go through a registration procedure governed by the GSE (the state-owned company that promotes and supports RSE in Italy).

The Fifth Conto Energia sets out support schemes based on the capacity of qualifying plants. Two schemes are available based on the share of net generation *injected into the grid*. First, for PV plants up to 1MW, there is an **all-inclusive feed-in tariff** *(tariffa omnicomprensiva)* based on the capacity and type of plant.

Second, for PV plants whose capacity is higher than 1MW there is a tariff equal to the difference (if positive) between the all-inclusive feed-in tariff and the relevant hourly zonal electricity price. The Fifth Conto Energia also has a **premium tariff** for the share of net generation *consumed on site*.

The incentive tariff is applicable on the date of commissioning of the plant and is paid over a period of 20 years from that date.

To control future capacity installations, however, Ministerial Decree 5 July 2012 provided for a specific indicative annual aggregate cost cap equal to EUR 6.7bn per year which was the maximum amount of incentives which could be granted to PV plants. This cap was reached, and no further incentives are currently granted for new PV plants under the decree. Currently, incentives for PV installations continue to apply only to plants that have already completed the registration procedure or that, following due enrolment into the registers, have already obtained the relevant feed-in tariffs.

Feed-in tariff scheme for RES plants other than PV

Ministerial Decree 6 July 2012 introduced a support mechanism for non-solar RES (e.g. wind, biogas, hydro, biomass, bioliquids, geothermal). Incentives were granted either by direct access or through a specific registration procedure, or by means of auction processes, depending on the size and type of RES plant. The support mechanism is now applicable only to those plants that registered on time for the relevant registers held by the GSE and those that successfully participated in the auction processes pursuant to Decree 6 July 2012.

By means of Ministerial Decree 23 June 2016, a new incentive scheme was adopted which, in line with the previous scheme, gives specific rules for accessing the incentives. In particular:

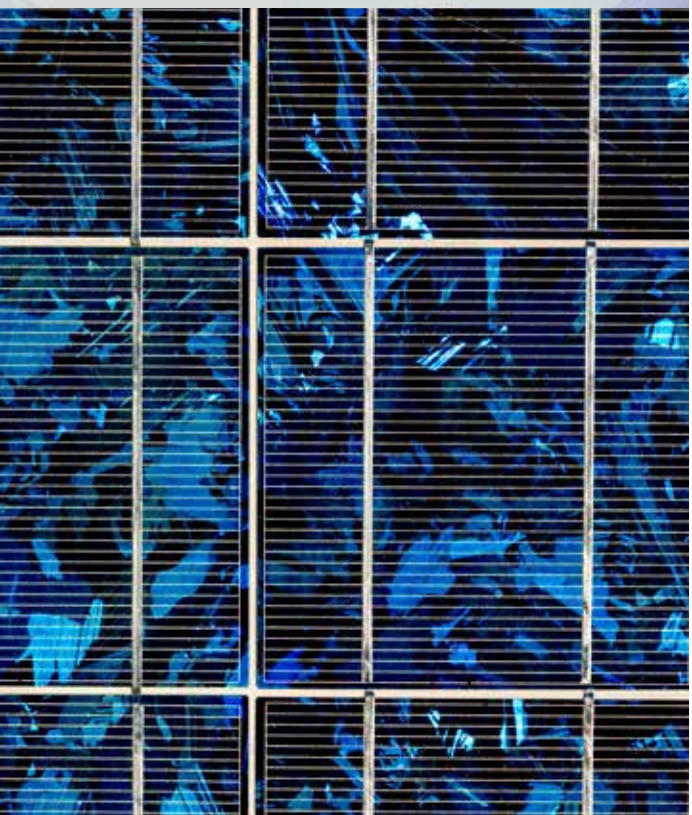
- **Small-scale plants** (i.e. 1–60kW wind farms, 50kW hydroelectric plants repowered up to 250kW, etc.) can access the incentives directly.

- **New, completely re-built and reactivated plants whose capacity is not higher than 5MW** (for instance 60–5.000kW wind farms) need to be registered with the electronic registers of the GSE before the relevant incentives are granted.

- **New, completely re-built and reactivated plants whose capacity is higher than 5MW** compete for incentives in specific auction processes *(aste al ribasso)* managed by the GSE.







Ministerial Decree 23 June 2016 also provides for a specific annual aggregate cost cap. EUR 5.8bn per year is the maximum amount of feed-in tariffs that may be granted to non-solar RES plants, taking into account the conventional anticipated average useful life of the specific type of plant. Once this cap has been reached, no further feed-in tariffs will be granted under the decree. As of July 2017, the annual aggregate cost had reached EUR 5.395bn.

As with the decree for PV plants, for the share of net generation injected into the grid, the Ministerial Decree 23 June 2016 provides for an all-inclusive feed-in tariff (for plants whose capacity is up to 500kW) and a feed-in-tariff (for plants whose capacity is higher than 500kW) predetermined according to the capacity and type of RES.

3. Forthcoming developments/opportunities in the renewables sector

Italy has made strong progress in the development and implementation of its energy policy and has proved extremely successful in achieving – in 2016 – its overall 2020 target of 17% of final energy consumption from RES.

With legislative elections approaching in 2018, it is expected that the new Government will continue to pursue the main objectives of Italy's energy policy, including: energy supply security; lower energy costs for consumers; promotion of new technologies; environmental protection; and sustainable development.

In the medium-to-long-term, the Government is expected to further foster the production of energy from RES and make Italy less dependent on imported fossil fuels. To this end, it is likely that new opportunities will arise for national and international operators and, hopefully, more resources will be made available for new incentive schemes.



Luxembourg

Author: Julien Leclere

1. Brief overview of the renewables sector

Luxembourg has made progress towards strengthening its energy supply security, developing sustainable energy supplies and integrating its markets into the central-west European region. Luxembourg promotes resource-efficient energy supply and has made eco-innovation and clean energy technologies priorities for research and development.

Legal framework

Luxembourg's policy on renewable energy sources (RES) is guided by the following key legal elements:

- *Law of 5 August 1993* (the Law of 1993): The Law of 1993 provides the legal basis for deployment and renewable energy usage in Luxembourg. It establishes mandatory energy use norms and standards for buildings. It also creates a legal basis for the introduction of financial support mechanisms for the deployment of renewable energies in Luxembourg, such as feed-in tariffs, grants, and tax reliefs. These activities can benefit from state aid.
- *The National Renewable Action Plan of July 2010:* In line with EU Directive 2009/28/EC, Luxembourg's 2020 renewable energy targets are:
  - Overall target: 11% share of gross final energy consumption generated from RES.
  - Heating and cooling: 8.5% of heat consumption met by renewable sources.
  - Electricity: 12% of electricity demand met by electricity generated from RES.
  - Transport: 10% of energy demand met by RES.
- *Luxembourg has specific policies and schemes to achieve these targets, including:*
  - Feed-in tariff system
  - Removal of administrative barriers
  - Energy efficiency and energy saving measures in new and existing buildings
  - Organisation of training in RES installation, servicing, management and certification
  - Renewable building obligations
  - Information programmes aimed at the general public, business and household owners, and potential investors
  - Financial support for research and development
  - Comprehensive framework of fiscal incentives.







The Grand Ducal Regulation of August 2014 on the production of electricity based on renewable energy sources (the Grand Ducal Regulation of 2014): The Grand Ducal Regulation of 2014 establishes a system of certificates guaranteeing renewable origin of the electricity produced. It outlines the method for calculating feed-in tariff (FIT) levels for renewable energy. It also introduces an additional bonus for commercialised heat generated by combined heat and power based on biomass, biogas and wood waste.

Several policies aim at promoting the development, installation and use of RES-installations, including a training programme for RES-installers; a general research, development and demonstration program; and support schemes for RES-H infrastructures.

General investments

Luxembourg awards investment grants in relation to all renewable electricity generation technologies. Luxembourg regulations identify several types of investment that are eligible for grants, including: investments in energy saving; investments in high-efficiency cogeneration; and investments in the production of energy from RES.

Any individual or company holding a business permit to carry out an industrial, commercial or artisanal activity as a main or secondary activity within Luxembourg may be eligible for these investment grants.

Aiming to support environmental protection and the rational use of resources, Luxembourg grants subsidies for companies investing in RES. Luxembourg attracts foreign investments with a full range of adapted investment incentives for investing in the efficient use of energy. Financial support may be granted in the form of medium- and long-term loans by the National Credit and Investment Corporation.

Luxembourg's income tax law provides for a special depreciation method to encourage investments in assets contributing to energy efficiency in buildings, some exemptions from income tax (e.g. for the sale of electricity generated from PV sources) or tax deduction (e.g. for biofuel).

Luxembourg's electricity market regulation has a compensation mechanism for any company involved in electrical activity (i.e. production, transport, distribution, supply or trading). The mechanism operates in the general economic interest as well as in the interest of consumers.

2. Recent developments in the renewables sector

The Luxembourg government programme makes energy transition a key priority. The new Grand Ducal Regulation of 24 April 2017 promotes RES and energy efficiency. It amends some elements of the Grand Ducal Regulation of 1 August 2014.

3. Forthcoming developments/opportunities in the renewables sector

Luxembourg intends to meet its renewable energy and climate targets mainly through efforts at the EU and international levels. Luxembourg adopted challenging energy and climate targets for 2020 within the EU framework.

In the context of the EU objectives to achieve a reduction of 80% to 95% of greenhouse gas emissions by 2050 and the discussion on the 2030 climate and energy framework, Luxembourg's white paper process is an opportunity to further work on a new integrated energy and climate strategy.

Given the regional integration of its gas and electricity markets, Luxembourg is also likely to be impacted by the decarbonisation policies of neighbouring countries, as it imports most of its energy needs.

Looking ahead, Luxembourg should seize opportunities for promoting a smart green economy, competitive retail markets, smart transport and mobility solutions, and regional integration of the short- and longer-term electricity markets, with a view to maximising energy security benefits while minimising costs to consumers.

Developing a long-term vision for the energy system up to 2030–2050 in consultation with all key institutions would provide Luxembourg with the opportunity to play an active and valuable role in enhancing energy security and meeting the decarbonisation challenges faced not only in Luxembourg but in the region. The regional element is vital, as it will encourage resource efficiency, and the interoperability of technologies and infrastructure, including in the transport sector. Two key institutions have a major role to play: the Ministry of the Economy, which has overall responsibility for energy policy including renewable energy; and Myenergy, a common agency of the Ministry of the Economy, which manages the promotion of the use of renewable energy resources.



Mexico

Authors: Derek Woodhouse, Luis Fernandez

1. Brief overview of the renewables sector

In 2013, Mexico radically reformed its electricity market. Before the reform, the generation, transmission, distribution and supply of electricity were reserved exclusively to the state by way of a monopoly granted to a body called the Comisión Federal de Electricidad (the CFE). The sector attracted little foreign investment and had few operational renewable energy projects. In 2014, as part of a package of reforms, the government passed the Electricity Industry Law (Ley de la Industria Eléctrica). This began the process of setting an open market where the private sector started to have an important role in the electricity industry in Mexico.

The reform consisted of two main parts: legal separation of the CFE from the government and unbundling of its various functions into independent subsidiaries and affiliates; and the creation of a brand-new wholesale electricity market, allowing the private sector to generate and sell electricity freely. Clean energy was also a key focus of the reform.

The Mexican government has pledged that by 2050, 50% of the energy mix will be clean energy, with 25% of that target to be achieved by 2018. Much of this will be achieved by the introduction of renewable energy projects. However, "clean energy", as defined by Mexican law, has a wider definition than the conventional characterisation of renewable energy. Clean energy includes nuclear power and conventional generators with carbon capture and storage mechanisms that achieve certain emissions thresholds, as well as renewable technologies.

To encourage private investment in clean energy, the reforms introduced the Long-Term Auctions (LTAs). The LTAs are a mechanism by which market participants can offer to buy or sell energy, Capacity (a commercial product which is granted to energy generators for making electricity available to the grid at peak times), and Clean Energy Certificates (CELs). The auctions are neutral between qualifying technologies, and all transactions are completed under the terms of standardised Electricity Coverage Contracts of 15 years for electricity and Capacity, and 20 years for CELs. The LTAs provide a regulated and transparent mechanism for selecting the most cost-efficient projects.

CELs are certificates issued to generators of clean energy by the market regulator, the Comisión Reguladora de Energía (CRE). One CEL is given for each MWh of clean energy produced. CELs are transferrable and may be purchased through private bilateral agreements or in the LTAs. Certain parties, known as "Load Serving Entities", are required to purchase CELs in proportion to the amount of energy from non-clean

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at a level of 5% of energy used (i.e. one CEL for each 20MWh of energy). This level will increase over time.

The first two LTAs were held in 2016. During the first auction 5.4TWh was assigned, with several wind and solar firms winning contracts. In the second auction 8.9TWh of renewable generation projects won contracts. The clearing price, announced in September 2016, was MXN 33.5/MWh, one of the lowest clean energy prices anywhere in the world and 30% lower than the average price from the first auction. International companies including Enel Green Power, EDF Energies Nouvelles, Engie and Fotowatio won contracts.

Since the reforms, foreign investment in renewable energy in Mexico has generated global interest. Energy companies and institutional investors have financed many new projects. Recently there has been an increased level of energy M&A activity, with developers selling projects that have secured electricity coverage contracts in the LTAs and have reached or are nearing commercial operation.
The CMS Power team in London and its associate law firm in Mexico, Woodhouse Lorente Ludlow S. C., advised the Mexican Ministry of Energy (SENER) on the Mexican electricity market reform.

2. Recent developments in the renewables sector

Although distributed generation existed on a small scale before the energy reforms, the 2014 Electricity Industry Law, and subsequent laws, gave the relevant authorities scope to expand distributed generation. In response to mounting demand, SENER released a manual on interconnection for projects below 0.5MW in December 2016. The manual contains more generator-friendly provisions, including a time limit to connect new energy producers. At the same time, the CRE opened a public consultation on the form of the administrative documentation for distributed generation and the results were published in March 2017. It is hoped that clarifying and streamlining the process will encourage more domestic and small-scale commercial users to install rooftop solar panels. The level of installation has grown dramatically since the reforms.

3. Forthcoming developments/opportunities in the renewables sector

In April, CENACE, the Mexican system operator, called the third LTA. In the previous two LTAs all generators, including private companies, could make offers for sale, but the only permitted buyer was the CFE in its role as the Basic Service Supplier – the regulated government entity responsible for providing energy to Basic Users (primarily households and small businesses).

This year, for the first time, Load Serving Entities other than CFE will be able to participate in the market as purchasers. This is due to the implementation of the Clearing House (Cámara de Compensación). This independent body will assess market participants' financial credibility and socialise the risk of default. The two types of Load Serving Entity that will be able to participate are Qualified Service Suppliers and Qualified User Market Participants:

- Qualified Service Suppliers – can purchase energy, Capacity and CELs to supply to Qualified Users and those that consume 1MW or more e.g. industrial consumers.

- Qualified User Market Participants – users of energy that have an expected demand of more than 5MW and that consume at least 20GWh a year, e.g. factories, can bid in the auctions to purchase their own requirement of energy, Capacity and CELs.

Opening the LTAs in this way will end Qualified Service Suppliers' and Qualified User Market Participants' dependence on private bilateral agreements to acquire energy, Capacity and CELs and allow them to take advantage of the record low prices achieved in the previous two auctions. Demand in the LTAs may increase because of the extra purchasers.

The results of the third LTA were announced in November 2017.

CENACE has launched the first medium-term auction that will take place towards the end of 2017 and run into 2018. It will offer medium-term contracts (three years) for the supply of energy and Capacity. It will be open to all technologies, not just clean energy.



Morocco

Authors: Marc Veuillot, Alix Fredet

1. Brief overview of the renewables sector

Morocco is highly dependent on foreign energy supplies, which represent significant costs for the kingdom where foreign exchange regulations restrict foreign currency payments. With about 3,000 km of coast and high sun exposure, the country has valuable assets in favour of energy transition and therefore has a strong interest in promoting renewables.

According to the Ministry of Energy and Mines, and the National Office of Water and Electricity, the demand for electricity will double by 2020 and quadruple by 2030. Implementation of the Moroccan "2020 energy plan" has started, with the promotion of two main governmental programmes: the Moroccan Solar Plan (2009) and the Moroccan Wind Power Plan (2010). These plans target the installation of 3000 MW by 2020 and to establish the kingdom among the world's top five countries for investment in the renewable sector. The Moroccan national energy strategy is looking to increase the contribution of renewable energy sources (RES) including hydropower, wind power and solar power.

Morocco's involvement in green energies was confirmed when the country hosted the 22nd session of the Conference of the Parties (COP 22) to the United Nations Framework Convention on Climate Change (UNFCCC), held in Marrakech from 7 to 18 November 2016. This event underlined the role played by the kingdom in cutting emissions and promoting renewable energies.

Solar

Solar represents the biggest investments in RES currently carried out in Morocco. The Moroccan Solar Plan led by MASEN (Moroccan Agency for Sustainable Energy) aims to implement a minimum power capacity of 2,000 MW by 2020. One massive project currently in process is the USD 9bn multi-phased Noor Solar Complex in Ouarzazate. Noor I was commissioned in 2016; commercial operations of Noor II and Noor III will start in 2017 and 2018 respectively.

As well as the Noor Project, Morocco is also establishing micro solar sites that benefit Morocco's rural population. In 1995, the rural electrification rate did not exceed 18%. Fifteen years later, the programme for rural electrification has brought this rate to 96.8%.

Wind

As part of the national strategy to secure the country's supply of electrical energy and promote RES, Morocco has set a target of achieving 42% of the installed capacity based on renewable energy by 2020. To achieve this goal, and in addition to wind capacity already produced or under development, Morocco has decided to launch a programme of integrated







production of electricity from wind energy. This Integrated Wind Programme includes two phases and six wind farms with a total installed capacity of 1,000MW. Five of the wind farms are now under tendering process – the 850 MW Project, the second phase of the Integrated Wind Programme – and should be implemented by 2020. Morocco's wind power potential capacity is estimated at 6,000MW.

Hydro

Morocco's installed hydropower capacity was about 1,770 MW at the end of 2015. The kingdom plans to increase this capacity by improving the sector's attractiveness; the new law No. 58-15, amending the law No. 13-09 for renewable energies, has set a new threshold for installed capacity from 12MW to 30MW.

Biomass

Today, the potential of biomass in Morocco is about 950MW. The Green Morocco Plan launched in 2008 to boost agricultural production, combined with new regulations for waste management, will lead to an additional potential of 400MW by the year 2030.

2. Recent developments in the renewables sector

Morocco established its real "green" legal basis through law No. 13-09 for renewable energies, dated 18 March 2010, later amended by law No. 58-15, dated 12 January 2016. Both laws establish an authorisation regime or prior declaration for any installation for the production of electricity from renewable sources, according to its power and nature. Below thresholds determined by law, the establishment, creation and modification of installations for energy production from renewables is free. To obtain authorisation, an operator must provide technical justification, prove financial capacity, and fulfil specific conditions. For example, if the applicant is a private legal entity, it must be a corporation registered in the Kingdom of Morocco and must not be subject to any court receivership or liquidation procedure. Authorisation is first granted on a provisional basis, and the applicant must obtain definitive authorisation to put the premise into use. Definitive authorisation is valid for 25 years, renewable once for the same duration. Concerning the prior declaration, the applicant must submit an administrative file leading to the delivery of a provisory receipt (récépissé) that becomes definitive after the file's examination. If the premise has not been put into service within three years of the date of definitive receipt, the entire procedure must be repeated.

For commercialisation of "home-made" renewable energies, priority is given to the Moroccan national market.

According to law No. 58-15, operators are now authorised, under certain conditions, to commercialise the 20% surplus of their annual production. Two types of conventions are necessary to commercialise renewable energies in Morocco: (i) a convention signed between the operator and the National Office for Electricity (ONE) or the electricity grid supplier; (ii) a convention between the operator and the State or the entity designated by the State for that purpose.

3. Forthcoming developments/opportunities in the renewables sector

As the renewables sector grows, projects will emerge in the next few years. The Research Institute on Solar Energy and Renewables (IRESEN) is financing joint research projects involving universities, research centers and Moroccan industries and enterprises. IRESEN is also aiming to launch two new calls for projects in research and development and for innovation support.

As an additional call to green investments, Morocco is continually trying to implement fiscal incentives to attract Moroccan and foreign investors. Most of these incentives are provided by the Investment Charter initiated in 1995, due to be renewed soon and including five main measures: total exemption from corporate tax for any new industrial business; implementation of at least one Export Processing Zone (EPZ) per region; granting of the EPZ advantages to big export companies even if they are not established in an EPZ; recognition of the indirect exporter status (for big export groups' subcontractors – exemption of corporate income tax on export turnover during the first five years, and application of a corporate income tax rate of 17.5% for the following years); and implementation of supports for less developed areas to stimulate industrial investment and promote well-balanced territorial investment.



The Netherlands

Authors: Cecilia van der Weijden, Maurits Rabbie

Introduction

For the Netherlands the Energy Agreement for Sustainable Growth of 2013 between the representatives of local governments, employers' associations and unions, environmental organisations, financial institutions, NGOs and other stakeholders, marks the starting point of the transition to a sustainable future. It includes targets of 14% energy generated from renewable sources in 2020 and 16% in 2023. For the period after 2023 the renewable objectives are addressed by the Energy Agenda, which includes a road map to achieve a CO_2 emission reduction of 80–95% by 2050.

In October 2017 the new Dutch government presented an ambitious energy policy that aims to result in a 49% reduction in greenhouse gas emissions by 2030 (compared to 1990), equivalent to 56mt CO_2. A large part of this reduction should be achieved by closing the five remaining coal plants and the introduction of carbon capture and storage (CCS) for industrial facilities, waste disposal and power plants. Other measures include a Climate Act, a successor to the Energy Agreement, a minimum price on CO_2, increased offshore wind capacity and taking the first steps to phase out the use of natural gas.

1. Brief overview of the renewables sector

Key statistics

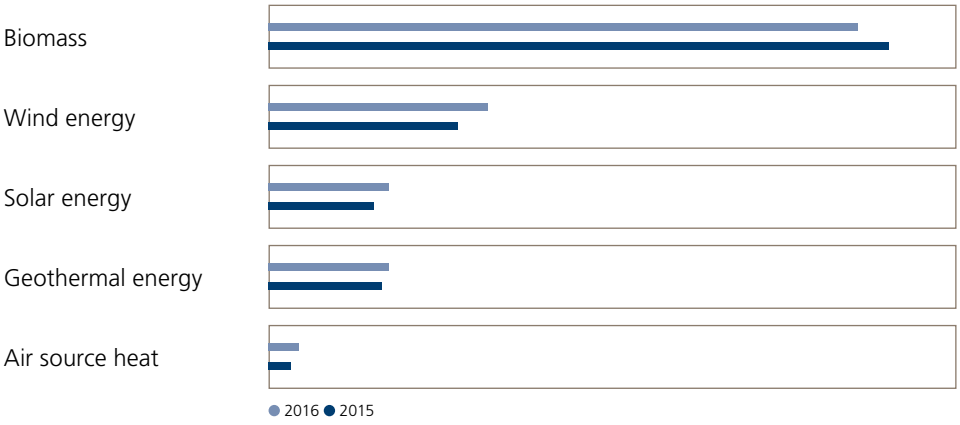
In 2016 the share of renewable energy was 6% (125 PJ) of total Dutch energy consumption (see the figure below). The Netherlands is lagging behind other European countries in achieving its greenhouse emission reduction goals. However, according to the National Energy Assessment 2017, the 2023 targets are feasible.

Today, biomass is by far the largest source of renewable energy in the Netherlands, with a share of almost 63%. However, the new government plans to stop the support for the use of biomass in coal fired plants in 2024. The share of wind and solar is still relatively small, but this is rapidly changing, with an increase of 20% in 2016. Based on current policy, it is expected that 50% of production capacity will consist of wind and solar in 2023 and 66% in 2030.

Subsidy scheme

The main subsidy scheme for the promotion of renewable energy is the SDE+ subsidy scheme, which will contribute to approximately 70% of the Dutch renewable energy targets for 2020 and 2023.

Renewable energy consumption by source



The SDE+ scheme offers an operating premium feed-in tariff subsidy for renewable energy that aims to compensate the difference between the production costs of renewable energy and the market price. The SDE+ subsidy is available for the generation of renewable electricity, gas and heat (or a combination of renewable heat and cogeneration) by biomass, geothermal energy, hydro power, (onshore and offshore) wind power and solar energy. The new government has announced that it intends to expand the SDE+ with CCS.

The SDE+ subsidy is financed through a levy on end consumer energy bills. From 2008 to the end of 2016, the SDE+ and its predecessor (the SDE) supported the development of 5,349.9MW of renewable capacity.

2. Recent developments in the renewables sector

The rise of solar PV

In the 2017 spring SDE+ subsidy round, a large majority of the subsidy applications was for solar photovoltaic (PV) projects. Although solar PV power plants currently represent a small part of Dutch power generation, solar PV is becoming an increasingly important energy generation technology in the Netherlands.

The last two years have seen a rapid increase in the capacity of solar PV. Projects with a capacity of 50–100MWp are under development, as well as a number of large rooftop projects. For example, dairy co-operative Friesland Campina has partnered with an energy company to install 400,000 rooftop solar PV panels on the farms of its members, and the project was granted an SDE+ subsidy of over EUR 200m.

Storage of solar energy

The storage sector in the Netherlands has just started to develop. In recent years a large number of energy storage pilots have been conducted. The Global Energy Storage Database includes 26 Dutch grid-connected energy storage projects.

Unlike in some other EU member states, Dutch consumers currently have little incentive to invest in storage systems. The reason for this is that the Netherlands offers the possibility to set off an energy surplus that is fed into the grid with the electricity purchased by a consumer from its energy supplier. According to the new coalition agreement, this arrangement will be replaced in 2020 by a new feed-in tariff scheme that offers the flexibility to adapt to market developments.

Subsidy free offshore wind

The current tender scheme consists of five annual tenders of 700MW that will be built in the period up to 2023. It is expected that, after 2023, the annual built capacity will increase to 1GW. To achieve the objectives of the 2015 Paris Climate Change Conference, it is believed that by 2035 the total Dutch offshore wind energy capacity will need to be approximately 17GW.

Following the recent zero-subsidy bids, the Dutch government has amended its tender scheme to allow for a procedure without subsidies. In the tender for sites I and II of the Hollandse Kust (zuid) Wind Farm Zone, tenderers were asked to submit bids without subsidy. Only if this tender is not successful will a second tender round, with subsidy, take place. Applications for the zero-subsidy tender were submitted from 15 December 2017 until 21 December 2017.

3. Forthcoming developments/opportunities in the renewables sector

TenneT's Hub and Spoke concept

Dutch electricity transmission system operator TenneT aims to make CO_2 reduction targets feasible and affordable by building a large European electricity system in the North Sea, based on a 'hub and spoke' principle. TenneT's thinking is based on an island with a modular structure at a location like Dogger Bank, with each module covering approximately 6km², with space for connecting roughly 30GW of offshore wind capacity and is expandable by adding one or two modules of 6km² each. The electricity generated by these offshore wind farms will be transmitted over direct current cables to the North Sea countries, with the same direct current cables serving as interconnections between the energy markets of these countries. Key complicating factors for the development of this concept are the national subsidy schemes for offshore wind and the national renewable targets of the EU member states.

Power-to-gas pilot project

The European Commission granted subsidy from the Connecting Europe Facility for a pilot power-to-gas-project, initiated by Gasunie. With its Hystock initiative, Gasunie will research the production of hydrogen generated with solar energy through electrolysis. Hystock is part of a larger project of the Dutch Ministry of Infrastructure and Environment, focused on doing research and gaining experience with the new technological developments in energy storage and alternative transport fuels. If the power-to-gas-project yields positive results, the use of salt caverns for the large-scale storage of hydrogen will be investigated. In future, a power-to-gas facility could also be linked to a new connection cable between the Eemshaven and Denmark, currently constructed by TenneT, allowing for the transportation of energy surpluses from Denmark to the Netherlands and the subsequent conversion to hydrogen in the power-to-gas-installation.

Power to Ammonia project

In March 2017 the Institute for Sustainable Process Technology published a feasibility study entitled Power to Ammonia that represents a major step toward commercialising renewable ammonia. It examines the value chains and business cases to produce CO_2-free ammonia, analysing the potential for commercial deployment at three companies with existing sites in the Netherlands: the Vattenfall Magnum CCGT power plant (1,311MW), Dutch DSO Stedin, and OCI Nitrogen. This concept uses an electrolyser to turn renewable energy into hydrogen, which is then turned into ammonia. The ammonia can be stored or transported and can subsequently be used either as a carbon-free feedstock for chemicals, or as a fuel in a power plant. The study shows that the electrochemical production of ammonia from renewable energy is a likely option, and offers a promising solution for the large-scale seasonal storage and import of renewable energy.





Peru

Authors: Augusto Astorga, Carlos Hamann

1. Brief overview of the renewables sector

The energy sector in Peru has experienced an important development in recent years due to an increase in internal demand, produced by the country's economic growth. In this context, the Government's objective has been to pursue a competitive market.

In aiming to satisfy the internal demand and to reduce pollution, a commitment has been made in favour of promoting energy generation by means of natural renewable resources.

On the other hand, taking into account the requirements of the Organization for Economic Cooperation and Development (OECD), related to environmental factors, and in accordance with commitments under the Paris Agreement, Peru has been gradually implementing policies that seek to achieve "clean" growth. In this sense, a fundamental aspect of its energy strategy is the relationship between environmental requirements (focused on energy efficiency) and the development of renewable energy, in accordance with the National Energy Policy 2010–2040.

RERs are regulated by Legislative Decree No. 1002 and its guidelines. Generators of electricity from resources like biomass, wind, solar, geothermal and maritime tidal are considered as RERs. In the case of hydro, it is considered as RER when the installed capacity does not exceed 20MW.

Due to the relatively high cost associated with these technologies, the Government plays a promoting role though the organization of RER Auctions, which are to be called every two years, and through which the bidders can participate in development projects. In each Auction, energy supply contracts are awarded to the bidders who have offered the best price for a period of 20 years. The difference between the market price for electricity and the price awarded in the RER Auctions is obtained from the contributions of network users, by means of surcharges in the connection toll.

The benefit of this scheme to RERs is that it secures the sale of their production at a pre-determined rate, which facilitates the financing of construction and operation.

Furthermore, RERs enjoy certain other privileges. An example is the priority given for the daily dispatch of freight, conducted by the Peruvian Committee for Economic Operation of the System (COES), by virtue of their being considered to have a variable production cost equal to zero.

In respect to the RERs, the expectation is that they acquire more participation in the energy generation market. According to Osinergmin, the power market regulator, it is planned that by year 2040, RERs will take up 20% of energy production by 2040.

2. Recent developments in the renewables sector

The development of RERs has been achieved on par with the Auctions. The evolution of the Auctions since the first one in 2009 can be seen in the table below.

In the fourth RER Auction, the following were presented: two biomass projects, four wind turbine projects and 48 solar projects. In the first round, two projects for the utilisation of solid urban waste were awarded, as well as one wind farm and a solar project installation. It is important to highlight that the equivalent annual operating hours of the awarded wind farms is 4547 hours, demonstrating the exceptional wind potential on the Peruvian coast.
The prices awarded on the 4th RER Auction, especially for wind and solar facilities, have reflected the price drop of wind turbines and solar panels experienced in the last 4 years. This situation encourages competition and benefits final users, because a decline in the costs faced by RERs translates to a decrease in their energy bills. The minimum unified prices of power and energy are lower than those minimum prices offered by hydroelectric plants. The results of the fourth auction suggest that the renewable energy integration scheme is becoming more competitive.

Another important indicator of the evolution of RERs are the 29 plants that are currently in commercial operation, and the 17 projects that are in development and that have 2018 as a referential date for the start of their commercial operation.

On the other hand, there are 16 projects of geothermal energy generation that have existing exploration rights, and it is expected that, in the upcoming auctions, a geothermal energy source requirement could be included, keeping in mind the special characteristics of this kind of project.

In this regard, according to OSINERGMIN's Statistic Report, as of December 2016, RERs represented 3.2% of the energy produced in the system, and it is expected that, by 2040, RERs will represent 20% of domestic energy production.

Total energy requirements tendered in RER Auctions

Auction	First Auction (2009)	Second Auction (2011)	Third Auction (2014)	Fourth Auction (2016)
RER Technologies Hydro < 20MW	1,314GWh 500MWh	1,300GWh 681GWh	320GWh 1,300GWh	1,300GWh 450GWh

3. Forthcoming developments/opportunities in the renewables sector

Renewable energy sources in the country by type of generation have a potential of 69,937MW in the case of hydropower, in the case of wind a potential of 22.500MW, and an indefinite solar power potential, 900MW in biomass and 3,000MW in geothermal.

The Ministry of Energy and Mines is currently evaluating the date on which it will call for the Fifth RER Auction, in which it is likely that geothermal energy will be included as a requirement.

Additionally, mechanisms that generate greater investment and greater competitiveness in the renewable energy sector are being evaluated in order to take advantage of the country's renewable energy potential. The aim is for RERs to be able to compete in the sector with generators from other sources such as thermal and hydro greater than 20MW.

RER projects are also being developed for mining. To date, 28 of the 40 biggest mining companies in the world, some of which operate in Peru, have already incorporated, or are in the process of doing so, the use of RER sources in their operations, achieving significant savings and reducing their greenhouse gas emissions as part of their social and environmental policies.

As a mining country and with a pipeline of world class projects in development, Peru has the opportunity to tap into these global trends in the mining sector. Energy companies, industries and investors should take advantage of the synergies that can be realised by using renewable energy for mining operations.

Finally, there is an attractive opportunity for the country to export its produced energy surplus to neighbouring countries such as Ecuador, Chile, Brazil, Bolivia and Argentina. The challenge is essentially political; last year, the Government took the first step by proposing a law to approve the general framework for the international interconnection of electric systems, and electricity exchange with other countries.





Poland

Authors: Piotr Ciolkowski, Kinga Makuch

1. Brief overview of the renewables sector

Since 2005, the support of renewable energy sources (RES) in Poland has been stimulated by two major mechanisms of support: certificates of origin; and the mandatory purchase of energy produced by RES. Certificates of origin (green certificates), issued by the Regulator, confirm the generation of electricity by a renewable energy source. The property rights resulting from green certificates can be traded at the Polish Power Exchange and OTC. At the same time, the default suppliers are obliged to purchase all electricity generated from RES connected to the electricity grid within the area of their operations. The statutory price is set at the average price of electricity on the competitive market in Poland in the preceding calendar year announced annually by the Regulator. The green certificates system will be gradually phased out and replaced by a new auction system introduced by the Act on Renewable Energy Sources adopted in 2015. The new support mechanism entered into force on 1 July 2016.

Support in the form of green certificates and mandatory purchase of energy endorsed an intensive development of the RES sector in recent years. The share of total installed capacity amounted to 6.9% in 2005, then increased to 9.3% in 2010 and 11.8% in 2015. In order to meet the RES strategy determined by EU legislation, Poland should achieve a 15% RES share in final energy consumption by 2020. The EU's energy and climate targets set the share of renewable energy in the energy mix at 27% for 2030.

2. Recent developments in the renewables sector

Auction system

The auction system offers an opportunity to participate in auctions for the sale of energy organised by the Regulator. The maximum volume and value of electricity which can be auctioned in the next calendar year is determined annually by the Council of Ministers. Additionally, 60 days prior to the first auction in the given calendar year, the Minister of Energy publishes a maximum price ("reference price") at which energy may be purchased in the auctions, and the period of support. The reference price is set separately for various types and capacities of RES installations. Price is the sole criterion of the auctions – the lowest bidders are selected until the maximum volume determined for the given auction is reached. Auction winners are eligible for coverage of a "negative balance" that may arise between the auction price and the market price of energy, which makes the system similar to CFDs (contracts for difference).

The first auction took place in the end of December 2016 and the second in June 2017. Both were mainly dedicated to smaller installations below 1MW. However, the auctions announced by the President of the Energy Regulatory Authority in August 2017 were cancelled and no further auctions are planned for 2017.

Onshore wind problems
The sector has faced many challenges recently, both from technical issues (such as grid capacity) and from the regulatory perspective. These challenges include:

- According to the Act on wind turbine investments, the minimum distance between wind turbines and households or mixed purpose buildings has been introduced and should be at least ten times the total height of the wind turbine.

- The market price of green certificates dropped dramatically from PLN 180 in 2013 to nearly PLN 20 per MWh in 2017. An amendment to the Act on Renewable Energy Sources entered into force on 25 September 2017 which connects the level of substitution fee, which has been widely used as benchmark in long-term certificates purchase agreements, with the market price of green certificates. The substitution fee will constitute 125% of the value of the annual average price of property rights resulting from the certificates of origin, but not more than PLN 300.03/MWh. Based on current market prices, this may amount to PLN 40–50. This will result in a dramatic decrease in income for many wind projects where the price was linked to the substitution fee level and may result in liquidity problems for many of these projects.

- Energa Group, the biggest purchaser of green certificates and green energy in Poland, claims that 150 agreements on the sale of property rights arising from green certificates concluded in 2007–2013 are invalid due to an alleged violation of public procurement law. Energa Group claims that the agreements should have been concluded under the public procurement procedure and is seeking confirmation of this interpretation in the courts.

3. Forthcoming developments/opportunities in the renewables sector

Offshore opportunity
Poland has significant industrial potential to develop offshore wind investments. No project has been constructed yet. Key energy companies have already shown a growing interest in the development of planned offshore projects. The two most advanced investments developed by PGE (a state-owned company) and Polenergia (a private company) will target, respectively, 1200MW and 1045MW of capacity.







As the first Polish offshore wind projects have recently gained new momentum, since mid-2016 a draft of Poland's first zoning plan has been developed. The plan will determine, among other things, the areas and conditions for the production of renewable energy and for the prospecting, exploration and extraction of mineral deposits.

Growing interest in PV
Falling investment costs for solar are a current market factor. This trend may create a major opportunity for investment in Poland. With the support envisaged under the Act on Renewable Energy Sources, there may be a tendency in the coming years to develop smaller solar projects or to combine PV with other RES technologies such as biomass.

Expansion of waste incineration plants
Demand for effective waste incineration plants creates opportunities for investors. In 2016 there were six incineration plants constructed in Poland – in Warszawa, Białystok, Bydgoszcz, Poznań, Konin and Kraków. Several projects are ongoing – in Szczecin, Warszawa and Gdańsk.

Energy storage
In order to balance the generation of energy from RES, energy storage projects are planned for the coming years. However, they are still at an early stage of development. As electricity storage is a relatively undeveloped field in Poland, there are still no detailed acts in Polish law which refer to it. In 2016 Energa-Operator, a Polish distribution system operator, completed the construction of a local distribution network balancing area, the first of its kind in Poland. It will include a 0.75MW electric energy store, which will constitute a key element in the construction of a modern smart grid.

Planned regulatory amendments
A planned amendment to the Act on Renewable Energy Sources and the wind turbines investments legislation proposes changes to the definition of a wind turbine. Under this new definition, the wind turbine will constitute an installation composed of the building part and technical elements. This approach should reverse the recent increase of the real property tax on wind turbines. Furthermore, the obligation to decommission the wind farm after the end of its operation period will be imposed on the last edeveloper involved in the construction of the wind farm.



Portugal

Authors: Monica Carneiro Pacheco, Joao Marques Mendes

1. Brief overview of the renewables sector

Portugal's dependence on imported energy has been historically high, since the country does not produce oil or natural gas. However, due to an increasing amount of renewable energy in the generation mix, total energy dependence has been declining. In 2016, energy was produced from biofuels and waste (5%), hydro power plants (30%), wind (22%) and solar (1%). Wind and solar power have been the main drivers in growing energy production in Portugal.

Implementation of renewable energy policy is conducted primarily by the Portuguese government; policy development is carried out by the Directorate-General for Energy and Geology (DGEG) and the Energy Services Regulatory Authority (ERSE).

As an EU member, Portugal's renewable energy policy is aligned with the EU 2020 targets. Portugal's binding national target for renewable energy is 31% of gross final consumption of energy by 2020. Beyond 2020, the EU member states have agreed on a target for a 27% share of renewable energy in energy consumption in 2030. The target is binding for the EU as a whole only. The level of effort to be made by each EU member state to achieve this EU target has not yet been decided.

Portugal's targets on renewable energy for 2020 and the policies and measures to meet them were initially laid out in the National Renewable Energy Action Plan approved by Resolution of Council of Ministers No. 29/2010 of 15 April 2010. However, updated national plans were approved by Resolution of Council of Ministers No. 20/2013 of 10 April 2013.

The legal framework regarding renewable energy, in force since 1988, was disseminated by a number of laws. In 2012, because of Portugal's changing economic circumstances and the reduction of electricity demand, the government conducted a series of comprehensive structural reforms in several sectors, including the electricity sector. One of the outcomes of this process was a new regulatory framework (Decree-Law No. 215-A/2012 and Decree-Law No.215-B/2012, of 8 October), which allowed anyone producing electricity from renewable sources to sell it on the open market.

2. Recent developments in the renewables sector

In June 2014, Portugal exited the bailout funding programme it had to undergo in the previous three years. Within the bailout package, Portugal had to take cost







adjustment measures in the energy sector. The new energy model following the bailout package is based on economic rationality and sustainability. On 26 November 2016 a new Government took office with energy policy priorities that include: giving new impetus to renewable energy sources; reducing the tariff deficit through the implementation of new measures to reduce energy costs; and promoting competition in the energy sector.

Recent notable developments include:

Return of alleged excess support funds received by RES projects promoters

By means of Ordinance No. 69/2017, of 16 February, the Secretary of State of Energy approved a regime addressed to power plants included in the special regime which, in addition to feed-in-tariffs, have previously received public support funds for the promotion and development of renewable energy. The ordinance establishes that the promoters of these power plants are required to return to the National Electric System the "excessive" amounts received due to the accumulation of feed-in-tariffs and public support funds. This measure mainly affects promoters of wind, small hydro and cogeneration projects.

The reimbursement will take effect through the deduction of the amount to be returned in the feed-in-tariff to be paid by the supplier of last resort, as quickly as possible. The calculation, for each power plant, of the excessive amounts received and which should be corrected in favour of the National Electric System, will be made by order of the member of the Government responsible for energy, by proposal of the General Directorate for Energy and Geology and following consultation with the Energy Services Regulatory Authority, which has not yet been approved.

Delay in the extinction of liberalised electricity tariffs

The term for the conclusion of the liberalised market in Portugal has had successive extensions. Initially, the term was 2011, which was extended to 2017. However, in 2017, the State Budget Law committed the Portuguese government to extending the term of regulated tariffs in the electricity market. Through Ordinances No. 39/2017 of 26 January 2017, and 144/2017 of 24 April 2017, the Government extended the term for domestic clients to move to the liberalised markets of electricity and natural gas and contract their market supplier, to 31 December 2020.

Allowing customers to return to the regulated electricity market

The Portuguese Parliament has recently approved Law No. 105/2017 of 30 August 2017, which allows clients who have moved to the liberalised market in the electricity sector to return to the regulated market, thus ending the principle of irreversibility of change to the liberalised market which existed in Portugal, as explained above. This law puts more pressure on private suppliers to be competitive and, if their offers are not competitive, it may lead to a setback in the liberalisation process of the energy market, with the possible return of a great number of clients to the regulated market.

3. Forthcoming developments/opportunities in the renewables sector

New renewable energy projects

In the past, almost every renewable power plant project benefited from feed-in tariffs. The feed-in tariff scheme was revoked in 2012 (except for small generation units and self-consumption units), but was maintained for ongoing projects. Portugal has now entered a new stage, characterised by the proliferation of projects – specifically solar photovoltaic (PV) – without subsidised tariffs, and whose electricity will be sold and remunerated through market prices, currently around EUR 45 per MWh, through PPAs (power purchase agreements) or similar agreements negotiated with private investors. These projects benefit from the downward trend of technology prices.

The General Directorate for Energy and Geology has already licensed projects which amount to an estimated total of around 400MW capacity of solar PV plants, without subsidised tariffs. These solar plants, currently in the financing or construction stage (some of which are being sold to investors), will almost duplicate Portugal's solar PV installed capacity, which in 2017 amounted to 470MW.

Although these new projects are mostly solar, projects involving other technologies, notably biomass, are also in development.

Renewable energy certificates

While Portuguese legislation allows for a renewable energy market with renewable energy certificates (RECs) and other environmental attributes, these "green certificates" are not yet regulated and implemented in Portugal.

To encourage production through RECs, Decree-Law No. 33-A/2005 of 16 February 2005 foresees the implementation of green certificates, defined as titles which may be traded, and outlines the environmental and social benefits of production through renewable sources. The terms of emission and conditions of trade of these green certificates must be regulated by autonomous legislation which, according to the authorities, could be approved between 2017 and 2018.

Electric interconnection Portugal – Morocco

Portugal and Morocco are in the final stage of the study of a first electricity interconnection between the two countries. The viability study of this interconnection was commissioned in the first quarter of 2017 and the expectation is that the construction may begin in 2018. This project is expected to be financed through funds from the European Union.

This interconnection will allow Portugal to expand and diversify its energy production capacity, which currently has a surplus over its domestic energy needs. This would reduce Portugal's dependence on Spain for energy exports, which is aggravated by the fact that the interconnection capacity between Spain and France is still residual.



Romania

Author: Varinia Radu

1. Brief overview of the renewables sector

Romania's renewable energy market went through an unexpected investment boom in the solar and wind sector in 2011, making the country 11th out of 40 countries listed in *The Renewable Energy Country Attractiveness Index,* prepared by E&Y. The remarkable increase in installed capacities from renewable sources achieved during 2011–2013 was determined by the incentives offered by the government to renewable energy producers.

Romania introduced a support mechanism scheme in 2008 to promote electricity from renewable sources, providing renewable energy producers with additional gains beyond the energy sold on the market. Renewable energy producers accredited by the National Regulatory Authority for Energy (ANRE) are entitled to receive monthly green certificates[1] (GCs), issued per MWh of power produced and delivered into the power grid – either to the suppliers or directly to final consumers. The suppliers (and some producers) of power are obliged to purchase GCs each year, with the number determined by ANRE under specific procedures.

Due to the support mechanism scheme, in 2013 Romania installed more than 1GW of solar PV for the first time, placing the country in a tier that includes global players such as Italy, India, Greece and the UK. Small, medium and large solar PVs were built.

While the support scheme initially helped the market and improved the production of electricity from renewable sources, the past two years have seen a slowdown in investment in renewable energy caused by important changes to the legal framework governing the sector. The Romanian government addressed the issue of overcompensation by amending the support scheme to reduce renewable energy quotas. This led to a decrease in demand for GCs, which affected investor income. Fewer GCs were issued, allocations were postponed and trade limitations were imposed. Following the legislative changes, the big wave of investments is now on standby. For example, the number of GCs traded on the centralised markets in 2015 fell more than 73 times, to 36,618 certificates, compared to over 2,675 million traded in 2014.

[1] The Green Certificate is a document that certifies a quantity of 1MWh of electricity from renewable sources supplied to the network.

Romania had an installed renewable electricity generation capacity of 4,690MW at the end of June 2016, including 1,312MW in solar and 2,959MW in wind, according to grid operator Transelectrica. During May 2017, wind power represented 9.77% of the total power delivered into the grid, solar power contributed 2.08% and biomass 0.08%. Biomass, biogas and waste fermentation gas projects generated 8.92% (724GWh) in 2015. In the last couple of years over 25 power plants using biomass, biogas and waste fermentation gas became operational.

Renewable energy investment in Romania is estimated at EUR 7bn, according to a recent study[2] presented in 2016 by the Association of Big Industrial Energy Consumers Romania (ABIEC). Most of the investments consist of imported equipment used to produce renewable energy.

The Energy Strategy of Romania for the period 2007–2020 highlights the country's future energy strategy, covering the need for energy now and in the medium and long-term at the lowest possible price to meet the needs of a modern market economy. Romania's *National Renewable Energy Action Plan 2010* was introduced to increase the efficient economic use of renewable energy sources in electricity production. The national plan sets national targets for the share of energy from renewable sources consumed in transport, electricity, heating and cooling by 2020. It takes into account the effects of other policy measures relating to energy efficiency on final energy consumption, as well as measures for achieving those national overall targets. The national legislation for promoting renewables sets out a target of 38% renewable energy in the final gross electricity consumption by 2020.

2. Recent developments in the renewables sector

On 30 March 2017, the Romanian government adopted a long-awaited Emergency Ordinance (EO) amending the support scheme. The EO aims to facilitate the GCs support mechanism granted to renewable projects and offers solutions to the impasse in the GC market. One of the EO's key measures is the extension of the validity term of GCs issued after 1 January 2017 until 31 March 2032. This will facilitate the selling of GCs over an extended period and will give producers more time to capitalise their unsold GCs. The EO also established an anonymous centralised market for GCs. This will give small and medium sized producers/suppliers equal chances on the market alongside bigger participants. In addition, the EO prohibits the repeated trade in GCs, thus avoiding the speculative trading of GCs.
On 29 August 2017, ANRE published the Regulation for organising and functioning of the GCs Market. The Regulation aims to ensure a transparent and non-discriminatory framework for trading GCs. Its key provisions include the reorganisation of the GCs markets and of the trading regulations for the GCs spot centralised anonymous market and the bilateral contracts market.

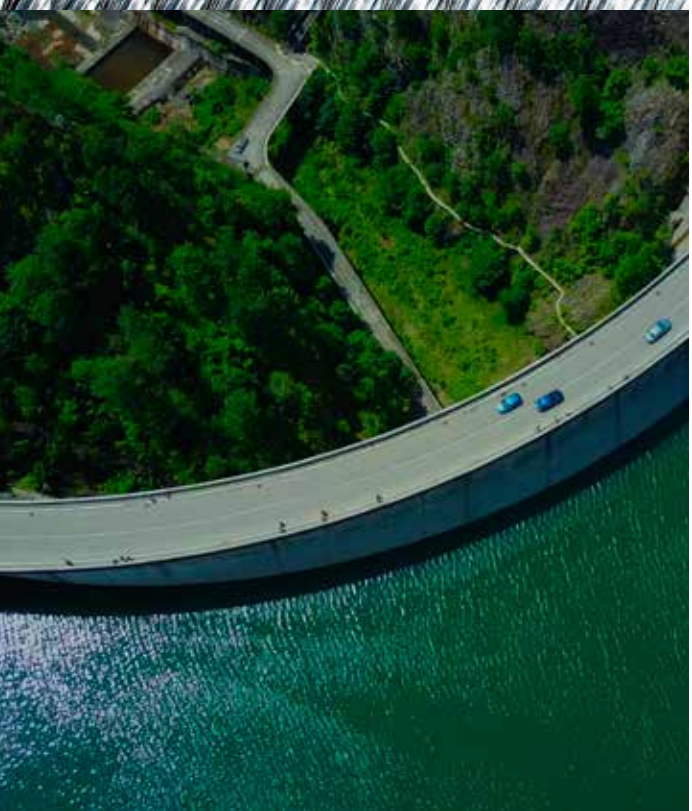
It is expected that the Regulation will determine a more liquid and efficient local market and will eliminate any illegal GC agreements, as a GC may only be the subject of a single transaction, whilst any exception is expressly provided in the Regulation. The producers of electricity from renewable resources with installed capacity of less than 1MW will therefore have the option to conclude bilateral contracts, directly negotiated with electricity suppliers for end consumers, outside the centralised platform (OPCOM).

From 1 January 2018, Romania's electricity market will be fully liberalised. This move comes after a long deregulation process, which began back in 2007: the price deregulation for non-household consumers was completed on 1 January 2014, and the price deregulation for household consumers was done in stages, with the final stage ending on 31 December 2017. The liberalisation aims to create a competitive, transparent and non-discriminatory mechanism for the sale of electricity in Romania.

[2] "Impactul schemelor de sprijin a energiei regenerabile în România şi lecţiile învăţate din ţările UE" - PwC, 2016







After 1 January 2018, ANRE will no longer approve the regulated tariffs, which are currently included in the price of electricity. Upon full liberalisation, household consumption will be billed according to the tariffs/prices for the universal service endorsed by ANRE. Household consumers will still have the option to conclude electricity supply contracts with any active supplier on the electricity market or to change their electricity supplier within 21 days from the date of the request.

Given the abrupt increase in the amount of electricity sold on the free market over recent months, full market liberalisation is expected to further benefit household consumers and increase the level of competition between electricity suppliers.

3. Forthcoming developments/opportunities in the renewables sector

While 2017 was not a big year for major renewables transactions in Romania, one big deal awaits completion. Austrian oil major player OMV Petrom is selling its Dorobantu wind farm for EUR 23m to Transeastern Power BV – a limited liability company registered in the Netherlands, a wholly owned subsidiary of Transeastern Power Trust. The transaction obtained the Competition Council approval and the completion is still subject to the fulfillment of the other contractual conditions.

Another major event expected in 2018 is the listing of Hidroelectrica, the state-owned hydro power company, on the Bucharest Stock Exchange. According to the newspapers, the Government wants to sell a 10% stake in Hidroelectrica and the authorities are awaiting the conclusions of the listing consortium.

Romania still has a lack of new investments in energy from biomass/biogas and waste. Longer project implementation times, project complexity and a not very generous support mechanism mean that investments in this field have not matched the levels achieved by wind or photovoltaic energy.



Russia

Author: Dominique Tissot

Introduction

Russia's energy mix is dominated by natural gas, which accounts for 52% of top primary energy supply and 42% of electricity generation inputs.

The Russian Federation has set out to increase and diversify its use of renewable energy sources (hereafter referred to as "RES"), particularly for power generation. Under current plans and policies, generation from RES should reach nearly 5% of total final energy consumption by 2030. Accelerated deployment, however, could boost Russia's renewable energy share to more than 11% in the same timeframe, according to the International Renewable Energy Agency (IRENA). Achieving this potential would require cumulative investments of about USD 300bn in RES up to 2030.

Generally, the environment is more favourable for wind, hydro and solar power generation. Hydropower, representing about a fifth of the Russian power generation capacity, is currently one of the most prominent renewable sources, along with bioenergy used for heating in buildings and industry.

1. Brief overview of the renewables sector

Key statistics

Since the adoption in 2009 of the Russian Energy Strategy to 2030, the Russian legal and regulatory framework has improved but still remains somewhat inconsistent, with the RES generation target being revised several times.

A governmental decree in 2009 set a target of 4.5 percent by 2020, excluding large hydropower plants of more than 25 megawatts (MW). A governmental resolution in July 2015 lowered the target to a minimum of 2.5 percent by 2020 and set a new target of 4.5 percent by 2024.

The above target corresponds to approximately 5.5GW of newly installed RES capacity (excluding large hydropower plants) by 2024, and is to be achieved using three renewables technologies: solar, small hydro, and wind, with the latter covering the major share of approximately 3.4GW.

In 2016, the total installed RES capacity was approximately 52.9GW, according to IRENA. The main part of it came from large hydropower plants, which represented 49.7GW, followed by bioenergy.

As of 2017, according to the Russian Ministry of Energy, hydro, solar, and wind power account for more than 20 percent of the country's total installed power capacity of about 236.34GW.

Subsidy schemes and tariffs
The Russian legal and regulatory framework sets the rules on wholesale and retail energy trading, and offers certain incentives.

A so-called "premium scheme" applied to the wholesale prices for RES generated electricity, was introduced in 2007 by an amendment to the 2003 Federal Electricity Law. However, largely due to the consumer price concerns and legal difficulties with developing a clear implementation mechanism, this price scheme, which would have been equivalent to a feed-in tariff, has never been put in practice.

In 2011, another support mechanism was introduced by the Federal Electricity Law: the promotion of RES through the capacity market. This scheme aims to ensure the financial viability of investments into renewables by concluding "Capacity Supply Agreements" with RES project developers.

The legal framework for this scheme was further developed in 2013 under governmental decree No. 449 (Decree 449). Decree 449 establishes the regulatory mechanisms for selecting new RES projects and for their supply agreements. Under a capacity supply agreement, the grid company (Distribution System Operator) undertakes to purchase electricity from RES-generation facilities in the relevant region in order to compensate for transmission losses. The Russian regulatory body, the Market Council, introduced regional incentive schemes for qualifying RES projects. These projects enjoy long-term tariffs, which aim to guarantee returns on investment over 15 years. The capacity to be produced by such facilities is selected by way of annual tenders for renewables at a price that is usually several times higher than the price for existing conventional capacity.

More specifically, the bidders must provide a technical description of the project, including the percentage of localisation (local content) and project financing/guarantee structures. On that basis, the trading system administrator will select the winning bids, and a relevant RES capacity supply contract will be signed.

Various other financial, legal and tax incentives are available at the local, regional and federal levels, depending on the specifics of a particular RES investment project (e.g. region of investment and degree of localisation, type of CAPEX, legal and project financing structure such as "special investment contract" (SPIC)).

However, although this is a significant step towards the creation of a regulatory framework designed to promote clean energy production in Russia, there are still restrictions. Firstly, this scheme is only applicable to RES generation facilities eligible for the wholesale market (5MW capacity or more). Secondly, it does not allow the promotion of renewable energy technologies in the regions of Russia that have fully regulated tariff systems and the more isolated regions, where the deployment of renewables is economically feasible and supported by the availability of renewable resources. Thirdly, and above all, only projects in which a certain percentage of Russian technology and locally-produced components have been used (the so-called "local content requirement") may qualify for the purposes of favourable pricing regime. For example, for wind projects the required degree of localisation is equal to 55% for 2018 and 65% for 2019 to 2024, and for solar projects it is 70%. Governmental decree No. 426 adopted in 2008 and the Order of Russia's Ministry of Trade No. 1556 adopted in 2014 provide the local content requirements for each type of RES, and also provide the formula to calculate a relevant degree of localisation. This is a key condition to ensure project bankability and thus sustainability, as a reduction factor is applied to tariffs for projects without the required degree of localisation (35% for solar power and 45% for wind, small hydro and waste treatment power sources).

2. Recent developments in the renewables sector

In 2017, the Russian Market Council, based on amendments to the Rules of the Wholesale Electricity and Capacity Market (Resolution of the Government of the Russian Federation No. 432 of 11/04/2017), launched a tender for the construction of facilities generating electricity from RES as follows: 1,651MW of wind, 520MW of solar and 49.8MW of small hydro projects. The winners got 15-year capacity supply agreements under Decree 449.

This tender was of historic importance, especially for the Russian wind market, due to the high interest from both foreign and Russian investors and strong competition among such big market players as Enel, Rosatom and Fortum (together with Rusnano).
Significantly, Rosatom and Rusnano, the leading Russian state-owned companies, have not historically been positioned on the RES market (the companies are involved in the development and commercialisation of nuclear and nano technologies, respectively). This demonstrates the political will and awareness of Russian state authorities in relation to the strategic importance of and prospects for RES in Russia.

Interestingly, these projects involve such leading foreign wind turbine suppliers as Danish Vestas, Dutch Lagerway and German-Spanish Siemens Gamesa. The suppliers have positioned themselves as key technology partners (supplying or locally producing wind turbine generators in Russia) of Fortum-Rusnano, Rosatom and Enel, respectively.

In total, 43 wind park projects with commercial operation dates between 2018 and 2022 were selected and split as follows: (i) the Fortum-Rusnano JV with 1,000MW of projects, (ii) Enel with 291MW, and (iii) VetroOGK, part of Rosatom, with 360MW.

3. Forthcoming developments/opportunities in the renewables sector

Russia has the potential to increase the use of all types of renewable energy technologies. Historically (since the Soviet period), it has a well-developed hydropower segment. Its bioenergy potential is also significant, as this technology is used in the agriculture, forestry, infrastructure and trade sectors. But today, Russian renewable energy policy is focusing on accelerating the deployment of wind and solar photovoltaic.

In 2018, Russia's Ministry of Energy plans to hold auctions for almost 1GW of renewable energy capacity: 57MW of solar and 899MW of wind power capacity is likely to be put up for tender.

Moreover, a new system is expected to be in place after 2024 to encourage the development of wind capacity.

Apart from the wind and solar focus, in 2017 Russia introduced a set of legislative amendments aiming to extend the existing renewable energy scheme to energy-from-waste facilities. Currently only the Republic of Tatarstan, Moscow and the Moscow Region are included in the list of Russian regions where such facilities are to be built. First tenders were carried out in summer 2017, and we expect accelerated development in this sector in the coming years.

More generally, there are a number of drivers in Russia that explain the increasing focus on renewables and decentralised energy. New energy solutions are seen as a way to modernise the power system, but they are also a part of a broader socio-economic development model to achieve higher living standards. In addition, a decentralised electricity generation system is of interest to Russia's remote and distant regions, as it is economically impractical to extend high-voltage electricity lines to these regions.

Furthermore, decentralised electricity generation is also interesting and attractive for industrial complexes. It offers opportunities for them and allows them to become more independent from the centralised power system. The current situation of relatively high electricity prices is another reason to explore new energy solutions.

Finally, in response to the EU and US sanctions, Russia's local content requirements have become one of its main economic policy drivers supporting inbound investments and technology transfers to develop local innovative technologies, including in the RES sector.







Serbia

Authors: Đorđe Popović, Mihajlo Matković, Igor Đorđević

1. Brief overview of the renewables sector

Serbia adopted its new Energy Law, which aimed to harmonise Serbian energy legislation with the Third EU Package, in 2014. The Serbian market then faced a long wait for by-laws that allow the full implementation of renewable projects. This finally happened on 13 June 2016, when the Serbian government introduced regulations governing the renewables sector and fostering further development of the entire energy market.

The new regulations, known as "the PPA package, consists of three decrees:

1) Decree on Incentive Measures for Electricity Generation from Renewable Energy Sources and High-Efficiency Cogeneration of Electricity and Heat ("Incentive Decree")

2) Decree on Conditions of and Procedure for Obtaining of the Status of a Privileged Power Producer, Preliminary Privileged Power Producer and Producer from Renewable Energy Sources ("Status Decree")

3) Decree on the Power Purchase Agreement ("PPA Decree").

The PPA package came in several months after the statutory deadline for its adoption had expired. Although the Ministry of Mining and Energy published the drafts of these decrees in September 2015, it took the Serbian government almost a year to finalise the wording. This is not a major surprise, however, given how important these pieces of legislation are for project feasibility. The drafts were the subject of thorough and detail-oriented discussions among the stakeholders – including public authorities, equity partners, sponsors and international lenders.

It was worth the wait. The result is a consistent, comprehensive and, at least on the face of it, bankable set of regulations to govern the renewable sector in Serbia in a manner which appears to be unmatched in the western Balkan region – both in the quality of drafting and the completeness of the solutions now in place.

Incentives for renewable energy include:

- mandatory take-off of electricity generated by the privileged producer by the guaranteed supplier of the entire quantities, under guaranteed preferential prices – feed-in tariffs (FIT) – for 12 years under PPA
- take-off of electricity during the plant's trial period at 50% FIT
- exemption of the privileged producer from the balancing responsibility – i.e. the privileged producer is not required to bear the balancing costs
- priority access to the transmission/distribution system
- free access to the transmission/distribution system.

A year after adoption of the PPA package, most of the major renewable projects have reached the construction phase, and some have even achieved financial close. Two minor wind farms are fully operational and produce electricity (around 17MW in total). A significant increase in power produced from wind is expected in 2017 and 2018 – at least another 170MW, possibly more.

Some of the sub-sectors failed, however. Solar is a case in point, where the government allowed for only minor capacities in its incentive measures (less than 20MW overall). It therefore remains to be seen how the government will tackle solar projects in the coming years – Serbia is surely not lacking in solar potential.

Biomass is an emerging sector, with a notable number of projects currently in the preparation phase. The same holds true for co-generation from waste-for-energy projects, where the facilities are expected to produce both electricity and heat from waste treatment operations.

In June 2017, minor improvements were introduced to the PPA package which are expected to further ease the bankability of renewable projects:

- political risk insurance is no longer required as a condition for political risk-related termination events under the PPA
- the change in law protections now refer to changes which result in an increase in costs, instead of changes introduced with the aim of increasing costs
- lenders may appoint a representative in addition to a substitute
- the step-in period is increased from 90 to 360 days
- the step-in agreement is in bilingual form (Serbian prevailing).

2. Recent developments in the renewables sector

The renewable energy market sector in Serbia is undergoing significant development, despite its long-delayed start.

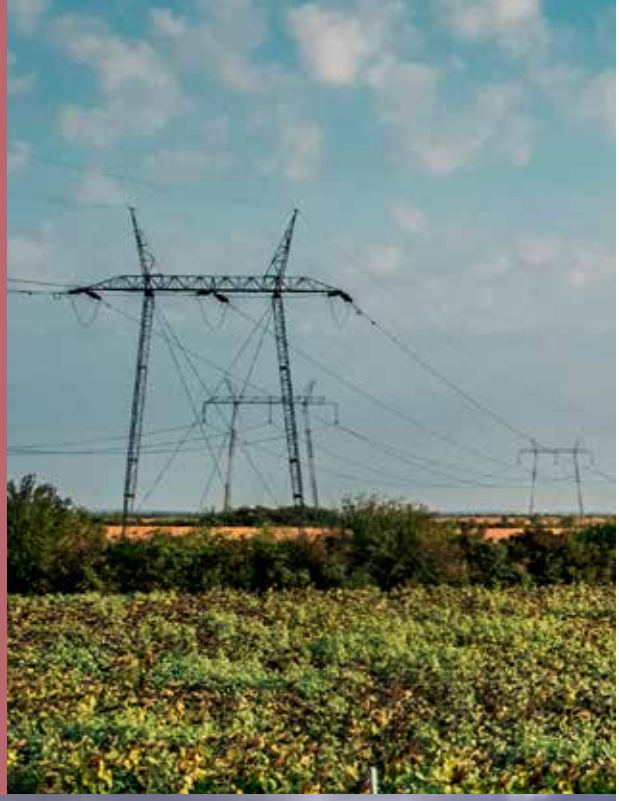
The general impression is that Serbia has good renewable energy resources. Some estimates of wind power indicate 10,000MW, while the potential for small hydropower plants is estimated at not less than 500MW.

There are currently more than 10 wind energy projects in various phases of development around the country, with a total of around 1,000MW – despite the current statutory cap on incentivized feed-in-tariffs of only 500MW. Big and small hydro projects are also in various phases of development, with a total planned capacity of 1,000MW, including both private and state initiatives.

Interest in Serbia for wind, hydro, biomass and solar projects is increasing among investors and companies from all over world . Companies including Enlight Renewable Energy, Masdar, Secci Italy, RWE Inoggi Germany, REV Canada, Fintel Energia from Italy, Taaleri from Finland, DEG from Germany and others already operate in Serbia and have established their market footprint. Many of their projects have already passed the financial close phase.

Local initiatives are playing their part, with small hydro projects in development around the country. There are reportedly only 31 small hydro power plants operating in Serbia, with an installed capacity of 34MW and annual energy production of 2,400GWh. Half of this capacity (1,200GWh/year) is located in the towns of Uzice, Nis and Kragujevac, where the hydro potential can be utilised in numerous small facilities with a total installed capacity of around 340MW spread across more than 700 locations.

During 2017, Serbia's Ministry of Mining and Energy made considerable efforts to promote the use of biomass in district heating and cooling (DHC) systems. Its initiatives were supported by the EU, EBRD, foreign governments, and international lenders. The programme, "Promotion of Renewable Energies: Developing the Biomass Market in Serbia", focused on facilitating a switch from fossil fuels to more environmentally-friendly solutions. The initiative has led to a partial switch to biomass in DHC systems in several municipalities, following the commissioning of reconstructed biomass-fueled boiler rooms. Several more projects are either planned to be completed or are planned to start in 2018. Consequently, this market now has major potential for investors, mainly ESCOs interested in entering into public agreements with local







self-governments, public authorities and institutions. Their focus is the reconstruction and refurbishment of existing coal and/or heating oil fueled boiler rooms, projects that will lead to further development of the Serbian biomass market.

3. Forthcoming developments/opportunities in the renewables sector

Despite the significant improvements introduced by the new PPA package decrees, the new model PPA has not remedied all the shortcomings of the previous regulatory regime.

One of the main downsides is that the off-taker may only provide promissory notes as collateral for the fulfilment of the obligations under the PPA, and not a bank guarantee. Under the law, promissory notes are only effective if the debtor has the funds secured by the promissory notes in its accounts, and therefore it remains to be seen whether they will be perceived as an adequate collateral by lenders. This fact, coupled with the possibility of a change in the off-taker every five years without the producers or the lenders having any say, is expected to be the most significant challenge for the further realisation of renewable energy projects.

Serbia has also so far failed to make significant progress in implementing the policy measures outlined in its action plan for reaching its 2020 renewables targets in gross energy consumption.

In wind energy, the statutory cap for wind energy (currently 500MW in total) is already reserved and exhausted, with many projects reaching the financial close stage. It remains to be seen what the government will do to attract more investments. Unofficially, there is speculation that an auction system may be introduced – instead of merely first-to-come-first-served cap mechanics – and that the cap for wind could be increased to 750MW or even more.

As solar has been a major failure so far, there is growing expectation among the stakeholders that the Serbian government will allow further incentives. Given Serbia's potential, it may be expected that solar energy will be properly tackled in the next regulatory package, which is expected to be adopted by the end of 2018.



Singapore

Authors: Marc Rathbone, Adrian Wong

Introduction

Singapore, as a small resource restrained country, relies heavily on imported fuels to generate power. Around 95% of Singapore's electricity is generated using natural gas which is imported via a combination of natural gas pipelines and liquefied natural gas. There is limited potential for deploying large-scale renewable energy projects. Low wind levels, limited capacity in the rivers and reservoirs, and a lack of geothermal reserves make it unfeasible for wind, hydro and geothermal generation. Land is also scarce which makes the development of utilities-scale ground-mounted solar photovoltaic (PV) economically challenging. However, according to Singapore's Energy Market Authority (EMA), Singapore enjoys relatively high levels of solar irradiation of around 1,580kWh/m^2. This makes the development of rooftop solar PV projects one of the most promising options for renewables generation in the urban city state and there has been a considerable increase in installed capacity over recent years.

1. Brief overview of the renewables sector

Key statistics

Singapore has a total registered power generation capacity of 13,384.4MW and over 95% of this is made up of gas-to-power plants.

In renewables, solar PV installations have grown from 25.5MWac of installed capacity in 2014 to 46MWac in 2015 and subsequently to 99.9MWac by the end of Q1 2017. This increase was driven by 955 new installations in 2016 and the first quarter of 2017. By the end of Q1 2017 there were a total of 1898 solar PV installations in Singapore. The majority of installed solar capacity is accounted for by non-residential private sector installations (45.9%) and town council and grassroots units (44.7%) while public sector agencies contributed to the remaining solar PV capacity. Singapore aims to have around 350MW of installed solar capacity by 2020.

Singapore also has waste-to-energy generating capacity of around 256.8MW. These incineration plants (currently five main ones in operation) dispose of a substantial portion of the waste produced by incineration.







Subsidy schemes and tariffs

Singapore has so far resisted a subsidy (or feed-in tariff) regime for renewable energy. It has followed a policy of waiting until technologies are commercially viable under usual market conditions as opposed to distorting the market with subsidised tariffs and increasing electricity costs for consumers. The government's support for renewables has been known to also come in the form of funding for research and development (R&D) to develop capabilities within the industry. In 2016, Singapore announced more than SGD 900m of new public sector R&D funding for the next five years for urban solutions and sustainability. This funding is designed to help strengthen innovation capacity in areas such as clean energy, smart grids and energy storage.

In the absence of a bilateral power purchase agreement, rooftop solar projects introduced tend to operate on the basis of owners of the installation using the power generated in place of power imported via the grid (i.e. embedded generation). Owners of the installations also have the option to sell excess electricity back to the grid and are paid against pre-determined tariffs payable by retailer SP Power. This is a regulated activity and requires approval from the authorities.

2. Recent developments in the renewables sector

The growth in installed solar capacity is the main story of Singapore's renewable energy sector.

An interesting development in the solar market is the development of "off-site" power purchase agreements (PPAs). Under such an arrangement, a solar developer may construct various solar systems at sites that are located away from the facilities of the buyer of the electricity. The seller then attributes power consumed by the buyer from the national grid to the electricity it contributes to the national grid from its various solar systems.

An example of such a transaction is Apple's PPA with the Sunseap Group. Under this transaction, the Sunseap Group developed and placed a portfolio of rooftop solar panels on various public and privately-owned buildings (including Apple's own facilities) generating enough electricity for Apple's operations in Singapore. This form of corporate PPA arrangement is said to be the first of its kind in South-East Asia. Sunseap recently announced a similar PPA arrangement with ST Kinetics.

Following this development, another pilot project – a platform for the trading of renewable energy certificates – was launched in the Singapore market in 2016. The platform is expected to enable companies without the ability (whether due to physical constraints or otherwise) to invest in their own renewable energy generation

(e.g. having rooftop PV installations) to purchase such renewable energy certificates from renewable energy developers. American environmental infrastructure solutions provider APX Inc announced a new product – Tradable Instruments for Global Renewables (TIGRs) – which is open for participation in Singapore and Asia.

However, this initiative is currently at an early stage and lacks the force of law – it depends on private sector voluntary take up as there is currently no regulation aimed at stipulating minimum consumption of renewable energy for consumers. If the scheme gains market traction, it may catalyse and incentivise increased investment in the renewables industry as it presents an additional revenue stream for renewables developers in Singapore.

Singapore's energy-from-waste and biomass capability is another area of recent activity. In May 2016 Hyflux Limited and Mitsubishi Heavy Industries Limited reached financial close on a 25-year concession with the National Environment Agency relating to a USD 750m energy-from-waste facility scheduled to come online in 2019. This would be Singapore's sixth and largest waste-to-energy plant to date.

3. Forthcoming developments/opportunities in the renewables sector

Further growth in installed solar capacity can be expected with potential expansions in various solar PV projects in the country. The government is studying the feasibility of floating solar PV projects as well as the large-scale deployment of rooftop solar for the public housing sector – both of which are subject to research and design initiatives by the Housing Development Board and Economic Development Boards respectively. The Public Utilities Board (the Singapore water agency) recently launched an environmental studies tender aimed at assessing the viability of deploying floating solar PV panels in reservoirs, including a potential 57MW plant.

Corporates are also increasingly active in renewable energy consumption through their corporate social responsibility (CSR) programmes. DBS, South-East Asia's largest bank, recently announced plans to procure all its energy from renewable sources by 2030. This creates opportunities for corporate PPAs similar to the Apple and Sunseap PPA.

Running alongside the issue of generation is the Singaporean government's research and development in new technology solutions. In July 2016, French Engie Group, with support from the Singapore Economic Development Board, opened the ENGIE Lab Singapore to act as a regional hub for energy innovation and technology in South-East Asia. The Lab is anticipated to focus on three fields: smart energy systems for cities and islands, industrial energy efficiency and gas technologies. This includes managing new energies, digital systems (Internet of Things) and mobile apps.

One initiative is the building of a small, self-contained power grid on Semakau Island to store renewable energy in the form of hydrogen gas. The Semakau Island project, is being undertaken together with Singapore's Nanyang Technological University and France's Schneider Electric SE. The technology is at early stage of development but is intended to operate as a storage option for intermittent power generated by solar and wind and act as an alternative to, and a longer-term storage option than, traditional battery storage.



Slovakia

Authors: Petra Corba Stark, Michaela Nemethova

1. Brief overview of the renewables sector in the country

Key statistics

Energy consumed from renewable energy sources (RES) currently represents about 12.1% in the Slovak Republic's energy mix, according to the most recent annual statistics (2015). Around 23.8% is represented by nuclear and the rest of energy production comes from fossil fuels, primarily gaseous fuels. Biomass and hydropower are the leading renewable sources.

The Slovak Republic has committed itself to reach the national indicative target set by the EU Directive on Renewable Energy and to produce at least 14% of electricity consumed from RES by 2020. In addition, the Slovak government approved its National Renewable Energy Action Plan setting a target of 15.3% of energy from RES by 2020.

Operational Support

Operational support has always been the main incentive for the development of RES. Generally, all producers of electricity from RES in the Slovak Republic are entitled to take advantage of preferential access to the distribution system and preferential access, transmission, distribution and supply of electricity. Electricity production from RES is further supported by the feed-in tariff scheme, under which RES producers sell electricity for fixed prices that are higher than those for conventionally-produced electricity. This support scheme has increased electricity prices for all end users. The feed-in tariff rates are set on annual basis by the Slovak Regulatory Office for Network Industries. The level of feed-in tariff depends on the year in which the project was put into operation and is guaranteed for a fixed number of years set out in the law.

2. Recent developments in the renewables sector

New head of the Regulatory Office for Network Industries (ÚRSO)

Mr Lubomir Jahnatek, former economy and agriculture minister and current MP of the political party SMER, was appointed chairman of the Regulatory Authority for Network Industries (ÚRSO) on 25 July 2017. He was appointed by the Slovak government in line with new rules governing the appointment procedure (whereby an approval by president is no longer required) after the resignation of the former chairman, Mr Jozef Holjencik, following politicisation of conflict, stemming from the allegedly arbitrary increase of electricity fees for end consumers.

Amendment to Act no. 309/2009 Coll., on the promotion of renewable energy sources and high efficiency cogeneration (the Renewable Energy Sources Act)

Effective from 1 August 2017, an amendment to the Renewable Energy Sources Act transposing EU legislation (Council Directive (EU) 2015/652 of 20 April 2015 and Directive (EU) 2015/1513 of the European Parliament and of the Council of 9 September 2015) was adopted.

The amendment aimed to accelerate the use of second-generation biofuels using biomass raw materials that ensure high savings in greenhouse gas emissions and whose economic value is high only when used as a biofuel. A methodology for calculating greenhouse gas emission savings over the life cycle of fuels was introduced by the amendment.

3. Forthcoming developments/opportunities in the renewables sector

New rules on support of electricity production in the renewables sector

The Slovak Ministry of Economy is currently working on amendments to the Renewable Energy Sources Act as well as to the Act No. 251/2012 Coll., the Energy Act. The amendments intend to lead to extensive reform of the support of electricity production from RES. The reform is being prepared in line with the phasing-out philosophy, with the priority of ensuring cost-effectiveness and minimising the impact on final energy prices. The draft amendments have not been officially published and are currently subject to internal discussions within the Ministry of Economy. According to the unofficial working draft, the new rules on support are likely to be applicable from 1 January 2019.

Under the new rules, sources with an installed capacity greater than 100kW will be entitled to the feed-in-premium rates (which guarantee a premium above the market price) instead of the existing feed-in-tariff system. In addition, the new sources will be selected in an auction organized by the Ministry of Economy in accordance with the EU guidelines. Further limitations are planned which will mainly impact electricity production from biomass or biogas.







Slovenia

Authors: Dunja Jandl, Urša Jozelj

1. Brief overview of the renewables sector

Slovenia adopted the Energy Act (EZ-1) in 2014. This is the main act in the field of energy, which transposed the EU Third Energy Package. Some minor amendments to the Energy Act have recently been proposed. The proposed amendments tackle subsidies for the renewables sector, with a planned reduction of the threshold for guaranteed purchase from 1MW to 500kW.

The National Renewable Energy Action Plan 2010–2020 (NREAP) was adopted in 2010 pursuant to EU Directive 2009/28/EC on the promotion of the use of energy from renewable sources. Slovenia aims to reach the target share of 25% of renewables in its gross final energy consumption by 2020. Recent analysis has shown that the share of renewables increased by only 1.5%in the period 2010–2015. To achieve its 2020 target, Slovenia must increase the share of renewables by 3%. The most significant backlogs are in the use of bio-fuels in transport, the construction of big hydropower plants, and the subsidies scheme for the production of electricity from dispersed renewable sources.

To address the situation, amendments to the NREAP have recently been proposed. The proposed NREAP includes measures and financial incentives for the intensification and improvement of their implementation, including: renewed subsidies schemes; promotion of self-supply; mandatory share of renewables in district heating; implementation of nearly zero-energy buildings; and a proactive role for the state in constructing hydropower plants. It also sets out some goals for the period up to 2030 – the target share of renewables in gross final energy consumption for the year 2030 is 27%. The government has chosen to favour solar projects over wind. Intensified construction of hydropower plants is planned, and the construction of wind power plants is foreseen only outside the protected areas.

2. Recent developments in the renewables sector

Infrastructure for alternative transport fuels

In summer 2017, Slovenia finally transposed Directive 2014/94/EU on the deployment of alternative fuels infrastructure by adopting the Decree on establishing the infrastructure for alternative transport fuels.

While the Decree regulates the technical requirements for recharging points and obliges distribution system operators to develop charging points, there are certain requirements for sellers of motor vehicles as well. Sellers must provide users with relevant and clear information on motor vehicles which can be regularly fuelled by the types of alternative fuels that are available on the market, or recharged at recharging points. The Ministry of Infrastructure will provide users of motor vehicles with a database showing the geographic location of refuelling and recharging points.

Subsidies scheme

Investments in the renewables sector have been dependent on the availability of financing mechanisms. Thus, most of the solar power plants were installed between 2009 and 2012, while installation decreased in the years 2014 and 2015. There has been a revival of the subsidies scheme in late 2016 and 2017. Power plant operators, awarded by public tender, may choose between guaranteed purchase and operating support. In the first half of 2017, EUR 77.4m was paid out as support for electricity generated from renewable energy sources and from high-efficiency cogeneration. In this period, the sources of electricity production within the support-scheme were: fossil fuels devices for high-efficiency cogeneration 34%; solar power plants 29%; biomass plants 14%; biogas plants 13%; and hydropower plants 9%.

Net metering

After its adoption at the end of 2015, some amendments to the Decree on self-supply of electricity from renewable energy sources are now on their way. Recently, the Decree introduced the net-metering instrument in Slovenia for the first time. This was well received among Slovenian households – there are currently 135 devices connected, with a total power of 1.1MVA. Net metering has also been supported by some electricity traders, who provide loans on affordable terms and turnkey installation of devices. Moreover, since April 2017 the Eco Fund, the Slovenian Environmental Public Fund, has provided subsidies for natural persons to install these devices.

Proposed amendments to the Decree include: an increase in the amount of power annually permitted to self-supply devices – 15MVA (up from 7MVA) for household consumers, and 5MVA (increased from 3MVA) for small business consumers; and the introduction of a maximal current power level which may be transmitted from the meter point to the public grid (11kVA). The Decree also introduces some changes to the method by which the distribution system operators carry out their half-yearly reporting.

3. Forthcoming developments/opportunities in the renewables sector

In order to overcome the backlogs in the implementation of the NREAP, the proposed measures in the renewed NREAP aim to increase the use of renewables in the areas with major shortcomings. Recent developments in the renewables sector have addressed these issues and have proposed or have already implemented changes to the regulation of alternative transport fuels and self-supply, and the subsidies scheme has been renewed.

However, the expected increase in the use of renewables of 3% percentage points to reach the target share of 25% of renewables by 2020 may prove difficult to achieve without constant support mechanisms and an active role of the state in the construction of hydropower plants.







Spain

Authors: Juan Zabala, María Guinot Barona

Introduction

The integration of the fragmented national energy markets into a smooth, functioning and coherent European system has historically been one of the ambitions of the EU, setting up a framework allowing the effective coordination of national efforts. Although a single European energy market for renewables is not yet attainable, there are increasing cross-national policy similarities in the EU as a result of the international policy coordination led by the European Commission and the European Parliament.

Critical reforms have taken place in Spain aimed at solving the substantial imbalance between the electricity system's regulated costs and revenues. As part of Spain's transition to a low-carbon energy system, the Spanish government has fixed a target of 20% of final energy consumption from renewable energy sources by 2020 (in accordance with the European Union's Renewable Energy Directive – the "Directive 2009/28/CE"). To achieve this goal, Spain has developed an action plan – the Plan de Acción Nacional de Energías Renovables (PANER) 2011–2020 – which is tracked by the European Commission.

Spanish lawmakers are also working on a draft Law on Climate Change and Energy Transition to achieve both the EU goals and those set by The Paris Agreement (COP21). The Spanish government has committed to present the draft law during this legislature (2016–2020). However, this commitment could be undermined by the current political situation of the country, influenced by two major challenges: the lack of stable majorities in Parliament, which results in political uncertainties; and the existence of a path of economic recovery, given Spain's ongoing high unemployment rates. These conditions could hamper the progress of the draft law.

Nevertheless, the Spanish Government is optimistic that the country is on track to meet its 2020 renewable energy targets.

1. Brief overview of the renewables sector

Key statistics

The most recent data shows that there has been a slight increase in electricity production from renewable energy sources (RES) during 2016. In 2016 the share of RES rose to 38% of the total amount of electricity generation, up from 36% in 2015. Nuclear accounted for 21% in 2016 (p.7 of the "Las energías renovables en el sistema eléctrico español, 2016" report).

From the electricity tariff deficit to comprehensive electricity market reform

From 1998 to 2012, Spain experienced a boom in renewable energy development due to an attractive remuneration regime (the feed-in tariff scheme). This support policy led to a scenario where the installed power capacity targets were exceeded and where, subsequently, a "tariff deficit" occurred.

Since 2012, extensive legal reform has been accomplished primarily by means of Royal Decree Law 9/2013 of 12 July 2013, Act 24/2013 of 26 December 2013, Royal Decree 413/2014 of 6 July 2014 and Order IET/1045/2014 of 16 June 2014. The electricity market reform has essentially affected the remuneration scheme for renewable energy as follows:

1) There is no longer an open and freely-accessible "special regime", rather production facilities with a "specific remuneration system";
2) The "specific remuneration" is assigned after carrying out competitive auctions called by the Government and limited to a certain amount of GW
3) Energy producers are entitled to receive both; the "specific remuneration" (if their projects are awarded at the auction) and the price obtained from the sale of energy in the electricity market.

As a result, we have noticed a growing lack of interest from producers in receiving the "specific remuneration". This is because the maturity of renewable energy technologies (especially wind power), and a marked increase in the efficiency of energy production through these technologies, have made the sale of electricity in the energy market at pool prices profitable.

2. Recent developments in the renewables sector

Change in the remuneration scheme for renewable energy

As previously explained, the electricity market reform directly affected the remuneration scheme for renewable energy. Today's framework pivots around the "reasonable return", which is a percentage applied to a theoretical initial investment value. The reasonable return, before tax, is calculated considering the average secondary market yield for ten-year government bonds and applying a differential (the "adjusting coefficient"). The parameters can be adjusted at the end of every six-year regulatory period. At present, we are in the first regulatory period (2014 to 2019). Therefore, in 2020 the Government will revise the reasonable return, and there is a risk that the revision will be downwards. The current reasonable return is 7.398%.

Renewable energy generation facilities that were commissioned before 2014 have been significantly affected by the change in the remuneration scheme: the government will deduct the excess over the percentage of the reasonable return received in the past from future specific remuneration payments.

At present, the Kingdom of Spain is facing many claims both from Spanish and foreign investors. Regarding national investors and the claims filed against the legislation implementing the new remuneration scheme, the Spanish Supreme Court has backed the reforms introduced under Royal Decree 413/2014 of 6 July 2014 and Order IET/1045/2014 of 16 June 2014. However, the Kingdom of Spain is still facing a series of arbitration proceedings under the Energy Charter Treaty, which is not applicable to Spanish investors. Recently, on 4 May 2017, the ICSID awarded the claimants compensation amounting to EUR 128m *(Eiser Infrastructure Limited and Energia Solar Luxembourg S.à.r.l. v. the Kingdom of Spain, ICSID Case No. ARB/13/36).*



Auction results
Since the feed-in tariff scheme came to an end after the electricity market reform and the new scheme based on auctions was implemented, the Spanish government has only called three renewable energy auctions. The first auction took place in January 2016, when 700MW were awarded – 500MW for wind technology and 200MW for biomass. The second was held in May 2017, when the government awarded 3,000MW – 2,979MW for wind technology, 1MW for photovoltaic (PV) installations, and 20MW for other technologies. The third was in July 2017 – 5,037MW were awarded – 3,909MW for PV installations and 1,128MW for wind technology.

3. Forthcoming developments/opportunities in the renewables sector

Renewable energy auctions: foreseeable developments
Auctions for renewable energy projects will continue to be the cornerstone of the renewable subsidy scheme. Nonetheless, the broad reform of the electricity market has affected the existing renewable support schemes, giving rise to a new landscape that has redefined the rules for the design of competitive auctions.

The lack of a clear national energy policy (e.g. lack of clarity from the government on the principle of technology-neutrality of the auctions; the feasibility of interconnections for selling the surplus electricity generated and for solving renewable energies' intermittency problem; and the gradual shutdown of nuclear power plants) severely complicates any prognosis as to whether the rules and features of further auctions will remain the same.

The financial health of institutions for funding renewable energy projects and the growth of responsible investment are further factors that will certainly have an impact.

Notwithstanding the above, it can be assumed that:

1) No more generous renewables subsidies are expected (at least during current legislature).
2) New auctions could take place in the short- and medium-term since Spain is obliged to comply with the EU targets. The date and design remain uncertain. The government has surprised the market this year with two linked renewable energy auctions.
3) The "reasonable return" will remain variable, subject to a periodic review.
4) To date, the request for a preliminary ruling issued by the Spanish Supreme Court on the compatibility of the electricity production value tax (IVPEE) – 7% – with European law remains pending before the Court of Justice of the EU. If incompatibility is recognised, taxpayers could obtain a refund of the tax.

Despite the barriers, the Government is likely to try to improve investor confidence, damaged by subsequent arbitral awards and court claims regarding cuts to renewable energy subsidies. It is likely to do so by following the principles of transparency, predictability and certainty when revising policies and regulations, and by adopting measures to stimulate investment and business development in Spain. These may include financial incentives: loans/leasing at low rates by the Official Credit Institute (ICO); grants and loans for large companies and SMEs by the Ministry of Energy, Tourism and Digital Agenda and the Ministry of Economy, Industry and Competitiveness; and direct participation in projects with loans at a low interest rate by the Institute for Energy Diversification and Saving (IDAE).

Corporate renewable power purchase agreements (PPAs): a kick-off trend?
While corporate renewable PPAs are, in general, unknown or at least unfamiliar in Spain, some stakeholders have recently started expressing interest in and debating the purpose of spreading their use. In fact, the EDP Group (a Portuguese energy company) and Calidad Pascual (a Spanish company) have signed the first PPA in the Spanish market to sell wind energy produced by EDP Renováveis to Calidad Pascual.

In Spain, PPAs with physical delivery (i.e., aimed at providing electricity to the counterparty at a supply point) can only be concluded between those qualified as "participants in the Spanish electricity market": producers, self-producers, external agents, distributors, generators, qualified consumers or representatives of either of them (Royal Decree 2019/1997 of 26 December 1997).

PPAs are well accepted in the US and some Latin American countries and there is a consensus on their potential benefits (and risks). However, for PPAs to become common practice, some regulatory measures, together with political will and renewed business mentality is indispensable. In Spain, the current political environment makes us believe that the necessary regulatory changes will not take place soon.



Switzerland

Author: Stephan Werlen

1. Overview of the renewables sector

For many decades Switzerland has used hydro-electric power as one of its main renewable energy sources. Today, more than 55% of domestic electricity production comes from hydro-power sources.

In 2017, more than 640 hydropower plants, each with a capacity of at least 300kW and producing an average of approx. 36,264GWh per year, are being operated within Switzerland. Roughly half of these hydropower plants are run-of-river power plants; the other half consists of storage power plants, with around 5% in pumped storage plants. The Swiss government intends to continue promoting hydropower, in particular by supporting the renovation and expansion of existing plants in order to increase their efficiency. However, the construction of new hydropower plants is rather unlikely in view of the current number of existing plants and restrictions from environmental laws, nature and landscape protection regulations, and other factors.

In recent years, other renewable energies such as solar, wood, biomass, wind, geothermal energy and ambient heat have gained an increasing share of Switzerland's energy supply – in 2016, roughly 5% of the annual domestic electricity production originated from such other renewable energies. However, it would take many years for most of these renewable energies to become economically competitive without supporting measures. In particular, the substantial potential of photovoltaic (PV) and geothermal energy will only become fully exploitable in the coming decades.

2. Recent developments in the renewables sector

Following the Fukushima nuclear disaster in 2011, the Swiss Federal Council and Parliament decided on Switzerland's staggered withdrawal from nuclear energy. This decision, as well as other far-reaching changes in the international energy environment, required a restructuring of the Swiss energy sector. For that purpose, the Federal Council has drawn up the Energy Strategy 2050, which has to be implemented gradually.

On 21 May 2017, Switzerland voted in favour of the first step of the Energy Strategy 2050 and adopted the revised Energy Act as proposed by the Swiss Federal Council and the Parliament. The revised Energy Act aims to reduce energy consumption, increase energy efficiency and promote renewable energies. In addition, the construction of new nuclear power plants shall be prohibited. Further, the revised Energy Act includes the aim of reducing Switzerland's dependence on imported fossil energy sources and of strengthening domestic renewable energies.

The revised Energy Act and the corresponding ordinances are expected to enter into force at the beginning of 2018.

3. Forthcoming developments/opportunities in the renewables sector

In accordance with the Energy Strategy 2050, the following four main pillars have been defined as the first set of implementation measures:

1) **Increasing energy efficiency:** recent studies have shown that more than 40% of energy consumption and climate-damaging CO_2 emissions are attributable to the building industry. Accordingly, measures have and will be put in place to subsidise the energy-saving renovation of buildings. Further, investments to improve energy efficiency are tax deductible, including the cost of demolition of existing buildings to make way for new buildings. Motorised vehicles are another focus – their CO_2 emissions will become subject to further restrictions by the year 2020, to meet a required reduction to an average of 95g CO_2/km.

2) **Development of renewable energies:** Operators of solar and wind energy production facilities are eligible to apply for feed-in remuneration (of up to 2.3 centimes per kWh) to promote the construction of these facilities and contribute to the (still high) production cost. This subsidy system is, however, limited to five years after the enactment of the new law. Further, provided certain criteria are met, operators of PV installations and large new hydro-electric power plants may apply for investment subsidies. In the past, only operators of small PV installations (i.e. production capacity of less than 30kW) were eligible; today, operators of large PV installations may apply. Given the importance of hydro-electric power plants for Switzerland and current low market prices, the Swiss government has decided to grant financial support to operators of hydro-power production facilities, both new and existing ones. This support is, however, limited to a period of five years. The procedures for the approval of new renewable energy production facilities will be shortened and simplified. In this context, the production of renewable energy will be granted the status of national interest – particularly important where the protection of nature and the landscape could limit the construction of new facilities.

3) **Nuclear energy:** the construction of new nuclear plants is prohibited – no permits for the construction of new nuclear plants will be granted anymore. Existing nuclear plants may continue to operate as long as they are safe. The export of spent fuel rods for reprocessing has also been prohibited. It is currently expected that the existing nuclear plants (there are four nuclear plants operating in Switzerland) will have to be demolished and dismantled by around 2034. The first nuclear plant will be shut down in 2019.

4) **Electricity grids:** the current electricity power grids need substantial upgrading to meet new requirements. Under the current legal system, the process for upgrading and renewing existing electricity power grids is burdensome and time consuming. The Energy Strategy 2050 will simplify and accelerate the processes for upgrading and renewal.





Turkey

Author: Döne Yalçın

1. Overview of the renewables sector

Under Turkish law, renewable resources fall into five categories: hydroelectricity, wind, solar, geothermal and biomass.

Hydroelectricity

Turkey has a hydroelectricity potential of 433bn kWh. At the end of June 2016, there were 572 hydropower plants in the country, with a total installed capacity of 26,246MW. This is the equivalent of only 34.3% of the total potential. In 2016, the country generated 24.7% of its electricity from hydroelectric resources.

Wind

Turkey's estimated wind energy potential is 48,000MW. Wind energy is a particular focus for the country and the legislative framework is favorable to investors. The Turkish government grants targeted incentives for wind generation, such as feed-in tariffs which vary from USD 3.48 (TRY 13.06) to USD 7.30 (TRY 27.39), and specific tax exemptions.

The market has seen regular announcements by Turkish Electricity Transmission Company (TEİAŞ) of grid connection points for wind farms in certain locations in the country. Tender procedures with minimal documentation are held among possible candidates.

Solar

Turkey has high solar energy potential due to its geographical position. According to the Solar Energy Map of Turkey prepared by the Renewable Energy General Directorate, the total annual insolation time is 2,737 hours (a total of 7.5 hours per day), and the total solar energy derived per year is 1,527 kWh/m^2 per year (4.2 kWh/m^2 per day).

At the end of 2016, there were 34 pre-licensed solar power plants with a total installed capacity of 402MW and 2 licensed solar power plants with a total installed capacity of 12.9MW. Also at the end of 2016, following the establishment of unlicensed power generation plants, the country had 1043 solar power plants with a total installed power of 819.6MW. The total installed power of licensed and unlicensed solar energy-based power generation plants is 832.5MW.

Geothermal

As Turkey is situated on the Alps-Himalayas belt, the country has relatively high geothermal potential. Turkey's geothermal capacity is 31,500MW, and 79% of the areas with geothermal potential are situated in Western Anatolia. 94% of its geothermal resources are low and medium heat and are suitable for direct application (heating, thermal tourism, the output of minerals, etc.), while 6% are suitable for indirect application, such as power generation.

Biomass
Annual biomass potential in Turkey is estimated at about 8.6m tonnes of equivalent petrol (MTEP), and biogas quantities that can be produced from biomass amount to 1.5–2 MTEP.

2. Recent developments in the renewables sector

Turkey is one of the richest countries for renewable energy. The latest development in this field, the Renewable Energy Resource Area Regulation (RERA), positions Turkey to play an even bigger role in renewable energy investments.

In March 2017 the Ministry of Energy and Natural Resources (MENR) held the first RERA tender – for a solar energy project of 1000MWs. The Kalyon-Hanwha Group consortium submitted the lowest bid – USD 6.99 per kWh for 15 years with a promised investment of USD 1.3bn – to construct a solar farm on the Karapınar Energy Specialized Industrial Zone.

MENR's second tender under RERA was for the development of wind farm(s) with a total capacity of 1,000MWs on renewable energy resource areas. A consortium of German company Siemens and Turkish companies Türkerler and Kalyon Enerji holdings won this billion-dollar wind energy tender in August 2017 with the lowest-price offer of USD 3.48 per kWh.

Incentives under the Supportive Mechanism for Renewable Energy Resources (YEKDEM) are updated annually by the Energy Market Regulatory Authority that regulates prices, periods and payments for production licensees who undertake production activities based on renewable energy resources.

Not all tenders involve building new power plants and factories. Tenders for privatisation have taken place recently in Turkey, mostly for hydroelectric power plants. In 2016, Gül Enerji won the privatisation tender for the Köklüce and Almus hydroelectric plants with a highest bid of over USD 250m. A further 11 small-scale hydro power plants will be privatised by the end of 2020.

Turkey is preparing for its recent and forthcoming projects by restructuring its transmission system infrastructure to make it ready for high volume renewable energy generation. The Renewable Energy Integration Project aims to help meet Turkey's increasing power demand by strengthening the transmission system in order to facilitate large-scale renewable energy generation. The project has a cost of USD 475m, including USD 300m from the International Bank for Reconstruction and Development (IBRD). The project's estimated closing date is 30 June 2019.

3. Forthcoming developments/opportunities in the renewables sector

According to the National Renewable Energy Action Plan prepared by MENR, Turkey's vision for 2023 proposes targets for the energy sector in Turkey that include:

- Raising the total installed power capacity to 120GW
- Increasing the share of renewables to 30%
- Maximizing the use of hydropower
- Increasing the installed capacity based on wind power to 20,000MW
- Installing power plants that will provide 1,000MW of geothermal and 5,000MW of solar energy.

On a different but related note, investments for geothermal energy are expected to increase to USD 7bn by 2020.





Ukraine

Authors: Vilitaiy Radchenko, Volodymyr Kolvakh

Introduction

Renewable energy generation is one of the key priorities for the energy sector and national economy, as set out in Ukraine's energy strategy. The National Action Plan for Renewable Energy until 2020, approved by the Ukraine government in 2014, estimates the potential of Ukrainian renewable energy generation as equivalent to 68.6m t of oil, which is roughly half of the country's total energy consumption at present.

At the same time, the share of renewable energy in Ukraine's total energy mix is quite insignificant. According to the recently published draft Energy Strategy of Ukraine until 2035 the share of energy generated from renewable energy sources (RES) – wind, solar, biomass, biogas and small hydro, as well as by big hydropower projects (greater than 10MW) – currently amounts to no more than 4% of total energy consumption. The Ukraine government's plans aim to exceed 8% by 2020 and reach 25% by 2035.

Achieving these targets is both desirable and necessary for the safe and gradual replacement of the worn-out capacities of conventional generation. More than 84% of all thermal power plants (TPP) and combined heat and power plants (CHP) have already exceeded their operating lifetime, and the lifetime of almost 70% of Ukraine's nuclear power units would also require extension in the next ten years.

Fortunately, Ukraine has reasonably good generation potential in all types of RES. However, most of it is in biomass and biogas due to the country's large agricultural sector and available workforce. It is estimated that bioenergy's installed capacity could reach 15GW. However, under-developed infrastructure and an unstable supply of raw materials means that only a very small number of bioenergy projects have been implemented to date.

Wind energy has the potential to grow to around 15GW. But this would require a huge amount of investment – by private developers in generating facilities, and from the state budget in infrastructure to ensure availability of the grid's off-taking capacity for wind parks.

In general, Ukraine's emerging renewable market could be the biggest in CEE. According to research published in January 2017 by the International Renewable Energy Agency (IRENA), Ukraine can deliver more than 1m GWh a year.







1. Brief overview of the renewables sector

Key statistics

According to the national energy regulator, as of 1 October 2017 the total installed capacity of active renewable energy projects was 1,319.6MW, which is less than 2% of the country's total energy generation. Half of this RES capacity (52%) is from solar power plants (698.1MW), 35% from wind (461.4MW), 8% from small hydro (98MW) and the rest (5%) from biomass and biogas. That does not include big hydro generation (exceeding 10MW), which is not eligible for state support of renewable energy projects.

About 60% of all renewable generation is located in four regions – Odesska, Zaporizhska, Mykolaivska and Vinnytska – which, apart from the Crimea, have the best wind resources or highest insolation.

While the overall dynamic of the renewable sector has slightly increased compared to the previous year, only 201.9MW were installed by Q4 of 2017, of which only 23.7MW is wind, 7.6MW in biogas, 3.3MW in small hydro and the remaining 167.3MW (83%) in solar.

Subsidy schemes

The state provides various supports to renewable energy producers. The main incentive is the feed-in (green) tariff, which was introduced on 1 April 2009 as a special preferential price for electricity produced from alternative energy sources – wind, solar, biomass, biogas, small hydro (not exceeding 10MW) – paid until 1 January 2030. It is set by the regulator separately for each renewable energy producer and for each technology.

The green tariff is equal to the established retail tariff for households (known as "Class 2" consumers) multiplied by the fixed green tariff index of a particular renewable energy source. It may not be lower than the minimum green tariff, which is fixed in EUR according to the UAH-EUR exchange rate as of 1 January 2009. Therefore, the currency fluctuations of a Ukrainian hryvnia do not have an adverse effect on the pay-outs to renewable energy producers.

At the same time, the green tariff index decreases over time. However, the decrease applies to new projects only and does not affect power plants which were commissioned into operation before the decrease has taken effect. The latter will enjoy the same tariff rate until 2030.

Producers may also receive a premium of 5% or 10% paid on top of the green tariff for using equipment and other power plant elements of Ukrainian origin. The Ukrainian Chamber of Commerce and Industry certifies the origin of these elements, which include PV modules, rotor blades, and anaerobic digestion reactors.

In addition to the tariff, the state also guarantees the mandatory off-take of all electricity from renewable energy producers, and gives them priority in dispatch and settlement. The recently-adopted *Law on Electricity Market* also protects renewable energy projects against curtailments caused by network failure, providing for compensation for curtailed electricity volumes under the green tariff from 1 July 2019, when the balancing market should begin to operate.

Renewable energy and energy-saving equipment may also be exempt from import taxes, provided that it does not have equivalents produced in Ukraine.

2. Recent developments in the renewables sector

Power purchase agreements (PPA)

In order to ensure better conditions for financing renewable energy projects, the regulator has recently introduced changes to the standard power purchase agreement that is concluded by all renewable energy producers with Energorynok, the state-owned off-taker. These changes were initiated by a number of international financing institutions, such as the EBRD (European Bank for Reconstruction and Development) and the IFC (International Finance Corporation), with some additional improvements proposed by OPIC (Overseas Private Investment Corporation). One of the most important developments is that a PPA may now be executed at the financing stage, rather than after commissioning the power plant into operation, obtaining the generation license and the green tariff. Other improvements are described in our Law-now article.

At the same time, with the adoption of the new Law on *Electricity Market*, the regulator is developing a new template for PPAs, which is to be concluded with the guaranteed off-taker based on the new market model. The current improvements will also be transferred to the new template.

3. Forthcoming developments/opportunities in the renewables sector

New electricity market

On 13 April 2017, the Ukrainian Parliament adopted the new framework law aimed at the liberalisation of the Ukrainian electricity market. The Law on Electricity Market was prepared jointly with the EC Secretariat to be compliant with the Directives 2009/72/EC, 2005/89/EC and Regulation (EC) No 714/2009.

The new liberalised electricity market is expected to be launched on 1 July 2019 and will be based on the following submarkets: (1) bilateral contracts market; (2) day-ahead market; (3) intraday market; (4) balancing market; (5) market for ancillary services; and (6) retail market. This opens a variety of opportunities for traders, suppliers and other service providers and also allows producers to sell electricity under direct bilateral contracts.

Renewable energy producers could sell their output to the guaranteed buyer at the established green tariff and would not lose any other preferences granted under the existing framework. They would also have to enter the special balancing group to enable the guaranteed buyer settling their imbalances.

Please read our law-now article for more information about this development.



United Arab Emirates

Author: Amir Kordvani

1. Brief overview of the renewables sector

The United Arab Emirates (UAE), traditionally known for its oil and gas resources, is forging a path as a regional leader in the renewables sector.

The discovery of vast hydrocarbon reserves in the 1960s and 1970s saw the UAE rapidly transform in a few short decades to become a global financial and economic hub. The growing population – 3m in 2000 to 9m in 2016 – combined with continuous economic industrialisation has seen energy consumption and carbon emissions surge in the UAE. At present, over 90% of the UAE's power consumption is met by natural gas, with a significant portion of gas being supplied from abroad. Rapid increases in natural gas importation costs over the last ten years, coupled with the proliferation of international agreements to reduce fossil fuels, mean that continued reliance on gas-powered power stations is not desirable or sustainable.

In recent years, as the price of natural gas in the UAE has risen, the cost of renewable technology, particularly solar photovoltaic (PV) systems, has fallen. As a result, the electricity produced through renewable technology has become a competitive and affordable alternative for generating power in the UAE. Furthermore, the UAE's climate, located in the world's "Sun Belt", enjoys high solar irradiation and is highly suitable for various forms of renewable energy technology, in particular solar photovoltaic (PV). These factors mean that in recent years there has been a greater push by the UAE to move away from reliance on hydrocarbons as a source of electricity production.

Under the UAE's federal structure, each emirate retains autonomy over the management and regulation of its energy and resources. Some emirates, in particular Dubai and Abu Dhabi, have started to take steps to increase the use of renewable technologies.

2. Recent developments in the renewables sector

UAE Energy Plan

The UAE Energy Plan 2050 (the Energy Plan 2050), announced in January 2017, sets out ambitious targets which aim to place clean energy centre stage in the UAE's economic and environmental future, and which represents the UAE's strong commitment to applying the terms of the 2016 Paris Agreement and the United Nation's Sustainable Development Goal.

The Energy Plan 2050 aims to cut carbon dioxide emission by 70% and improve energy efficiency by 40%. The goal targeted by 2050 is a UAE energy mix

of 44% clean energy, 38% natural gas, 12% clean coal and 6% nuclear. It is expected that a USD 136bn investment will be required to make this transition to clean energy.

Recent projects

In addition to the UAE's federal policy, a number of the individual emirates are setting independent renewable energy targets. For example, Dubai has introduced a Clean Energy Strategy 2050, with the aim of having clean energy contributing 25% of total energy output in Dubai by 2030 and 75% by 2050.

Several significant renewable projects are being developed throughout the country, including the commissioning by the Abu Dhabi Water and Electricity Authority of the Shams 1 solar-thermal plant (100MW), which came into operation in 2013. The use of concentrated solar power (CSP) allows the plant to dispatch peak power at nights, a first of its kind in the GCC (Gulf Cooperation Council), and the one of the largest CSP facilities in the world.

Furthermore, the Abu Dhabi government has recently announced the construction of the Emirates' largest solar power project, the 1.17GW Sweihan solar PV plant, to be undertaken by Japan's Marubeni and China's JinkoSolar. The project is expected to be completed within 23 months and on completion will have the capacity to power approximately 200,000 homes in the UAE.

Not to be outdone, Dubai's Electricity and Water Authority (DEWA) has unveiled further plans for the Mohammed bin Rashid Al Maktoum Solar Park, the largest single-site solar park in the world and the first to be implemented using the IPP (independent power producer) model. The project is being rolled out in phases, with a total investment of AED 50bn (USD 13.5bn), and a planned capacity of 1,000MW by 2020 and 5,000MW by 2030. The 13MW PV first phase became operational in 2013, while the 200MW PV second phase of the solar park was launched in 2017. It is anticipated that the third phase of this project will be fully operational by 2020, adding a further 800MW. When all four phases are completed in 2013, the solar park will cover 214km^2.

3. Forthcoming developments/opportunities in the renewables sector

The UAE federal government needs to prepare the domestic market for the conversion to clean energy and attract private sector participation. At federal level, planning and participation under the Energy Plan 2050 banner will be key, in particular in the form of introducing a federal law governing the renewable energy sector.

As reliance on hydrocarbons will decline in the long term, by implementing the Energy Plan 2050, the UAE will be well positioned to become an innovator, and a creator of jobs and investment opportunities in the renewable energy sector. It is hoped that a wider variety of renewable technologies will be implemented, such as wind and landfill gas (which is currently being reviewed by some emirates) which will add further diversity to the UAE's clean energy mix.

So far, the majority of DEWA's investment has been in solar PV technology, and it is anticipated that a substantial amount of Dubai's future energy production will be through solar PV projects. However, DEWA has taken initial steps towards portfolio diversification by announcing a large-scale development at Hatta, which will include the first hydroelectric facility in the GCC – a 250MW pumped-storage hydropower project at the Al Hattawi Dam.









United Kingdom

Author: Munir Hassan

Introduction

The UK government has committed to sourcing 30% of its electricity from renewable sources by 2020, a target that the Committee on Climate Change has recently warned will not be reached.

Solutions to meeting the UK's decarbonisation targets while ensuring security of supply and affordability for consumers are needed, as the UK expects that all coal generation will come offline by 2025. Although substantive capacity is forecast to be provided by new nuclear, this is subject to concerns about both delay and commercial viability.

In spite of this, recent measures by the UK government, including closure of the Renewables Obligation (RO), have left many of the UK's main renewable technologies without clear support. This challenging climate has seen the UK slip to 10th place in EY's index of the most attractive countries for renewable energy investment.

1. Brief overview of renewables sector

Key statistics

The UK government's latest statistics show that electricity generation in the UK from renewable sources fell marginally in 2016 to 24.5%. This is despite a 16% increase in total capacity to 35.7GW in 2016 as new solar and onshore wind came forward ahead of the closure of the RO scheme. Although 2016 generation dipped due to low wind speeds, onshore and offshore wind continue to make up more than half of total renewable generation.

Subsidy schemes

On 31 March 2017 the RO – the UK government's main mechanism for encouraging the development of large-scale renewable electricity generation – closed to all new generating capacity other than those generators eligible to apply for a grace period. Responsible for delivering much of the UK's renewable new-build generation, the RO supported 69.1TWh or 23% of UK electricity between April 2015 and April 2016, compared with just 1.8% from feed-in tariff-supported generation. The regulator, Ofgem, has confirmed that the closure of the scheme will not affect capacity that has already been accredited and that it will continue to issue RO certificates and monitor compliance until the scheme's final date in 2037.

New renewable generating stations will now be expected to seek support under the CFD (contract for difference) mechanism, although this is currently open only to those so-called "less-established" Pot 2 technologies (including offshore wind) and not to the "established" Pot 1 (e.g. onshore wind and solar) and Pot 3 (biomass). The feed-in tariff scheme for certain renewable

generators with a maximum capacity of 5MW is due to end in 2019. In early 2016, deployment caps were introduced to the feed-in tariff scheme to limit expenditure by capping the total capacity that can receive a particular tariff rate in a particular tariff period. Installations that do not come within the cap enter the queue for the next tariff period.

2. Recent developments in the renewables sector

CFD auction results

In September 2017, the Department for Business, Energy & Industrial Strategy (BEIS) announced the results of the second round of CFD allocations for the "less established technologies" – Advanced Conversion Technology (ACT), dedicated biomass and offshore wind. Among the CFDs awarded were three offshore wind projects which, with a total capacity of 3.2GW, accounted for 96% of the capacity for this CFD round. The strike prices achieved (GBP 74.75 for delivery year 2021/22 for all technologies, GBP 57.50/MWh for offshore wind and GBP 40.00/MWh for ACT for delivery year 2022/23) are significantly below those seen in the previous allocation round and those predicted by the industry.

Bids for CFDs were received for ten times the value of the final contracts awarded, indicating the highly competitive nature of the process. The results take these renewable technologies one step closer to grid parity, as improvements in technology, supply chains and cost of capital make the technology less reliant on support mechanisms. Therefore, while the budget for CFDs has reduced from GBP 315.25m to GBP 176.18m from the first to second allocation round, the capacity supported has increased from 2.1GW to 3.3GW. By contrast, tidal and geothermal projects are notable for their absence in the results, raising further questions over their development in the UK.

Storage sector growth

The UK has seen rapid growth in the energy storage sector, which has been driven by falling costs of technology and the availability of new revenue streams. At scale, battery storage will allow renewables to represent a greater proportion of the UK's power.

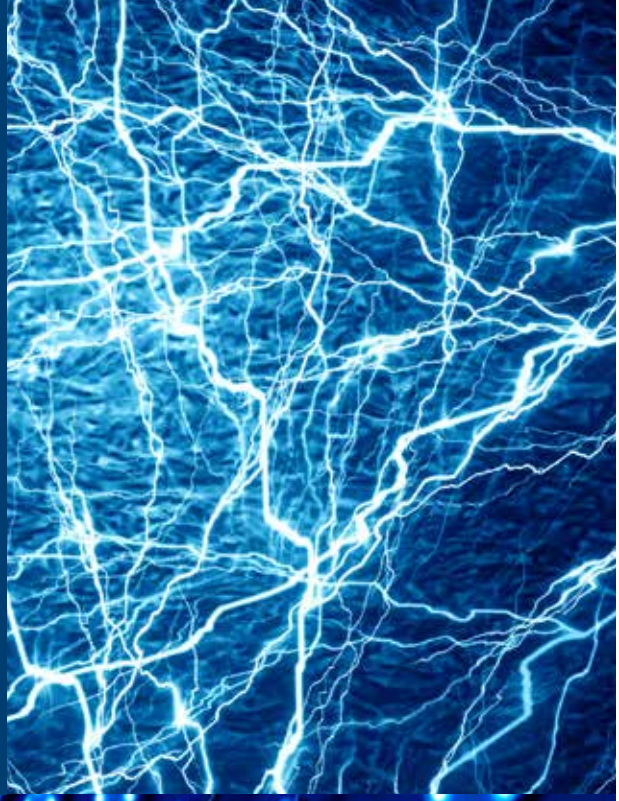
Where only 20MW of commercial batteries were in operation in 2016, 31 new projects have been awarded long-term contracts in the capacity market worth GBP 235m – these contracts will see 558MW battery capacity in place by 2020. Many more projects are in the planning stages, however, and forecasts show that a total of 153 projects with a combined capacity of 2.3GW will be deployed over the next four years.

The UK government has acknowledged the potential for consumer savings with the deployment of technologies that provide flexibility, such as storage. Our recent Law Now article sets out the changes proposed to the wider regulatory regime for storage, including: a new legal definition for storage as "a distinct subset of generation"; a proposed licence for storage; and the removal of final consumption levies (e.g. the RO and feed-in tariff) charged on electricity imported into storage facilities. Further detail on the impact and workability of these changes is awaited.

3. Forthcoming developments/opportunities in the renewables sector

The Clean Growth Strategy and the Control for Low Carbon Levies

In October 2017, BEIS published its long-awaited Clean Growth Strategy, which contains a number of high-level policy and funding commitments in relation to renewable energy. In particular, GBP 557m was pledged for the next Pot 2 CFD auction, planned for spring 2019, and it was confirmed that remote island wind projects will be eligible for this support.







However, recent policy announcements have not all been positive for the renewables industry. Alongside its Autumn Budget, the Treasury published a new Control for Low Carbon Levies (replacing the existing Levy Control Framework). The paper states that, following the spring 2019 CFD auction, there will be no further support for renewables projects until the burden of such support on consumers' energy bills starts to fall - a state of affairs which is forecasted not to occur until 2025.

Subsidy-free solar and onshore wind?
In the absence of RO or CFD support for solar and onshore wind, developers must look to the possibility of subsidy-free projects.

A recent report by Baringa projected that offshore wind may now be cheap enough to be delivered to consumers without subsidy. In April 2017 Baringa reported that onshore wind could clear a subsidy-free CFD auction with prices of GBP 49.90, resulting in a forecast net payback to the consumers of GBP 18m over a 15-year period.

Project developer RES has expressed agreement with this, as it believes its two onshore wind farm projects in Scotland, Hill of Towie II and Blary Hill, will be the first in the UK to come forward without subsidy following the closure of the RO scheme.

Subsidy-free solar also appears to be viable in certain circumstances, with the UK's first subsidy-free solar farm coming forward in September. The 10MW farm has been built in Bedfordshire by Anesco next to an existing project benefiting from RO subsidy, a crucial factor in driving down costs.

For further details on the closure of the RO regime, the most recent CFD auction results, the government's Clean Growth Strategy, and the Treasury's Control for Low Carbon Levies, please see our recent articles on these subjects on Law Now.

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