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Renewable Energy

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Introduction

This guide includes contributions from some of the most active renewables lawyers in the sector across the globe. What it shows is that the renewables industry remains in a period of major transition. However, the transition itself has changed.

Previously this transition was seen as an ongoing metamorphosis from being an immature, fast-developing sector to being a more mature and stable sector. It was about gaining political and social support for decentralised technologies that were seen as costly and unreliable. It was about technologies that were seen as having fringe impacts on the total capacity of most power sectors. It was also about primarily developed economies catalysing, funding and supporting a nascent industry through subsidies.

Even in the past two years the debate has drastically changed. While the renewables sector remains in transition, the conversation is now about whether countries are developing a sufficiently long and sizeable pipeline of projects to feed the almost insatiable desire of banks, investors and developers to deploy capital and debt in the sector. Bloomberg expects global investment in new renewable energy capacity to reach a staggering USD 2.6trn by the end of this year. The transition is less about facilitating the sector and more about removing the political and structural barriers to deployment, such as cumbersome consenting processes or moratoria on particular technologies. As renewables rapidly rise to become the most economic way to add new generation capacity in many jurisdictions around the world, the transition even becomes a focus for existing and planned thermal capacity operators, who may seek additional comfort that they will not become stranded assets in an increasingly decarbonised electricity sector.

With the price of renewables being now not only at, but at times, below grid parity (i.e. the wholesale price of power) in many countries, the question of whether the wholesale price of power remains relevant for investment decisions has risen up the agenda. Many electricity markets are struggling to send a sufficient, stable and transparent price signal to allow prudent investment decisions in the desired technologies to be taken. Further, with the electricity sector considered the engine for driving 'net zero' ambitions in currently non-decarbonised parts of the wider economy, such as transport and heating, the transition is not about whether renewables are fringe technologies, but whether the renewables ambition is large enough to meet these additional challenges. With renewables targets having been adopted in 168 countries as at the start of 2019, and deployment in developing economies having outstripped that in developed economies since 2015, the sector is transitioning to becoming a truly global industry.

The Global Context

Paris: Jusqu'ici tout va bien?

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 that 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.

Governments across the globe have subsequently been reviewing and implementing energy strategies that balance economic growth with sustainable development. For example, Peru has been implementing a series of policies that seek to achieve "clean growth by recognising the relationship between environmental requirements and the development of renewable energy. The UAE's Energy Plan 2050 aims to cut CO_2 emissions by 70% and expects an investment of USD 160bn to achieve its goals. Even in Albania, where around 97% of domestically generated electricity comes from hydropower, government programmes have been launched for investment in new solar and other renewable projects.

Although the installed capacity of renewable electricity has continued to grow globally, to around 2.4TW in 2018, scientists report that there is still much work to be done and in particular, United in Science recently reported that by their calculations, commitments to cut greenhouse gas emissions must be at least tripled and increased by up to fivefold if the world is to meet the Paris climate change goals. Jusqu'ici tout va bien – so far, so good for Paris. But lots more to do.

China: Rise of the sleeping giant

China has become the world's largest renewable energy market, with an incredible 200GW of installed wind capacity. While its investment in coal projects gets a lot of press attention, China has been significantly cutting its coal dependence in recent years. In addition, as has often proven to be the case with developing economies, China has been able to grasp the opportunities of new technologies more quickly than some other countries with longstanding and older infrastructure. When considered holistically as the leading provider of equipment to the sector, the value of the renewables transformation is huge for China.

Renewable energy is also central to Chinese government policy to help solve the challenges of energy security, climate change and severe air and water pollution. By the end of 2016, the total hydropower capacity of the country reached 330m kW, feed-in wind power capacity of 149m kW and generated a total of 241bn kWh electricity, solar thermal utilisation area exceeded 400m m^2 and generated more than 60bn kWh of electric power. In the future, China has ambitions to increase cooperation with other countries on energy technology, equipment, engineering services, and capacity development by encouraging Chinese companies to participate in foreign electricity projects.

EU: More rules and packages

Hailed as a major step towards completing the "Energy Union", in May 2019 the European Council formally adopted the remaining elements of the Clean Energy Package (originally presented by the European Commission in 2016). At over 1,000 pages, the long, rambling, repetitive and at times (even to lawyers) unclear provisions of the Clean Energy Package represent a new and supposedly comprehensive policy framework to build on the energy transition and deliver on the EU's Paris Agreement commitments.

The package is undoubtedly positive for the energy transition in its direction of travel for the European Union. It deals among other things with:

1) Energy efficiency including focusing on the energy performance of buildings.
2) A higher target of 32% renewable energy by 2030.
3) A requirement for National Energy and Climate Plans (NECPs) by each Member State for 2021 – 2030.
4) Facilitating prosumers by making it easier for individuals to produce, store or sell their own energy.
5) Rules to help integrate renewables into the grid, improve security of supply and improve cross-border co-operation.

Climate Action Summit 2019, New York

The New York summit will probably be best remembered for Greta Thunberg's emotional address. She didn't shy away from using her global high-profile platform to tell UN leaders directly, "We will never forgive you". Beyond the press and counter-reaction her address generated, the focus at the largest summit since Paris was on dramatically reducing emissions to reach net zero. More than 60 countries made climate pledges to cut emissions to net zero by 2050 – but, as was noted, not the biggest emitters, such as the US, India or China.

Key other messages from the summit included mobilising public and private sources of finance to drive decarbonisation of all priority sectors, advancing energy resilience, accelerating the shift away from fossil fuels and towards renewable energy, as well as making significant gains in energy efficiency and transforming industries such as oil and gas, chemicals and information technology.

Government policies facilitating renewables

With renewable energy becoming increasingly cost-competitive and a key driver of decarbonisation, many countries are taking on new commitments to deliver sustained renewable policies and targets. This political debate is happening against the backdrop of continued increases in overall energy demand in large parts of the world. Energy demand in Brazil, for example, is expected to grow at an average annual rate of 2.2% until 2040, as compared to just 1.2% globally. The disruptive power of renewables has been significantly enhanced by falling life-cycle costs. There has been dramatic drops in the cost of equipment and in the supply chain, sustained low interest rates from lending banks have facilitated economic project financing structures, and the huge interest from pension and infrastructure funds has brought low cost of capital into the sector. Governments are, among other things, considering how such value can be shared with electricity customers.

Policy commitments and developments continue to be announced on a regular basis. In Serbia, despite a long-delayed start, the renewable energy market is undergoing significant development and investment. In Hungary, renewable generation is still a growing sector with developers recently looking to other technologies, besides biomass, such as solar and geothermal to further renewable generation deployment. Following the presidential elections in Mexico, which saw significant uncertainty over the renewables long term auctions that were planned and concluded, the new administration highlighted strengthening the Energy Regulatory Commission as a key priority. The Austrian government has also adopted a climate and energy plan mission 2030 to increase its overall share of renewables to an impressive 45–50% by 2030.

Government policies hindering renewables

The story is not uniformly positive for the sector, of course. For example, the UK government introduced policy changes (such as to the consenting regime) which the industry contends give an effective "local community veto" against new onshore wind farms. Environmental challenges also ramp up depending on the technology. With increasing concentrations of, for instance, wind projects in particular areas, the cumulative impacts on local fauna will become greater challenges to developments. In Croatia for example, most of its hydropower potential could be challenged by potentially adverse biodiversity impacts, since almost all Croatian rivers are planned for inclusion in the EU's Natura 2000 system of protected habitats. Finally, the lack of policy frameworks is also an issue in many countries. In Romania, the legislative framework has not evolved quick enough to keep pace with the accelerated transition to renewable energy, causing projects and investors to stall due to the uncertainty.

Bankable Revenue Streams

Subsidies – swaying in the wind

Although the demise of subsidies for the renewables sector has been anticipated many times, subsidy schemes have not entirely gone away. To some extent perhaps they cannot entirely fall away until a fix is found for the inherent (and perhaps increasing) volatility in wholesale power prices across the world.

Also, with respect to reductions in subsidies, what works in one corner of the globe with one renewables technology has not made that solution automatically universal. Subsidies have remained relevant to kickstart sectors in countries that have perhaps been slower off the mark. Yet, most subsidy regimes have moved away from feed in tariff structures and in favour of regimes like the auctioning of sites with baked-in PPAs or UK-style model of offering competitively priced contracts for differences.

Authors of this guide found plenty of examples to demonstrate the variety of subsidy structures. In Romania the government is consulting on a new CFD scheme based on the UK model. In Slovenia subsidies and co-financing mechanisms with a focus on solar were announced to catalyse further investment in renewables. Similarly, in Switzerland, subsidy schemes have been announced to aid with the construction and production costs of solar and wind energy. From a more market driven perspective, countries are considering mechanisms such as market platforms and quotes. Examples of this include the Angolan government considering subsidised tariffs for renewable projects by 2025 and the consultation by the Italian government on the creation of a market platform as an alternative to the current incentive scheme, On the same theme, in Ukraine, there has been a switch from tariffs to an auction quota system for solar and wind technologies.

Yet, subsidies are distortions in competitive wholesale markets. And so there are also moves in the other direction. For example, the Egyptian government started a scheme to gradually liberalise electricity prices and achieve the full removal of electricity subsidies by 2022.

Other incentives for renewables

Taxes continue to be an alternative way to encourage green investment. For example, in Colombia, individuals and entities subject to income tax who invest 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 5 fiscal years after the investment is made. A similar arrangement is in place in Morocco via the Investment Charter 1995 (due to be renewed soon) whereby any new industrial business in the renewables sector can be entitled to a total exemption from corporate tax. Moreover, 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). Wider still, the 45Q tax credit regime in the US has been instrumental in increasing deployment of carbon capture usage and storage (CCUS) projects.

White Knights?: Direct purchase by corporates

In the world post steady subsidies, corporate PPAs are an attractive route to market as agreements can provide developers with longer term financial certainty and businesses with "green kudos". Corporate PPAs are not as well established in the European market compared to the US and UK. However, there is growing interest in the corporate PPA route as an alternative way to secure financing for onshore projects in Poland and continued development of corporate PPA segment in Spain and other jurisdictions.

Additionally, despite previous difficulties in the model, we may see community funding re-emerge as a significant option. For example, crowdfunding of energy projects is developing in France. The local dimension – with the financing community being the local community and the beneficiaries being local citizens, small companies, and municipalities – can also help with other local consenting and opposition issues to projects.

Falling costs but falling prices too

The International Renewable Energy Agency (IRENA) has recently stated that onshore wind and solar PV are set by 2020 to consistently offer a less expensive source of new electricity than the least-cost fossil-fuel alternative without financial assistance. The global weighted average cost of electricity generated by concentrated solar power fell by 26% last year from a year earlier, data compiled by the agency showed. Bioenegy fell by 14%, solar PV and onshore wind by 13%, hydropower by 12% and geothermal and offshore wind by 1%. Alongside the fall in upfront capital 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.

Tomorrow's world: Peering over the horizon

Even more new players in the sector

As the renewables market matures, we are seeing the stratification of the sector. Subsectors are emerging with their own language, contract forms, regulatory framework, supply chains, investors and developers. In addition, the geographical expansion of the sector introduces new players exploring established markets in which activity is still increasing, while at the same time pulling in experienced international players into projects in less established markets. Further, there is also a stratification of players in individual projects over the project lifecycle.

There are some companies that like to be involved in projects from cradle to grave. However, with increasing pressure on achieving rates of return in increasingly competitive markets, we are seeing more M&A activity. Strategic players continue to source projects but lean strategists may handover to developers with larger balance sheets to develop the projects, who in turn will look to enhance rates of return by selling down at a premium to their development capital at key stages in the project. Banks and institutional investors are also often happy for such strategists to exit the project at the operational stage while maintaining the O&M role with such assets then being collected together in mixed portfolios that meet the investment requirement of funds or so-called 'funds of funds'.

Challenging the new incumbents

Wind and solar are the most common renewable technologies deployed and central to most governments' renewables policies. These days, we hear less about tidal, wave, tidal lagoons and other technologies that were once much lauded as potential cornerstone technologies. While, they remain part of the overall picture, developers of other technologies complain that they are getting too little focus given the dominance of wind and solar.

For example, in Portugal and Russia, the uptake of renewable energy policy is focussed largely on accelerating the wind and solar industries. Offshore wind development continues to be a principal driver of anticipated capacity increases in its key markets, namely the UK, Denmark, Germany and Belgium.

There is still lots of untapped potential and opportunities for development in specific regions such as wind on the Peruvian coast and in Brazil and Serbia, solar in Croatia and Turkey and smaller rooftop solar in the Czech Republic, biomass in Ukraine and Slovakia and hydropower in Colombia and Albania.

With increasing cost pressures and the need to innovate, we may see more creativity in the sector and also see an upsurge in interest in mixed-technology developments. For example, in Oman, Japan's JGC Corporation, the winning bidder of Sharqiyah IWP, proposed the use of a captive solar PV plant to reduce the electricity consumption required from Oman's grid. Ørsted has also commenced a UK funded "gigastack" project in Denmark to commercialise hydrogen production from offshore wind to help deal with the increasing issue of system flexibility as offshore wind capacities increase.

CCUS: moving forward at a geological pace

Described by the UK Government's Committee on Climate Change as a "necessity not an option" CCUS is seen as essential in meeting net zero targets globally. CCUS is also seen as a key to unlocking the potential decarbonisation of the industrial and heat sectors by developing a hydrogen economy. In countries such as Germany and the UK which are heavily reliant on natural gas for heating, hydrogen is seen as a clean alternative fuel and, if done via methane reformation, a partner for the CCUS sector.

The scale of the challenge to develop CCUS projects at scale and quickly is highlighted by the forecasts. To achieve net zero, around 10,000 CCUS projects would be required by 2070. Many countries such as the UK, China, France, Germany and Saudi Arabia acknowledge an essential role for CCUS in their climate target

strategies. It is required to speed the decarbonisation of industry, for generation of low carbon electricity and for development of new technologies such as bioenergy, negative emission technologies and 'direct air' carbon capture. And yet the technology has currently only been deployed on a large scale in North America, as an adjunct to existing industries such as tar sands developments.

In light of the vast potential CCUS has to offer, the UK government has set a target of up to 40GW of new low-carbon baseload comprising new nuclear and power stations fitted with CCUS and has been developing new business models for developing CCUS projects across the UK. With potential growing to transport CO_2 across borders, the commercial barriers for CCUS may soon be a thing of the past.

The hydrogen sonata

My daughter loves to tell me the joke: "Why can you never trust atoms?" The answer: "Because they make up practically everything". The joke could be true of hydrogen, which makes up approximately 75% of all mass in the universe and burns clean and carbon free to produce only water as a byproduct (if produced by electrolysis). Hydrogen should be a dream solution for achieving a decarbonised energy sector. Yet despite its ubiquity, it remains elusive.

Many governments and companies worldwide are exploring the potential hydrogen can offer to the energy transition. The Hydrogen Council identifies multiple sectors which hydrogen can help to significantly decarbonise, such as: transport, heating, renewable integration and energy distribution. Moreover, it envisages that when deployed at scale, hydrogen could account for almost one-fifth of total final energy consumed by 2050 which would reduce annual CO_2 emissions by roughly six gigatons compared to today's levels. The Netherlands has seen ample investment into hydrogen research initiatives, such as 'Hystock', which looks at the production of hydrogen generated with solar energy through electrolysis.

The electric vehicle juggernaut

According to Bloomberg New Energy Finance, by 2040 more than half of all new cars worldwide will be electric. Evidently, the electrification of transport is pivotal to meeting net zero. China's focus on improving air quality and reducing oil imports makes it the world's largest market for electric vehicles. However, the industry is not without its speed bumps – whilst sales of electric vehicles grew by around 90% in Q1 2019, this was half the level of growth witnessed between 2017 and 2018, partly due to issues around vehicle choice and waiting times.

Many countries are yet to deliver the level of charging infrastructure required to increase consumer confidence and therefore uptake. But some jurisdictions, such as, Slovenia, report sufficient charging infrastructure for electric vehicles given the level of registrations. Bulgaria is expected to draw up legislation that will include obligations for electricity distribution companies to develop charging stations for electric cars. Moreover, many jurisdictions are grappling with the additional electricity capacity and increased network utilisation challenges that the further penetration of EVs may present. Despite these short-term issues, the long-term outlook for electric vehicles is positive and is largely encouraged by technological advances to cut costs and the introduction of favourable government policies that continue to drive the electrification of transport worldwide. For example, the Chilean government recently entered into an agreement with manufacturer Albermarle Corp to grant access to cheaper lithium resources to encourage EV battery manufacturing in Chile.

The development in EV technology is encouraging research in vehicle to grid/building (V2G/X) technology which it is expected will both change the way in which individuals and businesses consume electricity and unlock the potential of V2G/X to ease the significant pressures on local grid systems, as well as continue the societal shift in how consumers respond to greater democratisation of energy consumption and digitisation of the sector.

Conclusion

The pace of the renewables transition appears to be speeding up rather than slowing down. Spurred on by grassroots demand, typified by those like Greta Thunberg, and government goals like 'net-zero', there are new projects, products and ways of thinking that are changing the way many in the world regard renewables and their place in the future of the planet. Our renewables experts, each expert in their particular markets, are continuing to advise on and guide this global transition.

This guide, by its nature, provides a high-level overview on the sector in the covered jurisdictions. Our contributors remain at your disposal and would be delighted to discuss more specific details and developments.

Munir Hassan
Head of the CMS Energy Group

Albania

Authors: Mirko Daidone and Evis Zaja

1. Brief overview of renewables sector

Its geographical location in southeast Europe and its natural resources make Albania one of the best-placed countries in Europe to use and exploit renewable power and resources. Around 97% of domestically generated electricity in Albania comes from hydropower. This reflects the Albanian government's long-standing focus on developing hydropower as its main renewable energy source, even though it could tap into other sources of renewable energy.

According to a European Commission report published on 28 January 2016, "Albania has a surface of 28,748km^2 and a hydrographical distribution of 44,000km^2 or 57% more than state territory. The country has the potential to produce 16 to 18 TWh of hydro energy but so far it has exploited one-third of the potential." In 2009, the Albanian government endorsed contracts for the construction of 103 hydropower plants with a total capacity of 1,000MW, and total investments in the energy sector totalled EUR 3.1bn. Albania continues to emphasise hydropower today.

The government has also introduced to promote and improve Albania's renewable energy sector as a hole. In 2017 a new law promoting renewable energy was enacted, and in 2018 the Council of Ministers adopted Decision No. 179, dated 28 March 2018 "On the approval of the National Renewable Energy Action Plan (NREAP) 2018–2020".

2. Recent developments in the renewables sector

Law No. 7/2017 "On promoting the use of energy from renewable sources" aims to encourage the increase of energy production from renewable sources in order to ensure sustainable development in the Republic of Albania in accordance with its obligations under Energy Community Treaty. This relatively recent legislation is also partly in line with Directive 2009/28/EC, the EU's Renewable Energy Directive.

The Decision of Council of Ministers No. 179 of 28 March 2018 "On the approval of the National Renewable Energy Action Plan (NREAP) 2018–2020" approved the national action plan for the timeframe 2018–2020. This DCoM aims to achieve a level of 38% consumption of renewable energy sources by 2020. To reach this national objective, an increase in installed electricity generators based on renewable sources is estimated to reach 798MW with the consumption of electricity deriving from renewable sources amounting to at least 2,044GWh.

The law introduced incentives for the renewable energy sector, aimed at achieving the 38% national. These include:

1) **Contract for difference:** this model contract is provided to energy producers following a competitive process. It is calculated as the difference between the winning bid by the renewable energy producer for the feed-in tariff (fixed price) and the electricity market price (reference price). Preferred producers are those who generate renewable energy – in the case of hydropower with an installed capacity of up to 15MW for one generating unit – and qualify through the competitive process to benefit from supporting schemes in accordance with the provisions of the Law No. 7/2017. Ultimately, the incentive is provided as an award for reaching the specified price, in addition to the reference price. Under Law No. 7/2017, the definition of "reference price" is the market price of the following day, which is based on the organised electricity market or in a comparable electricity market. The reference price is calculated by ERE (the Albanian Energy Regulator) on a yearly basis. The contract is approved by the Council of Ministers through the Renewable Energy Operator and has a maximum duration of 15 years.

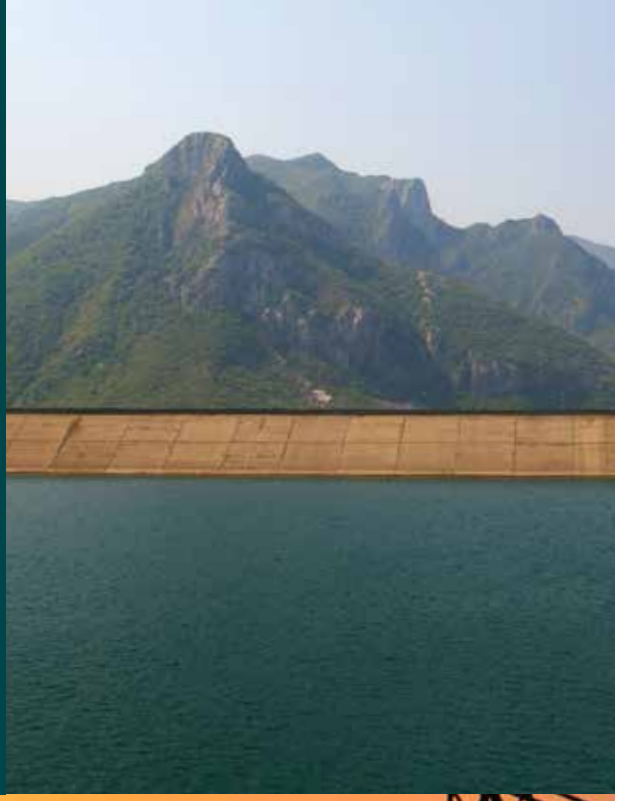
   Apart from the competitive process and application procedure a capacity threshold also applies. Support under the contract for difference will not be provided in the following cases:

   - if the producer has an installed energy capacity that reaches up to 2MW.
   - if the producer has an installed energy capacity for wind energy that reaches up to 3MW.
   - for demonstration projects.

   For producers of renewable energy through wind power, the purchase price is defined by ERE under the methodology proposed by the Minister and approved by the Council of Ministers. The methodology outlines the criteria for calculating the price based on reasonable return on investment value, according to the type of technology used.

2) **Specific incentive for renewable energy generated by hydropower plants:** the purchase price of electricity from hydro sources with an installed capacity of up to 2MW is set out by ERE, in accordance with the methodology proposed by the Minister and approved by the Council of Ministers. The methodology for calculating this price is:

   - Annual purchase price (ALL/kWh) = the annual average market price of the following day (HUPX DAM), of electricity in the band profile (baseload) of the relevant year of the Hungarian stock (HUPX)



of electricity in Euro cent/kWh x bonus for promoting renewable energy to the amount of 1.30 x average exchange rate in Euro/ALL of the last year.

- In any case, the price will not be lower than 7,448 ALL/kWH (the price approved by ERE in 2016).

Existing producers with priority who obtain the hydropower certificate before 31 December 2020 will be eligible to benefit from the support scheme according to the contract for difference, pursuant to the articles of Law No. 7/2017 and the procedures approved by ERE. These hydroelectricity producers are eligible if they obtain their certificate before the end of 2020, regardless of the signing date of their agreement with the Ministry of Infrastructure and Energy. The hydropower certificate will be issued by the Ministry of Infrastructure and Energy, pursuant to the instructions of the Minister.

Producers operating hydropower plants with an installed energy capacity greater than 2MW can invest through public-private partnerships based on concession, as this is also the most commonly used method of investment in hydropower.

3) **Origin guarantees:** producers may obtain an origin guarantee from ERE for energy generated by renewable energy sources. As Albania is a contractual party to the Energy Community Treaty, ERE also recognises the origin guarantees issued by a country in the EU or any country which is a contractual party to the Energy Community Treaty.

3. Forthcoming developments/opportunities in the renewables sector

Considering Albania's favourable geographical location and climate, there is a potential for further development and opportunities in solar, geothermal, wind and biomass energy in the renewables sector, especially when hydropower plants are not functional.

Solar

Albania has an average of 2,400 hours of sun around 240–300 sunny days per year – there is significant potential to exploit solar energy, especially as it does not raise any pollution or other environmental risks. The potential solar energy that could be generated per annum is calculated at approximately 1,500–1,700 kWh/m^2.

Wind

The country has vast areas with high wind energy potential, especially along Albania's 345km coastline. It is estimated that the total potential of wind energy is 2,000MW and 5% of the total electricity produced in the next five years will be solely from wind energy.

Geothermal
Whilst there are natural thermal resources or wells, which could prove useful in assessing the full potential of geothermal energy in Albania, this is still in the feasibility stage and there have been no recent developments in the advancement of this renewable energy source.

Biomass
Albania does not produce biofuels and no biomass energy plants have been developed to date. However, biomass has potential, as 36% of the total surface of Albania is covered by forests. Agricultural residues alone can reach an energy potential of about 6Mtoe. Furthermore, waste from the biggest Albanian cities is increasing every year and the most recent biomass potential calculation is estimated at around 2,300GWh/year.

4. Incentives and financing

Feed-in tariff
Currently, support in the renewable energy sector is advanced using feed-in tariffs. As stipulated under Law No. 7/2017, (as outlined in section 2 above) renewable energy plants are eligible if they meet the requirements for support through the feed-in tariff. The requirements for the eligibility of the tariff are:

(a) wind energy plants must exceed an installed energy capacity of 3MW.
(b) hydropower plants must exceed an installed energy capacity of 15MW.
(c) photovoltaic plants must exceed an installed energy capacity of 2MW.

Once these requirements are met, the tariff will be granted for a period of 15 years and public utilities are obliged to purchase energy from these renewable sources for the tariff set by ERE. The costs of the energy tariff for these renewable sources are borne by the final consumers.

Angola

Author: Filipa Tavares de Lima

1. Brief overview of renewables sector

Between 2008 and 2014, energy consumption in Angola recorded an annual average growth rate of 15.5%. Total Angolan energy consumption reached 9.48TWh in 2014, even in conditions where many Angolans do not have access to electricity or use power generators.

Energy consumption in Angola is mostly urban and residential. It is estimated that the residential sector accounts for 45% of total generation, followed by services (roughly 32%) and industry (around 9%). According to studies carried out in 2015, only 30% of the population had access to electricity (46% in urban areas and 18% in rural areas).

Strong growth in energy consumption is anticipated up to 2025, foreseeably reaching a load of 7.2GW. This envisaged growth is based on the provision of energy to 60% of the population, an increase in residential consumption and the country's industrialisation.

In 2013, over 70% of the electricity produced in Angola was hydro-based. Recent investment in large hydroelectric plants includes Laúca with a capacity of 2,060MW and Cambambe II with 700MW (adding to the 200MW of Cambambe I). Various other hydroelectric projects are being developed, particularly Caculo Cabaça (already under construction with 2,172MW), 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, the renewable energy sector in Angola is currently not diverse.

Recent developments indicate that the Angolan state is looking for investments in the energy sector, approximately USD 3bn by 2022 in order to increase production from 3,334MW to 7,500MW, with 500MW of the increase reserved for private investment in renewable energies.

2. Recent developments in the renewables sector

The Angolan government has a very ambitious energy project to be implemented by 2025. Within the "Angola 2025" strategy the 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 by 2025.

The strategy seeks to contribute to the National Energy Security Policy and Strategy (enacted in 2011), promoting the diversification of national energy, and to the Program

of Integrated Rural Development and Poverty Combat, and the promotion of growth and employment. Internationally, Angola considers that this strategy contributes to its climate change commitments and is in line with its participation in SADC (Southern African Development Community) and IRENA (International Renewable Energy Agency).

The Angolan government'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 three goals:

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

2) Develop the use of new grid-connected renewable technologies – with targets and guidelines for each type of renewable energy and the promotion of investment.

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, and credit lines to stimulate private sector initiatives in rural areas.

In order to promote investment in the renewables sector by 2025, the Angolan government is considering implementing the following actions:

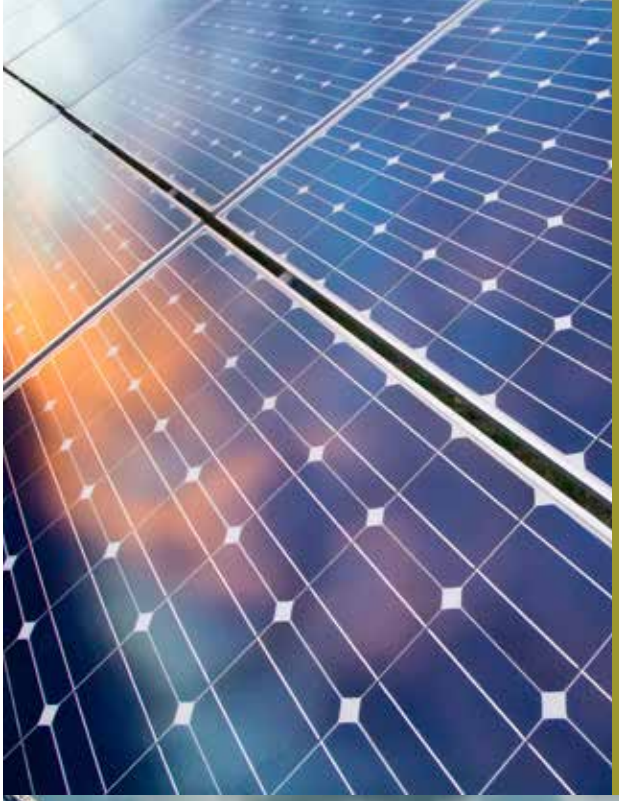
1) Approve specific laws for new renewable energies.

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

3) Allocate an amount of at least Kz 1bn per year to the National Electricity Fund (FUNEL) by 2025 to support rural electrification programmes based on renewable energies, and establish subsidised credit lines for the purchase of individual systems or the launch of productive activities.

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

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



3. Forthcoming developments/opportunities in the renewables sector

The Angolan government has conducted a thorough assessment of the potential of Angola in the renewable energy sector. Highlights include:

1) **Solar energy:** solar radiation is high and constant throughout the territory, with 55GW of generation potential. According to Angolan government studies, Angola has a high potential solar resource, with a global annual horizontal solar radiation between 1,370 and 2,100kWh/m^2/year.

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

3) **Biomass energy:** Angola's forests, 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 in excess of 3GW. The Central Region (the provinces of Huambo, Bie and Benguela) and the Eastern Region (the provinces of Moxico, Lunda Sul and Lunda Norte) are the most favourable zones in terms of forestry and agro-industry resources.

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 for the installation of more than 3GW of wind farms.

5) **Other renewables:** geothermal signs of average enthalpy in the centre of the country and an extensive ocean coastline also constitute potential resources to be developed.

Rural electrification based on renewable energies

The Angolan government has a project under way 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 maximise the number of beneficiaries.

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

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

2) Scattered areas: smaller villages and settlements isolated and away from main roads, where there are often farming communities with some organisational and trade skills.

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

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

Strategic goals for renewable energy

Three strategic goals have been set out for renewable energy in order to meet the main challenges:

1) Improve access to energy in rural areas using renewable sources. The goal is to support rural development and relieve poverty, as well as to guarantee that communities living in non-electrified areas gain 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 reducing regional asymmetries. The goal for grid-connected renewable energies is to develop the national renewable resources that provide electricity, 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 private and public investment in new renewable energy. The goal is to generate effective conditions for investment in the new renewable energy sources that mitigates the distortion introduced by fossil fuels subsidies, offering a suitable payback on investment, an appropriate mitigation of risks and regulation, procedures and communication that ease the implementation and commit investors.

Austria

Authors: Johannes Trenkwalder and Sanela Fürstenberg

1. Brief overview of renewables sector

Energy sourced from renewables is becoming more and more important in Austria. According to the Energy Report 2018 prepared by the Ministry of Science, Research and Economy, almost 80% of the energy generated in Austria was derived from renewable sources in 2017. Hydropower accounts for 33% of this amount, and 56% comes from biomass. However, wind and solar generation (6.4%) is also steadily becoming more important.

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 has thus set one of the most ambitious national targets on the use of energy from renewable sources within the EU. In recent years, Austria has successively increased its share of renewable energy to 32.6% (2018) and is well on track to achieve the target set for 2020.

The main driving force for supporting renewable energy within the legislative framework is the Green Electricity Act 2012 *(Ökostromgesetz 2012)*, which is being continually amended to further increase the share of renewable energy. In May 2018, the Austrian Federal Government adopted a climate and energy plan for Austria: #mission2030. The #mission2030 plan imposes ambitious national targets for the renewable energy sector, such as increasing the overall share of renewables to 45–50% by 2030.

2. Recent developments in the renewables sector

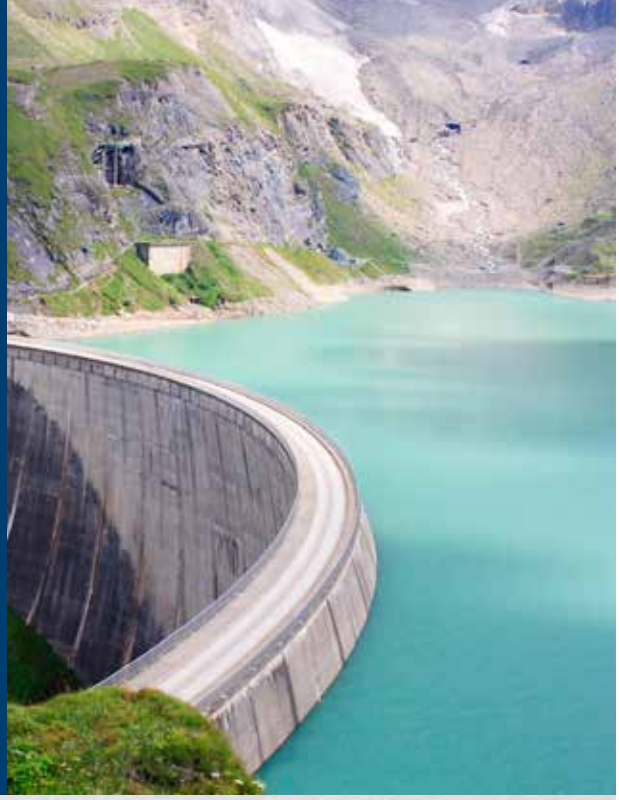
The subsidy structure of the Green Electricity Act 2012 is based on the Community Guidelines on State Aid for Environmental Protection (2008/C 82/01). The new Guidelines on State Aid for Environmental Protection and Energy 2014–2020 (2014/C 200/01) came into force on 1 July 2014 and set out a general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

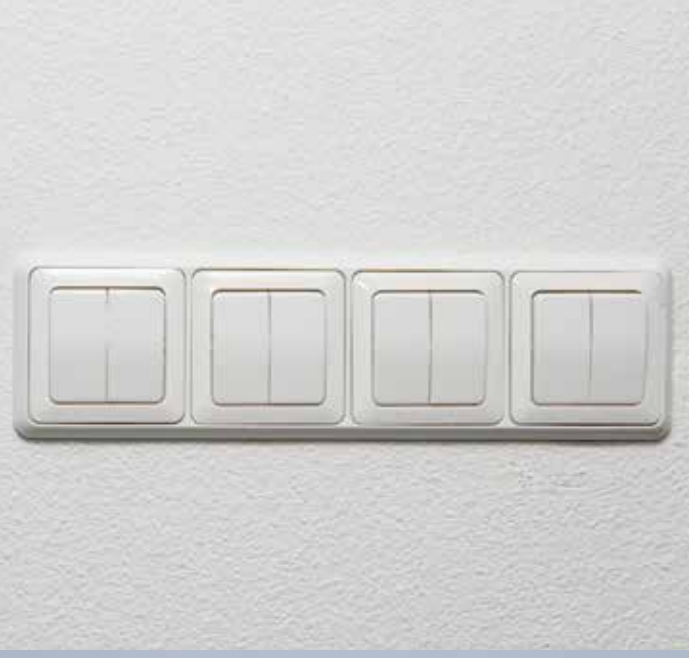
In 2016, the legislator agreed on the "Small Electricity Act Amendment" *("kleine Ökostromnovelle")*. This amendment is still encompassed by the approved subsidy scheme, and thus does not need to comply with the new EU state aid regime. Prices vary between EUR 124/MWh and EUR 129.80/MWh.

The main amendments are:

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 must obtain approval from the competent provincial governor first and then apply for a contract with OeMAG.

Further, the European Renewable Energy Directive (RED II) (see below) requires an extended "One Stop Shop" system, which is not only responsible for the approval and subsidisation of projects in the field of renewable energy, but also covers many issues of space planning. It is now planned that OeMAG will also have the corresponding instruments at its disposal to be able to fulfil this role.

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. Wind power plants only need to be put 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 into operation within nine months (instead of twelve months).

Amendments regarding investment subsidies
Investment subsidies must comply with the General Block Exemption Regulation (EU) No. 651/2014.

As of 2017, subsidies for small hydropower plants have been increased from EUR 16m to EUR 20m per year.

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.

3. Forthcoming developments/opportunities in the renewables sector

The Renewable Energies Directive (2009/28/EC), which has been the foundation for European and Austrian renewable energy policy since 2009, has been significantly amended by the new Renewable Energies Directive II ("RED II"). RED II came into force on 24 December 2018 and must be implemented into national law by 30 June 2021. RED II provides a binding target for renewable energy at the EU level only. Regarding renewable energy, RED II provides that renewables will be increased to 32% by 2030, and that the EU member

states must jointly ensure that this target is reached. For this purpose, all member states must submit national climate and energy plans containing measures and timetables as well as proposals for the funding of those measures. Austria based its climate and energy plan on #mission2030 and adopted its goals.

To implement the measures provided in #mission2030 and in the Austrian climate and energy plan, the Austrian Council of Ministers presented an outline of the Austrian Renewable Expansion Act *(Erneuerbaren Ausbau Gesetz),* which will positively shape the Austrian clean energy system. The Renewable Expansion Act will come into force at the beginning of 2020.

According to the outline, the most important aspects of the Austrian Renewable Expansion Act include:

Direct or self-marketing of renewable electricity
Currently, all renewable energy produced and not directly consumed by its producers is purchased by OeMAG and delivered to the grid. In return, OeMAG pays a fixed-fee tariff to the producers. It is now envisaged that larger producers of renewable energy will be subject to a self-marketing principle which would allow them to act independently in the market and to exploit all opportunities in new market segments. Small producers do not have to operate in the market independently, but can choose to do so. In any case, smaller producers can still opt to sell their energy to OeMAG and receive the fixed-fee tariff.

Promotion of renewable energy in Austria
Market premiums and investment subsidies will play an important role in the Austrian Renewable Expansion Act. These will facilitate the market integration of renewable energy generation. At the same time, a legally secure and predictable investment climate will be created, and administrative barriers removed. This type of support – in the future implemented as "market premium" – will take place over a 20-year term.

Expansion of photovoltaic plants
The Austrian Energy Expansion Act will provide incentives for private households and companies to ensure that buildings can play an active role in providing energy in the future, and that all usable areas in buildings – such as roofs and facades etc. – are used to the best possible extent. For this purpose, the own electricity tax *(Eigenstromsteuer)* will be removed in the course of the structural reform. Currently, the own electricity production of the first 25,000kWh is already tax-exempt. Now, businesses and private individuals should increasingly use photovoltaic modules to generate energy.

Large PV plants (with more than 250kW) should be enabled to participate in subsidiary tenders (as an alternative to investment subsidies). This measure will be taken to use other areas for the expansion of PV plants, such as traffic embankments, noise barriers, and waste landfills.

Renewable energy communities
The Austrian Energy Expansion Act will provide the legal framework for energy communities and allow them work together to generate and supply renewable energy. This means that consumers, small renewable energy producers, small companies and local authorities *(Gebietskörperschaften)* will be enabled to generate, store, sell and supply renewable electricity – even across property borders.

Maintenance of existing high-efficiency plants
In order to minimise the consumption of land and resources, existing high-efficiency plants will be maintained, and suitable successor regulations will be issued for plants expiring in 2020 or later.

Reduction of current applications backlog for subsidies
For projects that are in principle suitable for subsidies, waiting lists will be cut down to allow them to be implemented as quickly as possible. This will be done by introducing new systems for these projects, i.e. by allowing qualifying projects to participate in tenders, etc.

Cross-border feed-in of renewable energy
All renewable energy plants which can be directly connected to the Austrian grid should in principle be treated in the same way as plants built on Austrian territory. They should therefore be able to participate in the tender system for obtaining operating subsidies.

Simplification of approval procedures for high-voltage power lines
Power line systems of up to 45kV will no longer require a permit.

Difficulties in implementing the measures in Austria
Implementation of the planned measures is currently on hold because the European Commission stated that Austria's climate and energy plan needs to improve. The final version of the climate and energy plan must be submitted by the end of 2019 at the latest. Further, due to the dissolution of Austria's government in May 2019, it is rather unlikely that the planned Renewable Energy Expansion Act will be enacted on time (beginning of 2020); it is likely that it will be postponed by one year. However, the members of parliament have decided to adopt temporary solutions – set out in the "Climate Emergency Package" – to enable the rapid expansion of renewable energies until the new government has been formed. For this purpose, several proposals for temporary solutions have been submitted and are now being discussed in the Austrian parliament. It remains to be seen whether these initiatives will be passed with a view to the forthcoming elections, or whether they will aim for a suitable long-term solution to promote and expand renewable energy.

Belgium

Author: Ivan-Serge Brouhns (October 2018)

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.

Bosnia and Herzegovina

Author: Nedzida Salihović-Whalen and Zlatko Mašović

1. Brief overview of the renewables sector

Thanks to its geographical position in Europe, Bosnia and Herzegovina (BiH) has enormous hydropower electricity potential and is well placed to generate renewable energy from wind power plants, biomass and solar energy. BiH's potential for the production of electricity from renewable sources mostly lies in water and wind – hydroelectric power plants and wind power plants are therefore the main focus of the government's energy strategies and most of the state incentives and subsidies are directed to them. For this reason, BiH has a high proportion of renewable resources in its total energy consumption compared to other European countries.

BiH's complex constitutional structure requires energy legislation to be adopted at the state and entity level. Therefore, the State Regulatory Commission for Electricity *(Državna regulatorna komisija za električnu energiju)* (DERK) has jurisdiction over the transfer of electricity, operations of the transfer system and international trade of electricity as well as the production, distribution and supply of electricity to consumers in the Brčko district. Since 2005, the Independent Systems Operator in BiH *(Nezavisni operator sistema u BiH)* (NOSBiH) has been managing the country's electricity transfer system and is responsible for ensuring continuity of the electricity supply according to defined quality standards. Another entity – the Company for the Transfer of Electric Power in BiH *(Elektroprenos – Elektroprijenos BiH" a.d. Banja Luka)* (Elektroprijenos BiH) – is a body competent for the transfer of electricity and the related activities of electricity companies in BiH, including matters relating to the electric power grid.

At the entities level, in the Federation of BiH (F BiH), the Regulatory Commission for Energy in F BiH *(Regulatorna komsija za energiju u FBiH)* (FERK) is responsible for the supervision and regulation of the production, distribution and supply of electricity and for relations between the buyers of electricity in the electricity market. Its responsibilities also cover renewable energy sources through its supervision of the Operator for Renewable Energy Sources and Efficient Cogeneration *(Operator za obnovljive izvore energije i efikasnu kogeneraciju)* (OIEIEK), which was established in 2013 to create the institutional structure for production incentive systems and the redemption of electricity from plants using renewable energy sources and efficient cogeneration. In Republika Srpska (RS), the Regulatory Commission for Energy of RS *(Regulatorna komisija za energetiku RS)* (RERS) is responsible for the supervision and regulation of the production, distribution and supply of electricity and for relations between

the buyers of electricity in the electricity market, and for renewable energy sources. RS is in the process of establishing an operator of the incentive system for the electricity renewables sector – in the interim, Elektroprivreda RS is performing this role.

BiH has adopted several important strategic documents referring to renewable energy sources. These include the *Action plan for using the renewable energy sources of BiH for the period until 2020* (NREAP BiH), adopted by the BiH's Council of Ministers in 2016. NREAP BiH is based on the responsible entities' action plans for the use of renewable energy sources. These action plans are in line with the entities' law on renewables and efficient cogeneration, and with the *Energy framework strategy of BiH until 2035* (OES BiH), adopted by BiH's Council of Ministers in 2018.

According to the entities' action plans, indicative targets for producing energy from renewable energy sources in existing and new generation capacities in 2020 are:

F BiH

- hydro energy: 1,566MW and 4,066GWh
- solar: 12MW and 18GWh
- wind energy: 230MW and 575GWh
- biomass: 10.23MW and 61GWh

RS

- hydro energy: 1,134.22MW and 3,632.08GWh
- solar: 4.20MW and 5GWh
- wind energy: 100MW and 200GWh
- biomass: 25.50MW and 56.38GWh.

In line with EU Directive 2009/28/EC, BiH has an obligation to reach its target of a 40% share of renewable sources in total final energy consumption by 2020 for the entire territory of Bosnia and Herzegovina. Each of the entities in BiH and the Brčko district has its own target to reach in order to fulfil the state's target. The 2020 sector targets required to achieve the overall 40% state goal are: heating and cooling – 56.9%; electricity – 52.4%; and transport – 10%.

These sectors are therefore the main areas for reaching the target of renewable sources in gross final consumption, and it is predicted that the required increases in renewables will need to be 9.1% in heating and cooling, 6.6% in electricity, and 10% in transport. Current predictions for reaching the target identify heating and cooling as having the biggest gross consumption of renewable energy, followed by electricity and transport.

Today, almost all the country's renewable electricity comes from hydroelectric power plants and there is a reasonable expectation of increased electricity generation from wind power plants. Incentives for renewables are offered for hydroelectric power plants (up to 10MW), wind power plants, solar energy plants and biomass plants. By 2035, it is expected that the incentive system will result in the share of electricity produced by wind power plants overtaking that of small hydroelectric power plants.

The F BiH's renewable energy incentives use a feed-in tariff model, under which the producer must obtain the status of privileged producer of electricity and meet other prescribed requirements. All the technologies in the system are based on a feed-in tariff. In contrast, RS has various models of feed-in tariff, premiums and net metering which require producers to fulfil prescribed conditions in accordance with the respective laws: the feed-in tariff is used for technologies up to 1MW or up to 10MW, depending on the technology; premiums apply for technologies over 10MW or over 30MW (also depending on the technology); and net metering is used for small producers, up to 50kW.

2. Recent developments in the renewables sector

BiH has recently started to further develop the renewable energy sources sector and is working towards global guidelines and goals. In the past few years, BiH has started to adopt renewables legislation, especially for wind power plants, as the country has significant potential for this source of renewable energy, as well as hydroelectric power plants. The country's renewables legislation regulates the subsidies for using renewable energy sources and for building renewable energy plants according to the available quotas. By 2020, hydroelectric and wind power plants with a total capacity of 345MW resulting in total production of 1,197GWh of electricity will be included in the system of incentives. BiH is also starting to recognise opportunities and create a favourable investment climate to realise the unused potential of renewable energy sources.

To further these efforts, the Council of Ministers of BiH adopted the following strategic documents:

- *National emission reduction plan of BiH,* adopted in 2015 *(Nacionalni plan smanjenja emisija za BiH)*
- *Action plan for using renewable energy in BiH,* adopted in 2016 *Akcioni plan za korištenje obnovljive energije u BiH)*
- *Action plan for energy efficiency in BiH for period 2016–2018,* adopted in 2017 *(Akcioni plan za energetsku efikasnost u BiH za period 2016–2018)*
- *Energy framework strategy of BiH until 2035,* adopted in 2018 *(Okvirna energetska strategija BiH do 2035. godine)*

The action plans prescribe the measures for increasing the use of renewable energy sources in order to achieve renewable energy consumption targets. These measures include:

- continuous development and improvement of action plans at the state and entities' level;
- promotion of possibilities locally, regionally and worldwide;
- reporting on the promotion and use of renewables to relevant bodies;
- changes in the activities of BiH's energy sector.

One of the recent positive examples of usage of renewable energy sources is the wind power plant Podveležje. Currently under intense development, the plant will have 15 wind turbines with an installed power of 48MW producing an annual output of 120GWh. Another potential wind power plant project, on Hrgud mountain, has planned power of 48MW and average annual production of 126GWh. This project is currently in its feasibility study review phase following a one-year wind potential assessment.

3. Forthcoming developments/opportunities in the renewables sector

As renewables are expected to increase, it is predicted that this will bring about an imbalance in the electric power system, mostly due to the increased number of wind power plants and their inability to accurately forecast the production of energy. It will therefore be necessary to implement future legislative changes aimed at improving and developing the technical infrastructure as well as to defining the process balancing mechanism for renewable energy producers.

While wind power is recognised having great potential, solar energy is still not considered as such in BiH. In that regard, the south of the country has a major opportunity to be used for producing energy from solar power – one of the globally increasing sources of renewable energy. The possibilities for the use of solar energy are unlimited and, as the construction of solar plants requires substantial investment, BiH's relevant legislation should be amended to help ensure that solar plants are cost-effective within several years of their construction.

Therefore, continuous improvement and development of the renewable energy sector will be made in accordance with the strategic priorities and guidelines at the state and entities' level and Directive 2009/28/EC. This will include adoption of new action plans from 2020, better promotion of the use of renewables and further development of a favourable investment climate.

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 over 9% is generated by wind. Perhaps surprisingly, only a small percentage of installed capacity (around 2.9GW or almost 2%) comes from solar power generation, but this is growing rapidly. Overall, over 83% of Brazil's installed capacity for electrical energy comes from renewable sources.

Although Brazil has recently suffered an economic downturn, which has in turn slowed growth in demand for electricity, rising demand for energy is forecast for the near future. The BP Energy Outlook 2019 projects that Brazil's energy demand will grow at an average annual rate of 2.2% to 2040, as compared to just 1.2% globally.

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, which has also been bolstered by increasing licensing rounds in recent years. For example, in October 2018 a joint venture between the Canada Pension Plan Investment Board (CPPIB) and Brazil's Votorantim Energia acquired control of Brazilian hydropower generation company, Companhia Energética de São Paulo (CESP), for BRL 1.7bn. Other investors in the sector include Canada's Brookfield, Italy's Enel Green Power, France's EDF, 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 attracting healthy levels of investment. The average capacity factor of Brazilian wind farms is 50%, around double the global average. In 2019, the Global Wind Energy Council announced that Brazil had the fifth-largest installed

capacity for wind power in the world (and the largest in Latin America) after increasing capacity by 1.9GW in the year 2018. Over 600 wind farms provide an estimated installed capacity of 15GW, and the government aims to expand wind energy capacity to nearly 27GW by 2027.

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 2027" (PDE). The PDE forecasts an increase in the share of installed capacity from renewable sources, from around 126GW in 2017 to 164GW in 2027, as part of a medium-to-long-term national strategy. In contrast to earlier projections, a greater share of the increase is projected to come from wind (14.3GW) than hydropower (9.9GW). Increases in biomass (3GW) and solar (8GW) are also projected.

The latest A-4 energy auction was held in June 2019, for generation projects to commence operation on 1 January 2023. A total of 401.6MW of renewable energy generation capacity was contracted, over half of which (211MW) was for solar, which set a new world record low price of BRL 67.48/MWh. The next auction is an A-6 auction to be held in October 2019 for commencement on 1 January 2025. According to the MME, a total of 1,829 projects have been proposed representing more than 100GW, including wind, solar, hydropower and biomass.

The hydropower sector is likely to remain strong, despite the government's aim of diversifying the supply of energy. The PDE forecasts that, by 2027, hydropower capacity in Brazil will increase to 103.4GW (from the 2017 level of 93.6GW).

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. With an installed capacity of 2.9GW in May 2019 (of which 0.8GW comes from distributed generation), the Brazilian Association for Photovoltaic Solar Energy has said that there are projects currently in development which represent a further 1.7GW of capacity and that are due to come online by 2022. The MME forecasts that this will reach 8.6GW by 2027. 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

Despite the government's goal of increasing 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 import taxes remain an obstacle to developing other non-hydro forms of renewable energy. This is particularly the case for solar power generation, which requires 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.

Discounts on the transmission system usage rate and distribution system usage rate of 50% are also available for solar, wind and biomass generation projects whose capacity is 300MW or lower. However, the federal government is currently considering cancelling these discounts. A bill proposing a special tax regime for the development of alternative energies, which was introduced to congress in 2009, was finally rejected in December 2018.

The Brazilian development bank, BNDES, offers financing for renewable energy projects that achieve minimum levels of local content. However, over recent years, BNDES interest rates, which were previously heavily subsidised, have been converging with normal commercial lending rates, so the advantages of this financing have been reduced.

Bulgaria

Authors: Kostadin Sirleshtov and Borislava Piperkova

1. Brief overview of renewables sector

In 2002, Bulgaria ratified the Kyoto Protocol to the United Nations Framework Convention on Climate Change, which imposed targets on Bulgaria to reduce greenhouse gas emissions by decreasing its 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. That act established general conditions for the 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, the country accepted mandatory obligations for the development of renewable energy production. Bulgaria undertook to achieve an 11% share of electricity from renewable energy sources (RES) in the 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 favourable 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 or 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 some 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 programme 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 early 2011, the government approved a draft Energy from Renewable Sources Act (ERSA) to create a more favourable investment climate and to achieve the new EU targets. On 3 May 2011, the ERSA entered into force and promoted an attractive and stable FiT support programme 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 1MW and 12 years for wind). The 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 or used for the plants' own consumption.

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

When Bulgaria realised, around July 2012, that it had reached its target ahead of schedule and that the incentives programme would continue to attract more investments in the renewables sector, it decided – like other European countries – to take measures to withhold further investments, especially in solar and wind. 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.

Between 2016 and 2018, the Bulgarian government adopted specific changes to encourage small roof-top power plants and power plants with installed capacity up to 4MW, by limiting the FiT only to those small producers.

2. Recent developments in the renewables sector

Starting in the summer of 2012, Bulgaria 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:

1) In September 2012 the Regulator introduced a retroactive temporary grid access fee for all RES, where for some projects the fee reached 39% of their FiT.

2) From 1 January 2014, Bulgaria introduced a fee on the revenues of PV and wind farms 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 these payments had been found to be unconstitutional. The end of July 2019 was the final date for claiming reimbursement of the 20% withholding tax for the period July-August 2014.

3) 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). This meant that electricity produced in excess of that threshold could be sold on the free market.

4) 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. The fee amounted to 5% of their revenue, excluding VAT.

The above measures led to numerous court proceedings brought by RES producers against the competent authorities in Bulgaria, most of which ending with a positive outcome for the producers. Some big investors have already started international arbitration proceedings against Bulgaria.

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.

The situation with the existing RES producers has gradually become more stable since 2015, and we are seeing an increase in M&A activity in the market.

In May 2018, producers with total installed capacity of 4MW and above 4MW were obliged by the law to enter into feed-in premium agreements by October 2018. These agreements were to be made with the Bulgarian Energy Security Systems Funds (ESSF), which would pay the producers up to the net specific production for the respective power plant. After these agreements came into force – from 1 January 2019 – the long-term PPAs were terminated. The ESSF then compensated the difference between the FiT and the estimated market price as determined by the Regulator and depending on the energy source.

Following the success of this reform, a similar regulation was introduced at the start of 2019 for smaller power plants – with a deadline of October 2019 for concluding agreements . Following this change, around 370 power plants will sell electricity on the free market.

3. Forthcoming developments/opportunities in the renewables sector

The Bulgarian Energy Strategy (2020 – 2030) (the Energy Strategy) is a key political document with legal and regulatory importance, due to be adopted by the Government and the Bulgarian Parliament by the end of this year. A draft has been circulated for approval by local authorities. It sets the main priorities for the development of the energy sector up to 2030. The Energy Strategy focuses on future trends such as the development of electric cars market, as well as on systems for energy storage. The use of eco cars, including those charged with electricity produced from renewable energy sources, is a key step towards building Bulgaria's "green" cities of the future and the infrastructure they need. It is therefore expected that legislation will be drawn up that will include obligations for the electricity distribution companies to develop stations for electric cars, as well as additional energy storage capabilities for both producers and electricity distributors. Bulgaria will also be focusing on "Smart Grid" systems in the years ahead.

Today's opportunities related to RES projects are mainly connected to the refinancing of RES projects to reflect decreased interest rates; there has also been an increase in M&A activity in the sector. In 2017, CMS advised on the largest renewable energy refinancing in Bulgaria. Currently, CMS is advising on the sale of the biggest photovoltaic project in Bulgaria.

There is also some developments in the free market, but the market is still picking up.

Chile

Authors: Luis Felipe Arze and Aldo Poblete

1. Brief overview of the renewables sector

Chile's unique geographical conditions are increasingly more favourable to the development of energy projects based on non-conventional renewable energies (NCRE) – including biomass, hydropower, geothermal, wind and solar.

The progress of NCRE has been faster than predicted. Lower cost and construction times for these projects, along with their contribution to the reduction of global emissions in the electricity sector, show that NCREs have great growth potential in Chile's electricity matrix.

During the last ten years, Chile turned from coal plants to cleaner energies. During 2018, renewable energies accounted for an average of 18.2% of the energy matrix (with a peak of 20.7%). And while the goal is to reach 20% in 2025, that goal could be met sooner.

In 2019, Chile was ranked as the most attractive country for clean energy investment, according to the "Climatescope 2018" report by Bloomberg New Energy Finance. The study covered 103 developing nations and Chile was the top scorer. The annual survey analyses variables such as opportunities, fundamentals and experience.

Chile has achieved this leadership position for several reasons, including: a very good business environment; government policies that have made it possible to improve the entry of new NCRE players to the market, making it more competitive; and a commitment to de-carbonization of the matrix.

2. Recent developments in the renewables sector

In 2019, the Chilean government unveiled a key milestone in the energy sector: a plan for the gradual withdrawal of more than 5,300MW in installed coal capacity in Chile, which will be replaced mostly with NCRE. It is an ambitious plan that, in addition to the challenge it implies for all players, will require significant investment in both generation and transmission.

The government has said that by 2040 – when all coal-fired plants must be closed according to the plan – the investment will amount to between USD 13bn and USD 25bn in new generation capacity alone. The difference is explained by the forecasting of demand: in a scenario of greater growth, the investment will be at the top of the range and vice versa. But, if the investment that will be required in transmission is added, the costs could increase by between 10% and 20%. This means the total investment would vary between USD 15bn and USD 30bn.

The development of NCRE in the country has faced several problems due to a lack of transmission capacity. However, in June of this year, and thanks to an investment of more than USD 1bn, the "Cardones-Polpaico" electrical transmission line was introduced. This line improves the country's energy security, advances the decarbonisation of the matrix, and completes the interconnection of the National Electrical Power Grid, thereby enabling the large-scale entry of renewable energies into the energy matrix.

Specifically, this line would allow about 1,300MW of NCRE to be transferred from north to south. In addition, the line will feed the demand of around 5.7m homes with green energy. Every hour of solar energy prevents nearly 1,430t of CO_2 from being emitted. The line also avoids the problem of the decoupling of marginal costs due to transmission restrictions.

3. Forthcoming developments/opportunities in the renewables sector

Decrease in NCRE costs

According to the International Renewable Energy Agency, the total costs (entire useful life) of photovoltaic solar energy projects have fallen by around 73% since 2010. Total installed costs of solar power concentration projects have dropped 33% in the same period. The installation costs of wind projects on land have reduced by 22%.

Potential in NCRE

Chile has enormous potential for the development of renewable energy, which is estimated at 1.865m MW for solar, wind and hydropower. The Atacama Desert has one of the best levels of solar radiation in the world.

Energy policy

The Chilean government developed a determined short-, medium- and long-term public policy in the 2050 Energy Agenda. It includes goals, a new role for the government, carbon taxes and an extensive legislative agenda, and brought certainty to investments in the sector.

Tenders

Chile's auction system for time blocks has been praised and imitated in other countries. There are two time blocks: hourly and quarterly. Although auctions have been defined as technologically neutral, they were established in a way that gives advantages to technologies such as solar in the daytime blocks, and hydro and wind in the seasonal (quarterly) blocks. This format allows intermittent technologies to maximise their potential without having to incorporate the still expensive energy storage technologies.

Increased mining activity

The Chilean government has given assurances that, in 2019, mining activity would register an increase with the completion of large investment projects.

The portfolio of mining projects in the country is at its highest level in three years. According to the Chilean Copper Commission's Investment Cadastre of Chilean Mining for 2018–2027, current activity involves 44 initiatives with a total value of more than USD 65bn.

In addition, the cadastre of projects to be developed in Chile will reach USD 63bn for the five-year period between 2018–2022. That is USD 4bn more than in the previous report in which mining involves the greatest amount of resources for the period, reaching USD 18.66bn, equivalent to 30% of the total projects.

In terms of estimated employment, the mining sector continues to lead the way, with a peak requirement of 27,000 workers for October 2019.

Lithium

The lithium industry has been gaining strength in the country. Chile is the second-largest lithium producer in the world, with an annual output of 14,100t. According to Reuters data, Chilean exports of lithium carbonate reached USD 949m in 2018 and forecasts predict that global demand for lithium will quadruple by 2025. The portfolio of initiatives exceeds USD 1.8bn.

In 2019, the Chilean government signed an agreement with the leading lithium mining company, Albermarle Corp, to give the manufacturers access to cheaper lithium and attract the industry to manufacture their batteries for electric cars in Chile. Chile expects manufacturers to start installing lithium processing plants by the end of the year and, as a result, to become a centre for manufacturing rechargeable batteries for electric vehicles.

Reform of the Environmental Impact Assessment System

This year, a new government bill to reform the Environmental Impact Assessment System (SEIA) entered the Chamber of Deputies, the lower house of Chile's bicameral Congress. The purpose of this initiative is to speed up the granting of permits and give greater legal certainty to companies.

Creation of the Sustainable Project Management Office

Under the Ministry of Economy, the Sustainable Project Management Office formally functions as the Secretary General of the Advisory Board on Sustainable Projects, created on 14 May 2018. The board is composed of the undersecretaries of the economy, defence, public works, health, agriculture, mining, national assets, energy, environment and culture portfolios.

The Sustainable Project Management Office carries out the following activities:

- **Support for investors** – the office acts as the first point of contact between project owners and the state and coordinates project evaluation with the various responsible state agencies. It provides support for the owners of investment projects during the entire process, coordinating between them and the offices of evaluation.
- **Project monitoring** – the office has an updated list of investment projects that are engaged in the environmental or industry-wide authorisation process, which allows it to monitor them transparently, both for the general public and for those involved in the public and private sector.
- **Proposals and recommendations** – the office proposes regulatory or management process modifications, to increase the efficiency of the process and maintain the environmental requirements and good relationships between the projects and the communities.

4. Favourable climate for investors

Macroeconomic stability, growth prospects and low levels of risk are among the most promising factors of the Chilean economy.

Chile was the first South American economy to become a member of the OECD, is leading Latin America in competitiveness and has a solid basis for economic dynamism, with sustained policies that have allowed it to have the best GDP per capita in South America. It is a nation with a dynamic business environment, and keeps maintaining its leadership position in Latin America.

Chile has signed a significant amount of Free Trade Agreements with various nations. Chile's free trade agreements allow access to 86.3% of global GDP under privileged tariff conditions, reaching 4.3bn potential consumers. Chile also has agreements with 32 economies to avoid double taxation.

In addition, Chile produces 28% of the world's copper and has 54% of the world's lithium reserves. It has become the ideal environment for clean energy, placing itself at the forefront in the fight against climate change in the region. The country leads Latin America in the Global Connectivity Index – GCI 2018 (Huawei).

China

Author: Vera Zhang (October 2018)

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 (October 2018)

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 and 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 has already exceeded the target of 20% renewable energy in final energy consumption. The Directive (EU) 2018/2001 proposes increasing the RES share to at least 32% by 2030; Eurostat's data shows that Croatia achieved a 29% share in 2015, yet since then the share has steadily decreased, and in 2017 it was 27.25%.

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, and a further significant decrease to 47% in 2017. In these years, large hydropower plants accounted for between 42% and 67.3% of the total energy generated and between 80% and 90% of the RES total. Other renewable sources – small hydropower plants, wind energy, solar energy, biomass, biogas and photovoltaic systems – rose from 3% to 19.6% of annual RES electricity.

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. Since the introduction of the new law in January 2016, the Croatian government adopted secondary legislation regarding the tender procedures and percentage of RES energy that distributors of electric energy are required to buy from the HROTE. Secondary legislation relating to the new quotas is still missing. 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. Tenders for RES incentives are yet to be announced.

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 5,060MW, 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 (1.7%).

Hydropower plants (43.5%) account for the largest proportion of the installed power of power plants in Croatia, followed by thermal power plants (38.8%), wind power plants (9.5%), a nuclear power plant (50% of NE Krško – 6%), biomass power plants (1.2%), and solar power plants (1%).

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. By the end of 2019,

the Ministry of Regional Development and EU Funds is expected to announce a new EUR 30m public tender for energy renewal of households. 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 completed in 2021. The next development phase of the Croatian electric grid will include implementation of electricity meters and informatisation of grid control. HEP (a national energy company) plans to invest HRK 230m in order to install 2.4 million advanced electricity meters and establish a central information system for the energy grid.

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. To date, however, only one hydropower plant has been built, with an installed power of 220kW. As environmental protection is a big factor in planning a hydropower project, most of Croatia's remaining hydropower potential could be challenged by 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 will invest almost HRK 3.2bn in revitalising Croatia's largest hydroelectric power plants, increasing their installed power by around 150MW by 2022. HEP is currently investing in construction of HE Kosinj, the largest hydroelectric power plant project in Croatia in the last 20 years, worth HRK 3.7bn. Currently, reconstruction of access roads is under way, while construction work on HE itself will begin in late 2019. HEP plans to invest HRK 3.6bn in order to increase the RES share of production in its portfolio from 35% to 50% by 2030. To help achieve this, HEP has announced a public call for potential partners in the development and sale of RES projects. The end date for the public call for submissions of interest is 31 December 2019. The energy renewal of buildings is proceeding at a fast pace, with HRK 1.5bn contracted to date, translating into the energy renewal of 1,300 public buildings and 17,000 households.

Czech Republic

Authors: Lukas Janicek and Lukas Vymola

1. Brief overview of the renewables sector

Key statistics

Energy generated from renewable energy sources (RES) currently represents about 11% of the Czech Republic's energy mix. Around 34% of overall energy production is nuclear, with the remaining 55% from fossil fuels (primarily lignite). Despite this, the share of energy from renewable sources in gross final energy consumption represents approximately 15%.

Electricity generation from renewables is led by biogas and solar (around 27% each), followed by water and biomass (18% each); the rest is covered by other RES, especially wind projects.

The Czech Republic has committed itself to produce at least 13% of consumed electricity from RES by 2020, in line with the national target set out by EU Directive 2018/2001 of 11 December 2018 on the promotion of the use of energy from renewable sources. In addition, the Czech government approved the National Renewable Energy Action Plan that set a target of 15.3% of energy from renewable sources in gross final energy consumption by 2020. The country has already practically met this target.

The EU has set a target of 32% of gross final energy consumption from RES by 2030. The Czech Republic proposes to contribute to this EU-wide target by raising its RES share of gross final energy consumption to 20.8% by 2030. These targets are set and proposed in accordance with EU Regulation 2018/1999 of 11 December 2018 on the governance of the energy union and climate action.

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 the project's lifetime. 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 as it takes into account the market price for electricity in the given year.

An amendment to the Czech law governing the RES subsidy in the Czech Republic – Act no. 165/2012 Coll., on the Subsidy of Renewable Sources of Energy, as amended (the RES Amendment) – is being prepared. If adopted, the RES Amendment should significantly change the system of subsidising RES in the Czech Republic. It proposes abandoning the feed-in tariff system and keeping in place only hourly green bonuses for the RES with installed capacity of less than 1MW. For sources with installed capacity of more than 1MW, the RES Amendment proposes introducing an auction system whereby the bidder delivering the agreed-upon capacity with the lowest subsidy offer will be granted the subsidy. It is anticipated that this new system will apply to the new energy sources put into operation in 2021 or later. The legislative procedure concerning the adoption of the RES Amendment is at an early stage and the final form of the RES Amendment is yet to be seen.

2. Recent developments in the renewables sector

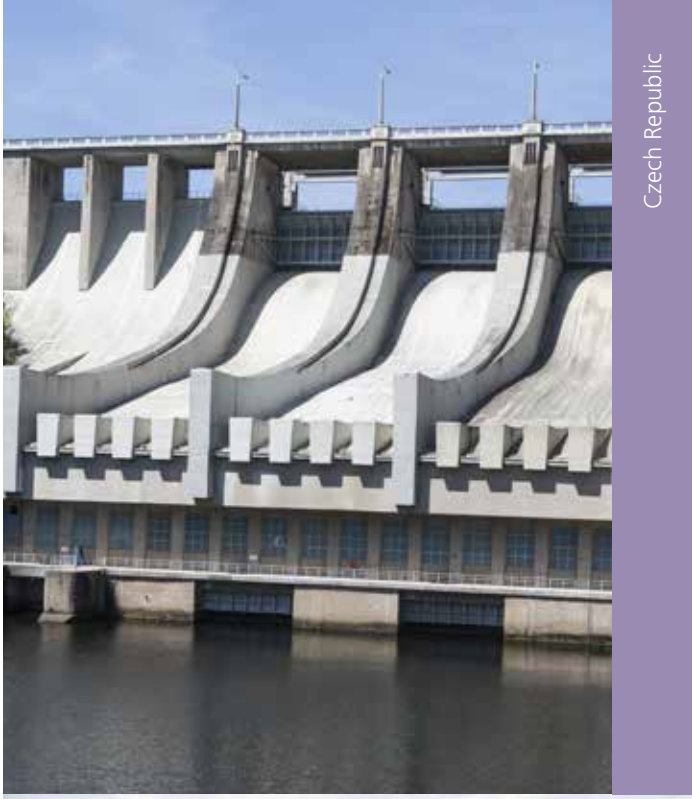
Czech support scheme confirmed as compatible with EU state aid rules

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 between 2006–2012, i.e. in the years where a significant portion of existing solar and wind sources were developed. Broadly speaking, the EC declared that, from a state aid rules perspective, the support schemes are compatible with the EU's internal market.

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



be implemented through the RES Amendment. The RES Amendment introduces a mechanism for assessing the adequacy of the state subsidy for the RES put into operation between 1 January 2006 and 31 December 2015. The proposed regulation aims to identify cases of overcompensation and, if such cases are discovered, it provides a mechanism for eliminating the overcompensation or for refunding the overcompensated amounts (e.g. by decreasing future subsidies, by shortening the period for which the subsidy is granted, etc.). The RES Amendment proposes specific limits under which the subsidy is considered adequate (IRR of 10.6% for fuel sources and 8.4% for non-fuel sources). The RES Amendment introduces sectoral inspections by public authorities to check IRR indicators after the energy source has been operating for 10 years. The control mechanism should not apply to subsidies up to the *de minimis* level pursuant to EU Regulation 1407/2013 of 18 December 2013.

3. Forthcoming developments/opportunities in the renewables sector

Long-term targets

The Czech Republic's 2020 target for the RES share of gross final energy consumption has been practically met. The latest version of the Czech government's Energy Conception indicates that by 2040 the share of renewables in total electricity production will be 18–25%.

The Czech public generally supports the EU targets for decreasing greenhouse gas emissions. In the Czech context, this can be achieved through 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.

The discussion on building new nuclear blocks has been ongoing for several years. In July 2019, the Czech government outlined its plan on financing the new nuclear block which is expected to be built in the nuclear power plant in Dukovany.

Support for new renewable projects

Support for developing larger installations is currently very limited. This, 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 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, in particular the 2,000MW of photovoltaic commissioned in 2009–2010 with the tariff guaranteed for 20 years, represent attractive 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 the RES Amendment will affect this trend once it is enacted, especially regarding controlling the overcompensation of projects put into operation in previous years.

Egypt

Authors: Dr Fatma Salah and Heba Elkady

1. Brief overview of the renewables sector

The development of the renewable energy industry has become a priority for the Egyptian government over recent years. Egypt's current energy strategy aims at increasing the share of renewable energy, a target expected to be met largely by scaling up renewable energy projects.[1]

Egypt has adopted an integrated sustainable energy strategy to 2035, which aims to increase the contribution of renewable energy to 42% of the aggregate power capacity generated in Egypt by 2035.[2]

The Egyptian government is making extensive progress towards becoming a significant player in the renewable energy industry. It has long recognised the need for reform of the electricity sector in order to attract private sector investment in power generation.[3]

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.

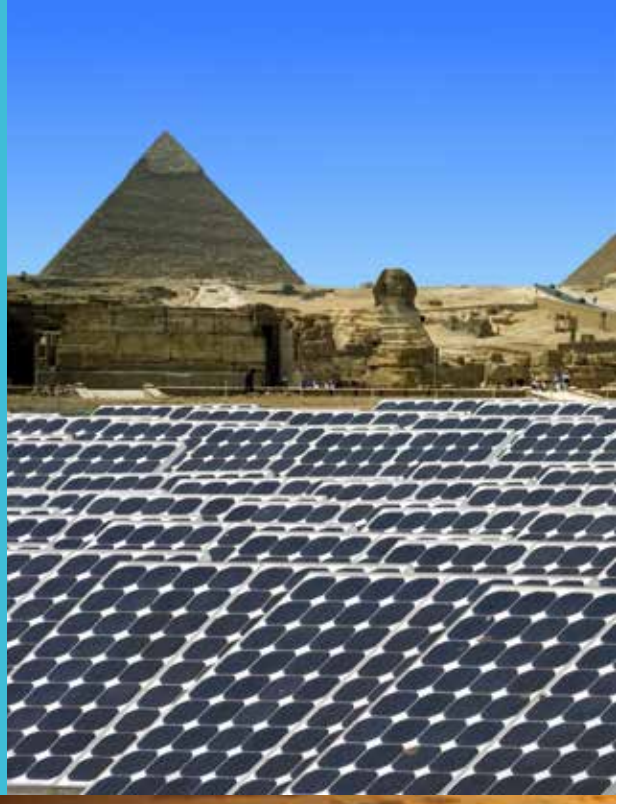
These steps have included the enactment of Law No. 203/2014 for the Production of Electricity from Renewable Energy Resources. The law aims at encouraging the private sector to produce electricity from renewable energy sources by adopting several schemes for the private development of renewable energy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

In 2015, Egypt witnessed a substantial reform in its electricity legal framework by issuing the Electricity Law No. 87 of 2015 (Electricity Law).

The Electricity Law replaced the previous single buyer model and established 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

[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] https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2018/Oct/IRENA_Outlook_Egypt_2018_En.pdf, Page 4.
[3] 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 83.



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) pay a regulated tariff and purchase electricity from the distribution companies who are 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.

Electricity subsidies reform

In its moves towards a free competitive market, in 2014 the Egyptian government started a scheme to gradually liberalise electricity prices and achieve the full removal of electricity subsidies by 2022.

To implement this gradual liberalisation, the Minister of Electricity issued an annual ministerial decree setting the new electricity tariffs applicable for that year. The latest one was issued on 21 May 2019 by virtue of decree No. 111 of 2019 determining the new electricity tariffs for the year 2019/2020.

2. Recent developments in the renewable sector

Net metering

EgyptERA's efforts to encourage the exchange and usage of electricity generated from solar energy have included issuing in 2013, a set of rules regulating the net metering system in Egypt. These regulatory rules were subject to several amendments to improve the system and encourage the investors to produce electricity from solar energy using the net metering system.

The current net metering system now applies to solar photovoltaic plants with a capacity of up to 20MW rather than 500kW. It also allows customers to cover all or part of their needs from electricity provided by their own solar plant or one owned by a third party qualified by NREA to establish PV plants and contracted with the customer through a power purchase agreement to sell the electricity generated from the solar plant.[4]

The main advantage of the net metering system is that it allows the customer to feed any surplus power generated from the solar plant into the national grid, with the option of claiming it back in the following months when needed. The settlement is made on a monthly basis through net metering devices installed by the distribution company to the customer at its own cost.

If there is an electricity surplus at the end of the fiscal year, it is bought by EETC or the distribution company at a price equivalent to the average cost of the generated electric power according to an EgyptERA report on the cost of service. The price will be updated annually for existing and new solar projects.[5]

Waste-to-energy

The Egyptian government is committed to the safe disposal of waste, and in 2015 it started producing energy from waste recycling.

In 2018, the cabinet approved a unified waste-to-energy feed-in tariff of EGP 1.40/kWh 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.

The announced waste-to-energy tariff should be borne and distributed between several governmental entities, and the biggest percentage of the tariff will be borne by the electricity sector.

In April 2019, EgyptERA finally approved a rate of EGP 1.03/kWh as the percentage of the waste-to-energy tariff that will be borne by the electricity companies.

Egypt has a Waste Management Regulatory Authority (WMRA), established in 2015 by virtue of the Prime Ministerial Decree No. 3005 of 2015, affiliated to the Minister of Environment. WMRA is mainly responsible for regulating, supervising and controlling all matters relating to waste management and determining the roles and responsibilities of all stakeholders in the waste management system.

It is also responsible for attracting investments in waste collection, transmission and management, and the safe disposal of waste. WMRA works on promoting relationships between Egypt and other countries and international organisations in relation to the waste management.[6]

The Egyptian government is keen to support the private sector's participation in environmental projects and to benefit from the high technology that follows from private sector involvement. These environmental projects include the conversion of municipal solid waste into electricity.

3. Forthcoming development in the renewable sector

Benban Solar Park

Benban Solar Park is one of Egypt's most ambitious feed-in tariff projects. It was established on a total area of 37 km^2 in Aswan Governorate, aiming to produce 1,800MW through solar energy. Its total capacity was reduced to 1,715MW after the construction of the internal roads and the ring roads, and the allocation of an area within Benban site for the facility management company to carry out the facility management works for the benefit of all the developers.

The Benban project falls under the feed-in tariff program (FIT Program) announced by the Egyptian government in 2014 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 1 for solar projects with a capacity of more than 20MW and up to 50MW is USD 14.34 cents/kWh; it was reduced to USD 8.40 cents/kWh in Round 2.

Benban Solar Park is expected to be officially inaugurated before the end of 2019. This will see 32 developers with total capacity of 1,465MW – under Round 1 and Round 2 – start producing their full capacity of electricity generated from solar energy. The remaining 250MW has not yet been allocated to a developer.

When it becomes operational, Benban will be the biggest solar photovoltaic park in the world. In March 2019, it was awarded the annual best project award by the World Bank Group – the first time Egypt has won this award.

The project is developed by private investors and financed mainly by the International Finance Cooperation (IFC) and the European Bank for Reconstruction and Development (EBRD).

The development of the Benban site is ongoing. Presidential decree No. 230 of 2019, issued in May 2019, allocated a total area of 15 feddans to NREA to be used in the establishment of a solar photovoltaic plant.

[4] EgyptERA Circular No. 3 of 2018 issued on 16 August 2018.
[5] EgyptERA Circular No. 3 of 2017 issued on 6 September 2017.
[6] For more information, please visit the following website: http://www.wmra.gov.eg/en-us/Pages/default.aspx

France

Authors: Christophe Barthélemy, Céline Cloché-Dubois and Aurore-Emmanuelle Rubio (October 2018)

1. Brief overview of the renewables sector

Key statistics

In the fourth quarter of 2017, the production of primary power was 28.2mt (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.

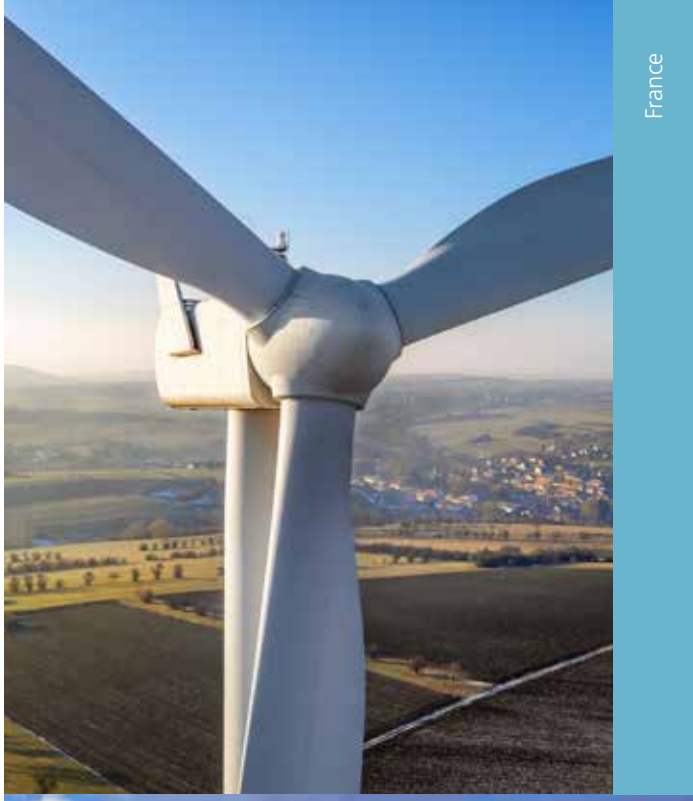
The Law of 17 August 2015, and its implementing decrees, deeply reformed this support system, turning it into a mechanism of contracts for difference, in accordance with the new Guidelines.

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

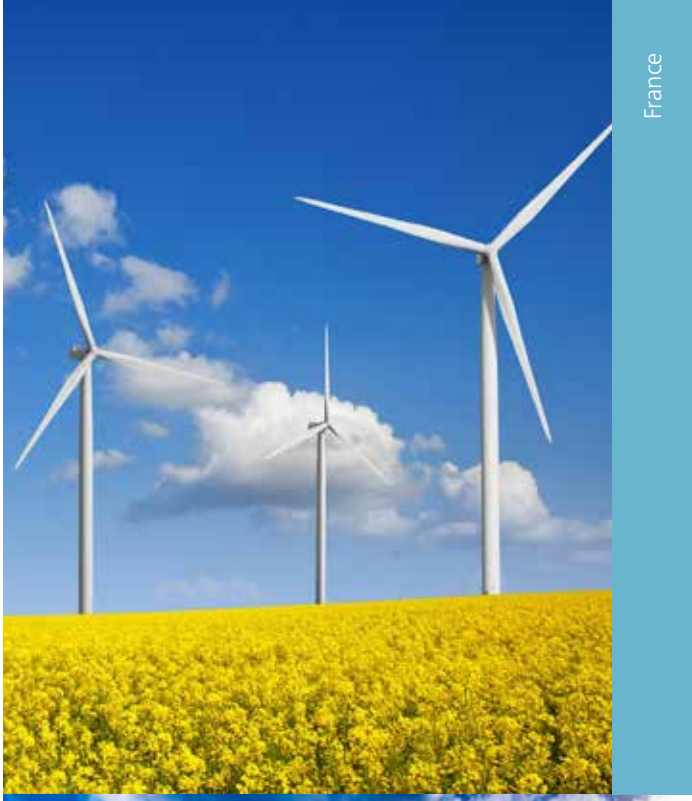
first cap set by installation shall be superseded by a second yearly and overall cap of EUR 70m. The tariff ("TURPE") pays the balance. This rule applies only in cases the cause of delay (or limitation) of the production is imputable, at least in part, to the TSO.

- 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.



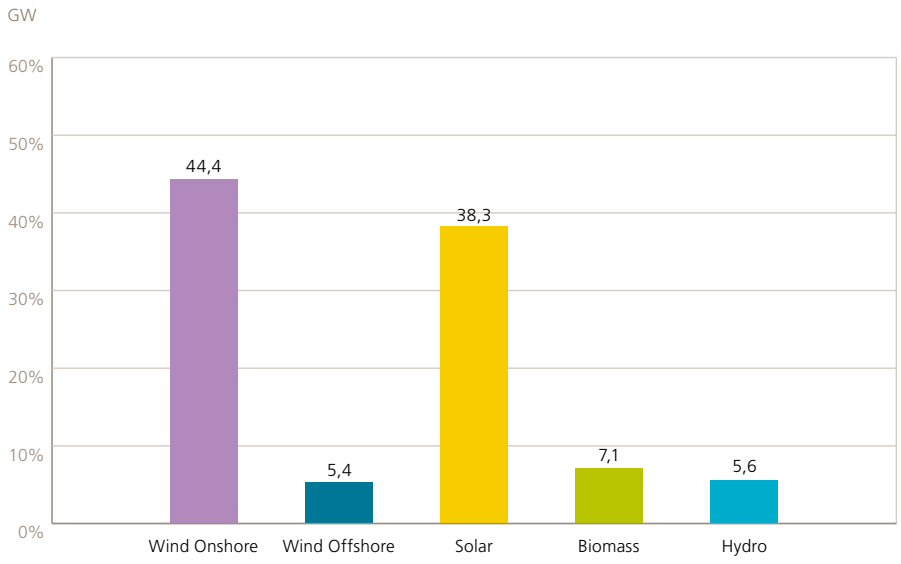
Germany

Author: Dorothée 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, in 2018 16.6% of Germany's gross final energy consumption and 37.8% of Germany's gross electricity consumption was generated by renewable energy sources. Germany aims to increase the percentage of gross electricity consumption from renewable energy sources to 40% – 45% by 2025 and to 80% by 2050.

Split of installed capacity for renewables-based electricity generation in Germany in 2018:



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

With an installed capacity of roughly 59GW, Germany is one of the world's largest markets for wind energy. The renewable industry in Germany is no longer a market for pioneers. Since 2000, a total of more than EUR 250bn 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 with predetermined capacity volumes being auctioned in each tender. For offshore wind the feed-in tariff-based support system still applies for all wind turbines commissioned prior to 1 January 2021. 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). In addition, the system grants more control over the increase in installed capacity, as tender volumes are based on growth targets. The results of the first tenders in 2017 demonstrated that the renewables industry seems to be willing and able to accept lower support – or, in the case of some offshore wind projects, no support at all.

The price for offshore wind energy dropped to an average of 0.44 Cent/kWh in the first offshore tender in 2017. Four projects were awarded, all in the North Sea. Three of these are Europe's first offshore projects without any subsidy. The 2018 tender still included a bid with zero subsidy. At the same time, the highest successful bid was awarded with a subsidy of 9.83 Cent/kWh. There was no tender in 2019, as the planned growth of offshore capacity will be reached by the 2017 and 2018 tenders. Before the tender system was introduced, offshore wind capacity had been growing especially fast in recent years. A key reason for this growth is the multiple increases in the statutory offshore tariff between 2009 and 2014 – from 9.1 Cent/kWh up to 19.4 Cent/kWh in 2017.

However, the first tender rounds also showed flaws in the system, especially for onshore wind. While the support dropped significantly in the first 12–18 months of the tender system, it has since started to increase again. In addition, the last five tender rounds for onshore wind were undersubscribed and installed capacity for onshore wind dropped from 5,009MW in 2017 to 2.273MW in 2018.

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

	Wind onshore		**Wind offshore**		**Solar**	
Tender result in Ct/kWh (Weighted average)	November 2017 **3.82**	September 2019 **6.2**	April 2017 **0.44**	April 2018 **4.66**	February 2018 **4.33**	June 2019 **5.47**

The tenders are organised by the Federal Network Agency which publishes tender dates, volumes and maximum prices in advance and tender results afterwards. Bidders must provide security and implement the winning projects within a predefined period or pay a penalty. Tenders are performed between once and four times a year, depending on the technology. For onshore wind and solar, in December 2018 the legislator introduced additional tender rounds and capacities for the years 2019 to 2021 to counteract reduced growth in installed capacity and to ensure political targets can be met.

More than 95% of the projects awarded in the first two onshore wind tenders were won by so-called citizens' cooperatives. These organisations – with projects with a maximum of six wind turbines and 18MW – only needed to have secured the area of installation, but were 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 further 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 citizens' cooperatives to take part in onshore wind tenders up to June 2020.

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, and it may require further adjustments given that the recent rounds for onshore wind featured bids for significantly less capacity than the volume available in the respective round. At the same time the system provides a stable regulatory framework for further investments.

The offshore zero-subsidy bids in 2017 did not seem to be a one-off occurrence. However, 2018 saw a significantly higher weighted average subsidy for offshore wind – which could be partially due to specific rules for that tender ensuring a certain capacity would be awarded to projects in the Baltic Sea.

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: Dr. Peter Simon and Peter Deak

1. Brief overview of the renewables sector

Electricity generation from renewable sources is a developing sector in Hungary. According to the preliminary data, in 2018 the share of renewables in final electricity consumption was 8.5%, 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 energy consumption from renewable sources by 2020 compared to the 13% share expected by the EU. This indicator was 13.3% in 2017.

Until 2015–2016, biomass was 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 a mandatory offtake regime for electricity produced from RES, some generators had already 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. From 2017–2018, the increase in electricity produced from RES has mainly come from the growth of the installed capacity of solar panels.

There are few waste-to-energy plants 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. Recently, there have been calls for EU-funded projects for the development of district heating systems in rural towns. Waste-to-energy is one of several options, but there has been no news to date on the outcome of these projects.

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 these reserves are typically used for heating purposes rather than electricity generation. Nevertheless, according to preliminary data for 2018, 12GWh of electricity has been produced from geothermal sources. This might not seem a great amount, but it is a significant increase given that the same data showed 0GWh in 2016. As Hungary has excellent geological conditions for the efficient exploration of geothermal sources (e.g. appropriate temperature of geothermal heat, and heat resources are relatively close to the surface), the exploitation of geothermal sources will continue to develop.

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. Some larger-scale PV plants (stand-alone or as part of an industrial project) are already in operation with a total national installed capacity of 680MW. According to the current government plans, capacity will increase to 4,000MW by 2030. The number of household-size PV plants that do not require a licence has also been increasing steeply – their total installed capacity was 240MW at the end of 2017, amounting to over 99% of the household power plants. As it is apparent from the above, solar power is the leading source for household renewable electricity production.

Hungary's renewables offtake regime was substantially amended at the end of 2016 and is currently in a transitional period. There are still some projects under the old regime which can be developed an operated, however, the market focus is now definitely on the new regime (the METÁR system). Under the METÁR system, the electricity generated from renewable sources is taken over from the generator in one of three ways:

1) at a pre-determined, mandatory feed-in tariff by the TSO (for smaller power generation units).
2) a premium subsidy can be awarded by the Hungarian Energy and Public Utility Regulatory Authority (HEPURA).
3) a premium subsidy is granted by way of a tender procedure called for by the HEPURA.

Following its introduction, several changes were made to the METÁR system. Since 26 April 2018, there has been no entitlement for a mandatory feed-in tariff to be granted and, after 1 May 2019, no premium subsidy may be awarded by the HEPURA without a tender. The market waited for a long time, for the first pilot tender procedure which has been called for granting premium subsidies at the beginning of September 2019. In the framework of the tender participants can apply for subsidies in the following categories:

- power plants between 0.3MW and 1MW capacity (a total of HUF 333m to be distributed).
- power plants between 1MW and 20MW capacity (a total of HUF 667m to be distributed).

Bids and applications are to be submitted between 4 November 2019 and 2 December 2019, and results will be announced in early 2020. It is expected that after the first pilot tender HEPURA will launch tenders in each of the following years.

The mandatory feed-in tariff or the premium subsidy is granted for a period, determined by the HEPURA, that guarantees a return on investment, with a maximum duration of 25 years. For solar power plants the length of the offtake period under the METÁR system is a maximum of 14 years and four months.

2. Recent developments in the renewables sector

New offtake regime

The most important recent change in the renewables sector was the introduction of METÁR, the new offtake regime. It has applied to the generation of electricity from renewable sources since 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.

The mandatory feed-in tariffs are applicable to production units that do not exceed 0.5MW in capacity. The tariffs are determined by legislation and are 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 by the HEPURA and pay the mandatory feed-in tariff to the producer. However, no entitlement for a mandatory feed-in tariff may be granted after 26 April 2018.

Premium subsidies for production units between 0.5–1MW of capacity can be applied for from the HEPURA. However, no premium subsidy may be awarded by the HEPURA without a tender after 1 May 2019. Premium subsidies for production units above 1MW capacity are granted through a tender procedure called for by the HEPURA on the instruction of the Ministry of National Development. Legislation sets a maximum level for the aggregate amount of premium subsidies 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 licences before 31 December 2016 are entitled to remain in the previous (very favourable) mandatory offtake system. This resulted in an enormous number of applications for solar power plant licences up to an aggregate amount of 2,000MW 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

At the end of 2016, close government control of potential future wind park projects was introduced and the development of these projects is now also hindered by restrictive construction provisions. The current regulatory environment effectively makes it close to impossible to obtain new wind park licences, and there is a question as to whether Hungary strategically will designate any specific role to wind in the energy mix in the next 10 years.

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.

Although Hungary has very favourable geological conditions, there are relatively few geothermal projects, 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. Recently, promising attempts for the application of new geothermal technologies have appeared on the market, therefore it seems that it is worth paying special attention to future developments in this source of energy.

The introduction of the METÁR system 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 and the development of PV projects under the old regime is expected to be continued to the end of 2022 at the latest.

Italy

Authors: Pietro Cavasola and Matteo Ciminelli

1. Brief overview of the renewables sector

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 increase 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 yet in 2016 and, according to the latest available data, the gross final energy consumption from RES is currently around 18,5%.

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:

- ARERA *("Autorità di Regolazione per Energia, Reti e Ambiente"),* formerly AEEG – 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 Servizi Energetici")* – the state-owned company that promotes RES and fosters sustainable development by providing support for renewable electricity generation and by taking actions to build awareness of environmentally efficient energy uses.

- Terna, which manages the Italian transmission grid, is responsible for high-voltage electricity transmission and distribution throughout Italy.

The administrative procedures supporting the development of renewable sources 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 last scheme has been implemented by Decree of the Italian Ministry of Economic Development dated 4 July 2019 and published in the Official Gazette of the Italian Republic on 9 August 2019 (the "FER 1 Decree" or the "Decree"). The Decree – which has come into force 7 years after the Ministerial Decree of 5 July 2012 regulating incentives for PV projects and 3 years after the Ministerial Decree of 23 June 2016 regulating incentives for RES projects other than solar – provides for a specific incentive scheme for energy produced through renewable sources for the 3-year period 2019–2021 and appears to be in line with the mentioned 2016 decree, confirming several provisions therein included.

In particular, the new Decree focuses on the following energy sources:

- Onshore wind;
- Photovoltaic;
- Hydroelectric;
- Plants fuelled by landfill and gas residues from purification processes.

The FER 1 Decree reintroduces the overall average annual cost for incentives, equal to EUR 5.8bn applicable to all renewable energy sources regulated under the Decree (that is the same threshold set by the 2016 decree which, however, did not include PV projects). Once this annual threshold is reached, no further incentives will be granted according to the Decree.

Registers and Auctions

According to the FER 1 Decree, RES projects may have access to incentives through registration with specific registers managed by the GSE or, depending on the size of the project, through auctions organised and managed by the GSE.

The Decree reduces the power threshold allowing access to incentives through registration to whose projects power capacity is less than 1MW (under the 2016 decree, the threshold was set at 5MW). Therefore, new plants with a capacity below 1MW will access via registers, while plants with power capacity equal to or in excess of that threshold will have access through auctions. Moreover, the FER 1 Decree eliminates direct access for small plants, discouraging very small investments.

The new incentives for photovoltaic plants shall apply *inter alia* provided that the relevant PV plant meets the following conditions:

- is new and built with new components;
- is not ground-mounted on agricultural land.

The Decree sets out seven rounds of register and auction procedures according to the following schedule:

Round No.	**Notice opening**
1)	30 September 2019
2)	31 January 2020
3)	31 May 2020
4)	30 September 2020
5)	31 January 2021
6)	31 May 2021
7)	30 September 2021

For wind and photovoltaic plants, the maximum power capacity which may be incentivised under the Decree, is equal to i) 770MW for access via registers; and ii) 5,500MW for access via auctions.

Specific provisions deal with the requirements and deadlines for the submission of the applications and with the priority criteria for the successful inclusion in the relevant rankings.

According to the Decree, incentive periods shall last for 20 years for all renewable sources except for hydroelectric plants, whose incentive periods may last 25–30 years, depending on the characteristics of the plant.

3. Forthcoming developments/opportunities in the renewables sector

The new Decree provides that within 180 days from the date of its entry into force, the GME *("Gestore dei Mercati Energetici"),* the company established by the GSE and vested with the economic management of the Italian Electricity Market, shall launch a public consultation for the creation of a market platform – alternative to the incentive scheme provided under the Decree – for the long-term trading of energy from renewable sources. Specific requirements shall apply to those operators willing to participate to such platform.

The FER 1 Decree is expected to attract new investments and create new opportunities for national and international operators in the renewables sector. Moreover, a new decree is likely to be implemented dealing with new incentives for energy produced by renewable sources not regulated by the FER 1 Decree (biomass or geothermal sources, etc.), which is expected to make the Italian market even more attractive for RES operators.

Luxembourg

Authors: Juilien Leclère and Jérôme Guillot

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) 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) – establishes a system of certificates guaranteeing the 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's 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 objective of achieving a reduction of 80% to 95% of greenhouse gas emissions by 2050, and discussions around 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 meet 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, Luiz Fernandez and José Antonio Tellez

1. Brief overview of the renewables sector

The 2013 energy reforms led to an increase in installed capacity of electricity produced by clean energy sources, resulting in greater domestic and foreign investment in Mexico's renewable energy sector.

The Presidential elections in 2018, and the inevitable political transition period, caused some uncertainty in the energy sector. Strengthening the Energy Regulatory Commission (CRE) has emerged as a priority of the new administration.

2. Recent developments in the renewables sector

Long term auctions cancellation

On 31 January 2019, the National Centre for Energy Control (CENACE) and the Energy Ministry issued orders for the cancellation of the fourth long-term auction. This auction was previously suspended on 3 December 2018 because, according to a statement issued by the authorities, the objectives and purposes of the long-term auction needed to be reviewed. Following the declarations made by the Energy Ministry and CENACE, it is uncertain whether auctions will be held in the coming years.

As a result various stakeholders – including participants in the wholesale electricity market, opposition political parties and investors – have expressed their disagreement with the decision taken by the authorities, as the long-term auctions enabled the development of new projects with financing schemes that were attractive to the banking industry, among other benefits for the electricity industry.

Clearing house cancellation

Even though there has been no official communication, it is rumoured that CENACE has unofficially notified the third auction portfolio generators of its intention to eliminate the clearinghouse system due to a lack of economic feasibility. This unfeasibility arose from the cancellation of the fourth and subsequent auctions, given that the clearinghouse made sense from an economic point of view only if it was used to operate various portfolios and not just one.

It also appears that CENACE has been negotiating with generators regarding the implementation of an alternative mechanism to substitute for the clearinghouse, although there has been limited information released so far.

Launching of private auctions
As a result of the minor turbulence in the industry following the cancellation of the long-term auctions, private parties are currently seeking mechanisms for energy and associated products to be sold and bought between private participants. In June 2019, Bravos Energía, along with Aklara, teamed up to reveal their new project: a private energy auction.

Bravos Energía has stated that this auction scheme is not intended as a substitute for the CENACE long-term auctions, as it is focused on different seller/buyer segments and includes energy balance as an additional product. National media platforms such as El Financiero and El Universal have revealed that this mechanism is not welcomed by the government, and that if this mechanism achieves its objectives, CFE will be left with no liquid resources and therefore face a bankruptcy risk. Notwithstanding, there have been no official communications by the Energy Ministry or other authorities.

This private auction has the following main objectives:
(i) promote investment for clean energy generation
(ii) promote electricity supply at the lowest possible cost
(iii) encourage the development of physical resources and additional finance mechanisms that add flexibility and liquidity to the National Electricity System.

The results for this private auction are expected to be announced at the end of this year, with an estimated commercial operation date of January 2022.

Amendment of the terms of strict legal separation of the Federal Electricity Commission
On 25 March 2019, the Energy Ministry published an amendment (TESL Amendment) to the terms of strict legal separation of the Federal Electricity Commission (CFE).

One of the fundamental elements established by the 2013 constitutional reforms was the unbundling of the CFE. The unbundling was implemented through the Terms for the Strict Legal Separation of the CFE (TESL CFE). The TESL CFE organised generation assets into six different CFE generation companies (GenCos). To reduce CFE GenCos' market power at a nodal level, an allocation of assets was implemented in which assets were distributed regardless of their location.

The TESL Amendment states that the distribution caused operational inefficiencies and losses at the GenCos, and proposes a reorganisation of the generation assets. In addition, the change in language opens the door for a potential bundling of the CFE GenCos (although this is not as clear as the intention to reorganise the generation assets).

CFE has 60 days from the publication of the TESL Amendment to submit its reorganisation proposal to the Energy Ministry. Once approved by the Energy Ministry, the proposal must be published in the Official Gazette to become effective. At the time of writing, no reorganisation proposal has been published.

3. Forthcoming developments/opportunities in the renewables sector

Launch of additional private auctions
In addition to the private auction launched by Bravos Energía and Aklara, there has been news within the industry that other private parties are preparing for additional private auctions. It is expected that these auctions will offer different schemes to generators and provide further liquidity to the market.

Acknowledgement of storage ancillary services
The CRE is in the process of preparing general administrative provisions regarding energy storage. The current draft regulation is not aimed at setting rules for a particular storage technology; rather, its main objective is to clarify the kind of ancillary services that will be recognised for storage services in the market. Storage is intended to:

(i) allow the deferral of time for consumption of electricity
(ii) diminish momentary cuts
(iii) reduce voltage variations, amongst multiple other benefits.

These provisions will not be subject to a public consultation procedure – they will be published in the Official Gazette once discussed and approved by the CRE commissioners.

Morocco

Authors: Marc Veuillot and Alix Fredet (October 2018)

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 3,000km 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 3,000MW 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 2,000MW 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 850MW 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 and Maurits Rabbie

Introduction

Since 2017, the Netherlands has taken many steps towards realising the objectives set out in the 2015 Paris Climate Change Conference. In October 2017, the Dutch government presented an ambitious energy policy that aims to result in a 49% reduction in greenhouse gas emissions by 2030 (compared to 1990) and a 95–100% reduction by 2050. On 1 September 2019, the Dutch Climate Act entered into force, making the Netherlands the seventh country in the world with a Climate Act. In addition, in June 2019 a proposal for a Dutch Climate Agreement was presented which sets out in detail how the Netherlands plans to achieve its CO_2 emission reduction objectives. The Climate Agreement was prepared by over a hundred organisations, companies and governmental authorities and provides for governmental measures in five different areas: electricity; mobility; agriculture and land use; industry; and built environment. One of the measures is a legislative proposal introducing a minimum price on CO_2 which is aimed to take effect as of 1 January 2020.

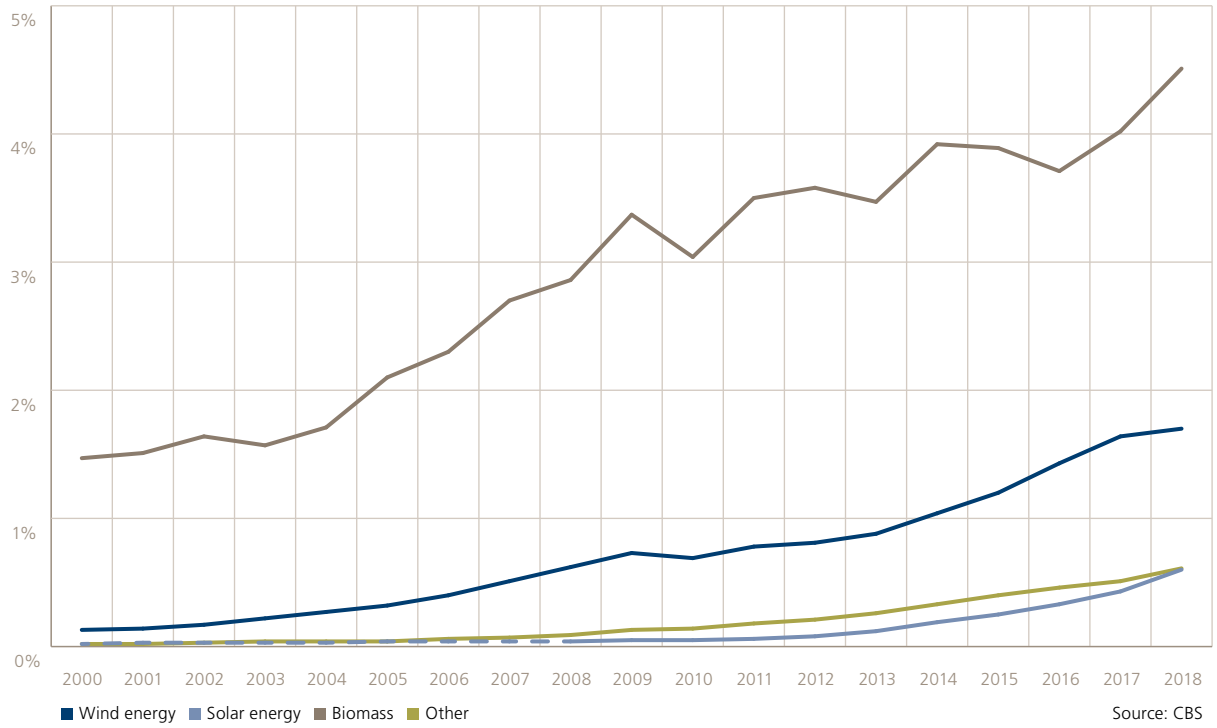
At the same time, the Netherlands has taken big steps to phase out fossil fuels. A bill prohibiting the use of coal for the production of electricity has been adopted by the House of Representatives. If adopted by the Senate, the first coal-fired power plant is to close on 1 January 2020 and the remaining four coal-fired power plants will follow in the years up to 2030. The Dutch government also announced in March 2018 that gas extraction from the Groningen field – the largest gas field in Europe – will come to an end by 2030 at the latest. The Dutch government envisages phasing out natural gas for households and has implemented legislation that means, as of 1 July 2018, the TSO is no longer obliged to connect new-built houses to the gas grid. The Dutch government forecasts that 75% of the new-built houses by 2021 will not be connected to the gas grid, and that by 2050 households in the Netherlands will no longer use natural gas.

1. Brief overview of the renewables sector

Key statistics

In 2018, the share of renewable energy amounted to 7.4% – 158 PJ – of the total Dutch energy consumption (see the figure below). Even though the Netherlands is lagging behind other European countries and is falling short of its targets, the development of renewable energy projects has shown an enormous increase in recent years. Although it is unlikely that the ambitious target for 2020 (14% renewable energy in the energy mix) will be met – the target for 2023 (16% renewables in the energy mix) is very feasible.[1]

[1] Short-Term Estimate for Emissions and Energy in 2020



A complicating factor is the current grid capacity shortage in nine out of twelve Dutch provinces. This shortage is putting the wind and solar energy sector at risk, since projects that have already been awarded subsidies are waiting to be connected to the grid. In order to solve this problem, the Dutch government came up with a series of solutions including developing strategies for congestion management, legislative changes, and amending the subsidy application procedure, taking into account the regional grid situation.

Biomass is currently by far the largest source of renewable energy in the Netherlands, with a share of almost 61%. The share of wind and solar is still relatively small, but this is changing rapidly. In 2018, solar PV increased by 40% to 13 PJ. Wind production rose by a mere 4% to 36 PJ, but multiple large new wind parks are already under construction. Based on current policy, it is expected that 50% of the 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 SDE+ (Stimulation of Sustainable Energy Production). At present the SDE+ subsidy is available for the generation of renewable electricity, gas and heat (or a combination of renewable heat and cogeneration) through the use of biomass, geothermal energy, hydropower, on- and offshore wind power, and solar energy. This subsidy scheme will, however, be replaced in 2020 by a new scheme: the Stimulation of Sustainable Energy Transition (SDE++). The goal of the SDE++ scheme is to reduce CO_2 and greenhouse gas emissions. As a consequence, technologies will no longer compete on the basis of amounts of renewable energy produced, but rather on the amounts of CO_2 and other greenhouse gases that have been avoided.

The SDE++ scheme will offer an operating premium feed-in tariff subsidy for renewable energy that aims to compensate the difference between the cost price of the technology and the market price of the avoided CO_2. The scope of the SDE++ scheme will be broader than the SDE+ scheme, as techniques such as carbon capture and storage (CCS) will also be eligible for subsidy.

The SDE++ will be financed in the same way as the current SDE+ system: through a levy on end consumer energy bills.

2. Recent developments in the renewables sector

The rise of solar PV

Although solar photovoltaic (PV) power plants currently represent a small portion of Dutch power generation, solar PV is becoming an increasingly important energy generation technology. In both 2017 and 2018, on average half of the SDE+ budget available was allocated to solar PV.

Over the past five years, the capacity of solar PV almost quadrupled. Today, projects with a capacity of 50MWp – 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, in a project which was granted an SDE+ subsidy of more than EUR 200m.

Storage of solar and wind energy
Even though storing energy is key to balancing the grid, the storage sector in the Netherlands has only recently started to develop. In recent years several energy storage pilots have been conducted.[2]

Storage is currently not regulated under Dutch legislation and therefore there are obstacles yet to be overcome. For example, unlike in some other EU member states, Dutch households that produce renewable energy with solar PV currently have little incentive to invest in home storage systems. One of the reasons for this is that the Netherlands offers consumers the possibility to set-off an energy surplus that is fed into the grid against the electricity purchased from their energy supplier.

For producers of wind and/or solar with a large-scale grid connection that are eligible for receiving SDE+ subsidy, storing electricity is currently also not beneficial as no SDE+ subsidy is granted for electricity first stored and subsequently delivered to the grid. In addition, double energy tax may be levied in the case of storage – both for the storage and the subsequent consumption of energy.

Subsidy free offshore wind
The current offshore wind tender scheme consists of five annual tenders of 700MW that will take place in the period 2018–2023. 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 have to amount to approximately 17GW (at present, the installed capacity amounts to almost 1GW).

SDE+ subsidy was made available for the first two offshore wind tenders. However, the third tender, held in autumn 2018 (for Hollandse Kust Zuid Sites I and II) and the fourth tender, which took place in spring 2019 (for Hollandse Kust Zuid Sites III and IV) were subsidy-free tenders. In both cases, the Dutch government awarded Vattenfall the permits to develop the world's first subsidy-free offshore wind parks.

The Offshore Wind Energy Act (OWEA) currently offers two tender procedures: a subsidised procedure with a wind permit and SDE+ subsidy awarded to the party offering the lowest tender amount; and a subsidy-free procedure with a wind permit awarded on the basis of a comparative test. Following the recent zero-subsidy bids, the Dutch government presented in November 2018 a legislative proposal for amending the OWEA. The bill introduces two additional subsidy-free tender methods: a combination of a comparative test and a financial bid; and an auction procedure.

3. Forthcoming developments/opportunities in the renewables sector

TenneT's Hub and Spoke concept
Dutch electricity operator TSO TenneT proposed in 2016 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. Offshore wind parks will be connected to a hub in the North Sea, from which the electricity generated will be transmitted to the North Sea countries with direct current cables, which will also serve as interconnections between the energy markets of these countries. Hydrogen may also be produced and stored at the North Sea hub. TenneT's thinking is based on an island with a modular structure, in the form of a platform, caisson island or sand island depending on the objective and desired characteristics of the specific hub.

In July 2019, this concept was further developed by the North Sea Wind Power Hub-consortium (consisting of TenneT, Gasunie, Havenbedrijf Rotterdam and Energinet.dk). After in-depth investigation, the consortium concluded that instead of having one large island, eight to ten smaller energy hubs (of 10–15GW each) would be more optimal for realising the 'hub-and-spoke' principle. The consortium envisages having the first energy hub operational as of 2030. Currently, the key complicating factor for the development of this concept is the approval of the various governments involved.

[2] The Global Energy Storage Database includes 25 Dutch grid-connected energy storage projects.

Power-to-gas pilot project
The European Commission granted a subsidy from the Connection Europe Facility for a pilot power-to-gas-project, initiated by Gasunie. This initiative, called 'Hystock', 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 the area of 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 the future the power-to-gas-installation could 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 Power to Ammonia, a feasibility study that represents a major step toward commercialising renewable ammonia. It examines the value chains and business cases for producing 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 feasible option and may offer a promising solution for the large-scale seasonal storage and import of renewable energy.

Oman

Author: Mary Allan

1. Brief overview of the renewables sector

Since the first economic oil discovery was made in 1962, the oil and gas sector in the Sultanate of Oman has been the driving force of its economy.

Since 2000, gas has been the primary fuel source for energy generation in Oman. However, in recent years the limited gas resources in Oman, coupled with the difficulties of transportation due to the remote locations of gas discoveries as well as the vast distances and land contouring, have caused the government to explore alternative fuel sources for generating electricity. This can be seen with the recent launch of several major renewable energy projects, the sultanate's monopoly power procurer, the Oman Power and Water Procurement Co (OPWP), expects solar energy, wind power, and waste energy projects to make up 30% of the country's energy mix by 2030.

This trend in Oman has coincided with the rapidly developing global shift towards renewable energy generation, with the Middle East region at the forefront of this energy diversification.

2. Recent developments in the renewables sector

The Omani government sees an important role for the private sector in order to achieve its *Vision 2020* goals towards sustainability and economic development. According to *Vision 2020*, Oman seeks to reduce its dependence on oil, as well as stressing an increased use of natural and renewable resources. It sets out an objective to privatise electricity, water, and other commodities alongside a target to produce 10% of the country's electricity requirements through renewable energy sources by 2020.

Oman currently aims to diversify the sultanate's energy resources. Leading this diversification is OPWP, which aims to meet ongoing demand for electricity by procuring 30% of Oman's power requirements through renewable energy projects by 2030.

According to the OPWP, the expected renewable energy mix by 2030 is for 21% to be generated using solar energy, 6.5% from wind power and 2.5% from waste energy. It is important to note, however, that gas-fired power plants will remain the largest source of energy, expecting to take up around 70% of the total energy mix.

In 2009, the Authority for Electricity Regulation of Oman (AER) also conducted a comprehensive study of the level of solar energy density in Oman. The results of the study demonstrated that the Sultanate of Oman has one of the highest levels of solar density in the world, which the government is now seeking to utilise in order to ensure that power can be generated in a more clean and efficient manner.

Recent projects

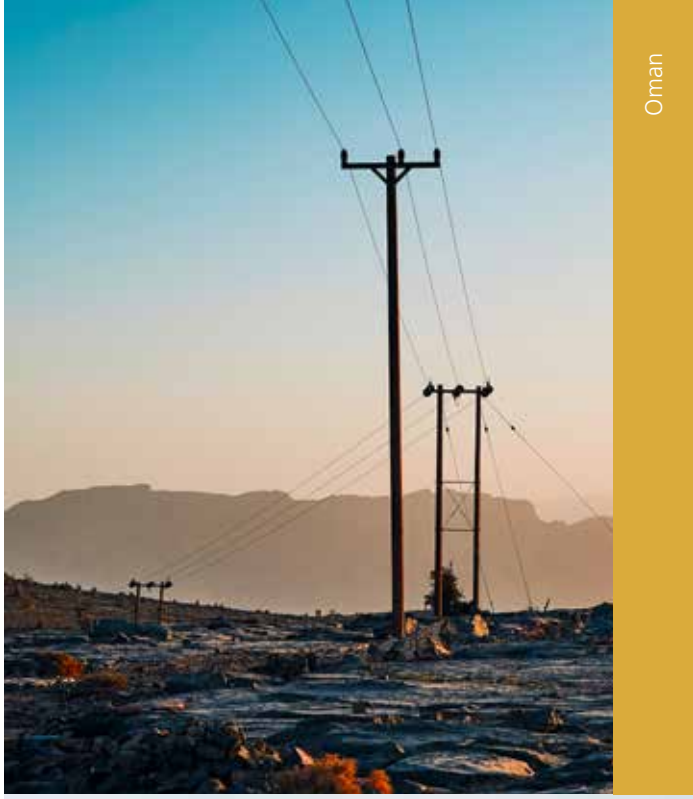
The renewables market in the sultanate is still very young with several projects currently in their procurement or construction phase, although there is a definite move towards expanding the renewables sector. The projects under way include a 500MW solar PV plant to be built in the Wilayat of Ibri by a consortium led by Saudi Arabia's ACWA Power which will power 30,000 homes by 2021.

The OPWP has recently also issued RFQs for two new solar IPPs – Manah I and Manah II – which will be located in Manah, southwest of Muscat, which will generate a combined 1.1GW of energy.

Having completed a feasibility study, the OPWP is also in the process of procuring a waste to energy IPP, which will have an electricity generation capacity of 125–160MW and would process 1.4m tonnes of municipal solid waste annually.

Petroleum Development Oman LLC (PDO) has procured a 100MW solar PV plant to be built by Japan's Marubeni which will supply electricity from May 2020 to PDO for the purposes of its operations in Amin, in the south of Oman.

A trend that is being seen elsewhere in the region is the use of captive solar PV in the construction, operation and maintenance of independent water projects (IWPs). This has already been seen in Oman during the procurement of the Sharqiyah IWP where the winning bidder, Japan's JGC Corporation, proposed the use of a captive solar PV plant to reduce the electricity consumption required from Oman's grid.



The AER has issued a licence for a first-of-its-kind solar pilot project in the sultanate. The 303kW solar power plant is located in the province of Al Mazyounah in the southern Dhofar Governorate. The pilot project allows assessments to made of the feasibility of commercial use alongside the challenges that may arise on similar projects. Another renewable project which is set to commence operations this year in Dhofar is Oman's first wind power project, the first large-scale wind farm in the GCC region which will generate a capacity of 50MW. Once fully commissioned, the wind farm is expected to generate enough electricity to supply 16,000 homes, equivalent to 7% of Dhofar Governorate's total power demand.

3. Forthcoming developments/opportunities in the renewables sector

Given that the renewables market in Oman is still in its infancy, it is notable that there is no specific renewable energy legislation which governs and regulates the renewables market. Therefore, the Electricity Sector Law promulgated by Sultani Decree 78/2004 remains the key piece of legislation governing energy generation in the sultanate. The AER has recently initiated the development of a regulatory framework for the use of renewable energy, which is expected to be drawn up by the end of this year.



Peru

Authors: Augusto Astorga and Carlos Hamann

1. Brief overview of the renewables sector

Peru's energy sector experienced significant development in the years following 2010 due to an increase in internal demand, produced by the country's economic growth. Unfortunately, growth has slowed in the past few years following the delay of some mining mega projects.

To satisfy internal demand and to reduce greenhouse gas emissions, a political commitment has been made in favour of promoting energy generation by means of natural renewable energy sources (RERs).

In line with OECD requirements and in accordance with commitments under the Paris Agreement, Peru has been gradually implementing policies that seek to achieve "clean" growth. A fundamental aspect of the country's energy strategy is the relationship between environmental requirements and regulations (focused on energy efficiency) and the development of renewable energy, in accordance with the National Energy Policy 2010–2040.

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

In order to achieve a diversified energy mix with a rising share of renewables, and due to the relatively high cost associated with these technologies, the Peruvian government has played a promoting role based on the organisation of RER auctions. The auctions are scheduled to be called every two or three years, giving bidders the opportunity to participate in development projects. In each auction, energy supply contracts are awarded to the bidders who have offered the best price for a 20-year period. 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 framework is that it secures the sale of RERs production at a pre-determined rate, which facilitates the financing of construction and operation. RERs also enjoy other privileges. For example, priority is given to the daily dispatch of freight, conducted by the Peruvian Committee for Economic Operation of the System (COES), because it is considered to have a variable production cost equal to zero.

It is expected that RERs will play an increasing role in the energy generation market. According to Osinergmin, the power market regulator, it is planned that by year 2040 RERs will account for 20% of energy production.

2. Recent developments in the renewables sector

The development of RERs has been achieved in line with the Auctions. The evolution of the Auctions since the first one in 2009 is shown in the table below.

In the fourth RER auction, two biomass projects, four wind turbine projects and 48 solar projects were presented. 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 4,547 hours, demonstrating the exceptional wind potential on the Peruvian coast.

The prices awarded on the fourth RER auction, especially for wind and solar facilities, have reflected the price drop of wind turbines and solar panels experienced in recent years. This situation encourages competition and benefits final users, because a decline in the costs faced by RERs translates into a decrease in their energy bills. The minimum unified prices of power and energy are lower than the 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 is that until April 2019, seven photovoltaic power plants were in operation, adding an installed capacity of 284MW. According to Osinergmin's Statistic Report (Energy Regulator), as of May 2019, Peru has awarded, through auctions, a total of 64 projects associated with RERs – in wind, hydro, solar and biomass technology.

Peruvian government RERs policies also have the aim of improving rural electrification in the country. By 2021, the Ministry of Energy and Mines aims to have 100% rural electrification, – a goal that will be achieved with the help of RERs.

Tendered requirements 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

Source: http://albertorios.eu/?p=2139

3. Forthcoming developments/opportunities in the renewables sector

Experts consider that the competitiveness of RERs is greater than that of hydroelectric power plants. As a result, wind and solar investments opportunities are currently being explored. In addition, in June 2019 hydroelectric power plants generated 2,836GWh of electricity, a value that was 28% higher than in June 2018. On the other hand, solar, wind, biomass energy accounted for 5% of the energy mix produced in the system, which means an increase of 14.9% compared to the 2018 period.

The evolution of technology and efficiency, and the appearance of new players in the local market, has led to a decrease in costs, managing to increase the competitiveness of renewable energies compared with other sources. However, a fifth auction has not been called, nor has it been scheduled due to market saturation.

Despite the interest of several players in the local market, the Peruvian government cancelled the 2018 auction, even though the Renewables Act of 2008 stipulates that at least one auction must be held every two years. The main reason to justify the suspension was the oversupply of power, given that the country's energy mix is currently able to supply twice the maximum power demand recorded so far, as there are an important number of natural gas fired power plants. The delay in the development of mega copper mining projects has lowered expected demand.

Additional mechanisms that generate greater investment and competitiveness in the renewable market are currently being evaluated in order to take advantage of the country's potential in the sector.

RER projects are also being developed for mining on a private basis. According to Osinergmin, almost 20% of the investment costs of a mining company have to do with the energy sources that they use for the development of their activity. Consequently, and as a mining country with a series of world class projects in development, Peru could tap into these global trends in the mining sector. Energy companies, industries and investors can take advantage of the synergies that may be achieved by using renewables in mining operations.

There is an attractive opportunity for the country to export its produced energy surplus to neighbouring countries, particularly Ecuador and Chile. The challenge is essentially to establish an adequate regulatory framework so that investors can focus on the development of new projects and, in this way, ensure that domestic demand is satisfied and that revenues can be generated based on the export of energy.



Poland

Author: Piotr Ciolkowski and Ada Szon

1. Brief overview of the renewables sector

The support of renewable energy sources (RES) in Poland has been stimulated by two major support mechanisms: certificates of origin and the auction system. 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 on the Polish Power Exchange and OTC. However, the green certificates system is being gradually phased out and replaced by a new auction system introduced by the Act on Renewable Energy Sources in 2016. Significant changes to this support scheme were made in July 2018 and in August 2019.

Support systems have underpinned an intensive development of the RES sector in the recent years. According to the data gathered by Eurostat, the share of renewable energy in gross final energy consumption amounted to 6.9% in 2005, increasing to 9.3% in 2010, and 11.8% in 2015. However, in 2016 and 2017 the share fell to 11.3% and 10.9% respectively.

The decreased share of renewable energy was not a good sign in light of Polish obligations under EU law. 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. The Polish government therefore decided to stimulate the RES market by strengthening the auction support system. As the auction system reinvigorates the RES market, a new wave of investments is expected.

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, 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. The sole criterion of the auctions is the price – 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 at the end of December 2016 and the second in June 2017. Both were mainly dedicated to installations below 1MW of installed capacity. The auctions announced by the President of the Energy Regulatory Authority in August 2017 were cancelled. However, introducing significant changes to the RES Act with respect to the auction system has breathed life into this subsidy scheme. Interest in the development of RES projects has significantly increased as, under the amended system, subsequent auctions took place in the 4th quarter of 2018. The next auctions are planned for the end of 2019.

Onshore wind

The sector has recently faced many challenges, both from technical issues (such as grid capacity) and from the regulatory perspective. In particular, the Act on wind turbine investments set a minimum distance between wind turbines and households or mixed purpose buildings of at least ten times the total height of the wind turbine. However, these requirements have been slightly mitigated by the legislator (longer interim periods have been introduced) and more changes are expected to relax these limitations in the future.

There was also a dispute concerning the real estate tax on wind turbines in 2017, when the companies were obliged to pay a higher real estate tax rate as a result of amendments to the law. These amendments caused divergences in interpretations resulting in many disputes against windfarm companies and individuals in Poland. These disputes were ended by the Supreme Administrative Court's ruling in 2018 that the real estate tax for 2017 based on the legislative amendments should be paid at a higher rate – 2% on all the elements constituting the wind-farm, both its construction parts and technical elements. Before the amendments, the real estate tax was paid only on the construction parts. Currently, the law has been changed again and the real estate tax is now paid as before – i.e. only on the construction parts.

However, following the auctions in 2018, the development of wind farm projects in Poland is much more appealing for potential investors, including foreign investors. Even so, there is a growing interest in the corporate PPAs (power purchase agreements) as an alternative way to secure financing for onshore projects.

3. Forthcoming developments/opportunities in the renewables sector

Offshore opportunity

Poland has significant industrial potential to develop offshore wind investments. The Ministry of Energy states that by 2025–2030 there will be room for 10GW wind farms close to the Polish coast. According to the draft Energy Policy for Poland until 2040, offshore wind farms will play a key role in achieving the RES targets set for Poland by the EU.

No offshore project has been constructed yet, but key energy companies are showing growing interest. The two most advanced investments developed by PGE (a state-owned company) and Polenergia (a private company) will target, respectively, 1,200MW and 1,045MW of capacity. Polenergia is the first company to have obtained an environmental decision for the development of offshore wind farm projects (the company has already obtained two environmental decisions). PKN Orlen (a state-owned company) is developing its own offshore project – it has already obtained the first decisions and has commenced environmental surveys on the Baltic Sea. Non-Polish companies – such as Equinor and EDPR – are also investing in offshore wind farms on the Baltic Sea.

The Ministry of Energy is currently working on an offshore-dedicated subsidy scheme; however, the details and implementation dates are not yet known.

Growing interest in PV

The photovoltaic (PV) sector is one of the fastest growing renewable energy sectors in Poland. The total installed capacity in PV power sources at the end of 2018 was about 500MW. In May 2019, the total installed capacity had already exceeded 700MW.

The draft Energy Policy for Poland until 2040 indicates photovoltaics as the installations that – next to the offshore projects – will play a key role in achieving the RES targets. So far, there have been three auctions in which solar projects with a capacity below 1MW have succeeded (in 2016, 2017, and 2018). In these three auctions, the total capacity of the winners' PV projects was 870MW.

Increased interest in the auctions and falling investment costs of 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 bigger solar projects – i.e. projects with a capacity above 1MW – or to combine PV with other RES technologies.

Expansion of waste incineration plants

Demand for effective waste incineration plants is creating opportunities for investors. In 2016 there were six incineration plants constructed in Poland – in Warsaw, Białystok, Bydgoszcz, Poznań, Konin, and Kraków. Since then, new incineration plants have been constructed in Szczecin and Rzeszów. In addition, several projects are still ongoing – in Warsaw and Gdańsk, as well as in Olsztyn.

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 regulations in this area. 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 includes a 0.75MW electric energy store, which constitutes a key element in the construction of a modern smart grid.

There are also other storage projects under development in Poland. In 2018, construction started on the largest energy storage facility in Poland with a capacity of 27 MWh near the wind farm Bystra. The construction of the hybrid battery energy storage is a critical project in the Polish energy sector. It is being developed by the Energa Group (Energa Wytwarzanie and Energa Operator), Polish transmission system operator Polskie Sieci Elektroenergetyczne, and Hitachi, as part of the joint project "Smart Grid Demonstration Project in Poland". The goal is to build a demonstration system for the protection of the electrical network, which will ultimately enable the appropriate management of a large number of wind farms.

Other Polish companies are also developing energy storage projects. PGE is currently working on several energy storage projects, including stores near the photovoltaic installation on Żar Mountain and near wind farm Karnice I.

Recent regulatory amendments to the RES support system

In August 2019, an amendment introduced some improvements to the RES support system, including:

- extending the deadline for selling the electricity generated by a RES installation for the first time.
- (for producers planning to participate in auctions in 2019 and 2020) a right to postpone the deadline for feeding electricity into the grid for the first time under existing grid connection agreements to 30 June 2021.
- a procedure allowing one-time modifications (updates) to the bid after winning the auction with respect to the planned date for selling electricity for the first time. This provision is subject to the European Commission's positive decision regarding state aid (standstill clause).

The amendment also specified the maximum volumes and values that can be sold in the auctions in 2019, both for new RES installations and existing ones.

Portugal

Authors: Monica Pacheco and 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 the first decade of the 21st Century it is estimated that renewable electricity contributed about 10% to energy dependency reduction. Nevertheless, the present decade has seen a tendency towards stagnation in the energy dependency index, and there is also a strong correlation between this index and the variability of the hydrological year.

In 2018, the share of renewable electricity in overall electricity production was 52.6%. The most representative sources of energy were hydropower (23.7%), followed by wind (22%), biofuels and waste (5.2%) and solar (1.5%).

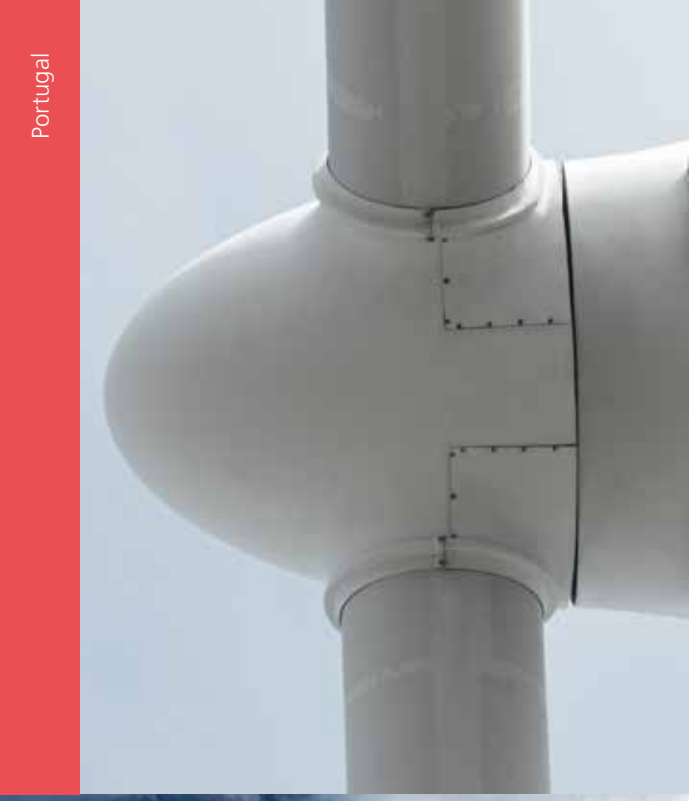
Power from renewable energy sources met about 55.1% of Portugal's electricity demand. The country produced 12.5TWh of wind power, enough to cover 24.3% of demand. Wind ranked as the main source of electricity in mainland Portugal for the first time, followed closely by hydropower with a share of 24.1%.

According to the Portuguese Association for Renewable Energy, in 2018, thanks to renewable power plants, the country saved EUR 1.27bn (USD 1.46bn) in fossil fuel imports and reduced CO_2 emissions from the power sector by 6m tonnes.

Wind and solar power have been the main drivers in the promotion of renewable energy sources and growing energy production in Portugal. In the future, solar's contribution will increase as the Portuguese government is aiming to reach about 9,000MW of installed solar energy capacity by 2027, from its current level of below 500MW. The government's new energy plan also includes the goals of covering 80% of the country's total power demand with clean energy by 2030, and electrifying 65% of its economy by 2050.

Implementation of the renewable energy policy is conducted primarily by the government and policy development rests with 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 has a binding national target for renewable energy to equal 31% of gross final consumption of energy by 2020.



Beyond 2020, the EU member states have agreed on a target of a 32% share of renewable energy in energy consumption in 2030. The target is binding for the European Union 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 for 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. 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, as a result 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, that incorporated the Renewables regime), which allowed anyone producing electricity from renewable sources to sell it on the open market. Recently, Decree-Law No. 76/2019, of 3 June, has introduced important amendments, as explained in section 2 below.

2. Recent developments in the renewables sector

Recent amendments to the renewable energy legal framework

The Portuguese legal framework applicable to the activities of the electricity sector has been amended significantly by Decree-Law No. 76/2019, of 3 June 2019, which entered into full force and effect on 4 June 2019 (DL 76/2019).

The most important amendment for renewables is the requirement of the granting of a prior network capacity reserve title before the generator can apply for a production licence to build a power plant. The network capacity reserve title is issued by the relevant network operator.

The issuance of network capacity reserve titles may occur through three procedures:

1) Standard procedure – request issuance of title.
   - Under the standard regime of issuance of titles, the applicant requests the title and, if there is network capacity, the network operator (of the distribution or transmission network) grants the capacity reserve title.
   - If there is more than one applicant for the same capacity, priority is given to the applicant that first presented the request.

- The applicant must submit a security deposit of EUR 10,000 per MVA of capacity reserve to be allocated, to ensure that it will carry out the procedure until the issuance of the production licence.
- According to the government's interpretation of the law, the title will expire automatically if a tender procedure is opened to the granting of capacity in the same grid area before a production licence was granted. In this case the security deposit is returned to the applicant.

2) Agreement procedure
   - Where there is an absence of network capacity, the applicant and the network operator may, following request of the former, enter into an agreement under which the applicant will finance the costs arising from the construction or reinforcement of the network required to receive the energy produced by the power generation plant.
   - Network capacity may be granted to the applicant, provided that applicant makes the relevant investments in the network.
   - The applicant must present a security deposit corresponding to the higher of (i) 5% of the costs incurred by the applicant for the investments in the grid, or (ii) EUR 10,000 per MVA of capacity reserve to be allocated.
   - The title issued in this regime is not subject to cancellation due to the opening of a tender procedure.

3) Tender procedure
   - The government may launch a tender procedure for the granting of network capacity reserve titles for one or more network areas.
   - Under this regime, the title is issued by the network operator following a competitive tender procedure for the allocation of reservation of reception capacity in the network.
   - The procedure may take the form of an electronic auction open to all interested parties who meet the defined requirements, and with defined criteria for selecting the awardee. Typically, the applicant offering the lower price or the higher contribution to the electricity system to each grid area will win the tender.
   - The procedure is opened by means of an announcement published in the Portuguese Official Gazette. The procedure documents published on the DGEG website and must contain, among other elements, the procedure modality, conditions and criteria for award, remuneration, and security.

The title of power reception capacity is non-transferable until the issuance of the operation licence, even though change of control of the applicant is not prevented in the standard and agreement procedures (in the tender procedure it will depend on the tender specifications).

The Decree-Law also foresees the possibility of having feed-in tariffs in the following cases:
(i) granting of network capacity through competitive tender procedures as mentioned above, depending on tender specifications.
(ii) power plants with installed capacity up to 1MW (up to the limit defined annually by the member of the government responsible for the energy area).
(iii) for overpowering situations or for production units using a different primary source to be installed in an existing energy project of new production units, depending on further legislation.
(iv) other regimes that may be foreseen in the law.

There are also former power plants still in operation and which still receive feed-in-tariffs (mostly wind).

DGEG is now the sole licensing entity for electricity generation undertakings. Licensing of the power plant and transmission line may be done simultaneously.

It is also possible to have hybrid electricity generation plants (two technologies injecting electricity alternatively into the grid up to the maximum licensed injection capacity) – subject to additional licensing if the second-generation technology to be developed is different to the one originally licensed. Further regulated will be introduced for these cases.

Under this new regime the government launched a first auction, in June 2019 – for 1,400 MW of electricity capacity injection rights (solar energy), divided into many grid areas – and has announced that in the coming years it intends to launch two auctions per year.

Extension of the application of the clawback regime to solar PV plants

Another recent and important change in the renewables sector was an amendment introduced by Decree-Law No. 104/2019 of 9 August to the so-called "clawback mechanism" (clawback) created by Decree-Law No. 74/2013, of 4 June.

Until the recent approval of the law changing the clawback mechanism, solar photovoltaic plants were not subject to clawback.

Under Decree-Law 104/2019, solar photovoltaic plants are now subject to the Clawback scheme and to its payment scheme. Three exceptions apply, for plants:

(i) with feed-in-tariffs; or
(ii) making contributions to the national electric system within the context of the competition procedures (auctions) foreseen in article 5-B of Decree-law No. 172/2006 as amended; or
(iii) with a capacity of less than 5MW.

This regime is aimed at eliminating windfall profits for Portuguese generators presumed to result from the increase in the market price of electricity caused by taxes then levied on power generators in Spain, which have no parallel in Portugal. In fact, due to the existence of a single wholesale electricity market in Portugal and Spain (the Iberian Electricity Market), which is a marginal pricing market, an increase in the price of power in Spain may cause a similar increase in the price of power in Portugal. These were the grounds on which the clawback scheme was built.

The clawback consists of a levy over power generators in Portugal, at an amount set by the Secretary of State of Energy, following a proposal by ERSE. It aims to offset the impact in prices of extramarket events occurring in Spain (notably the taxes in force in Spain). This levy is charged as an add-on to the tariff of Global Use of the System charged by REN, as Transmission System Operator, to generators subject to it.

This levy is currently set at EUR 4.75/MWh, but it is expected to be reviewed by ERSE soon, although it should always be set in a EUR/MWh figure.

According to Ministerial Order 282/2019, of 30 August (that revoked former Ministerial Order No. 288/2013, of 20 September as amended by Ministerial Order No. 225/2015, of 30 July) that implements the changes introduced by Decree-law 104/2019, the amount of the compensation should be set yearly, may be differentiated by technology, and may be set in a payment in advance to be made by power plants each year and subject to subsequent review if the impact of extramarket events is higher.

3. Forthcoming developments/opportunities in the renewables sector

New renewable energy projects

The auction of capacity launched by the Government in June 2019 has been considered to be a success. It was the largest licensing auction of any kind of energy launched in Portugal and represents more than double the current installed capacity of solar energy in the country. The auction allowed competitors to choose between selling electricity in the market – in which case they should offer a contribution to the electricity system (aimed at reducing the tariffs debt and system charges) – and the feed-in-tariff regime, where they should offer a given discount to the reference price (set at about EUR 45/MWh). The offer representing the most favourable net present value to the electricity system would win.

The auction attracted many competitors and the outcome produced historically low prices: an average price of electricity of EUR 20.9/MWh, with the lowest price (for a given grid area) of EUR 14.8/MWh (EUR 0.0148/USD 0.016 per kilowatt-hour) and the highest at EUR 39.7/MWh. Winning bids must commission solar projects within a maximum of 36 months.

It also known that there are several requests for network capacity reserve titles outside the tender regime. However, these requests may be subject to cancellation if a tender is opened for those grid areas.

This shows how the Portuguese solar PV market is attracting investors and developers and we believe that this will continue, as the government has announced its intention of launching two auctions next year.

The expansion of utility-scale solar projects is expected to radically change the Portuguese electricity system, together with the repowering and overpowering of wind farms. These changes will shift the load diagram of the system, causing more idle capacity of thermoelectric plants (and the probable decommissioning of coal-fired plants), and a decrease in electricity prices. They could also lead to a rethinking of aspects of the system, such as the need for capacity guarantee schemes and the market pricing regime.

This transformation may be even deeper if it is joined by a profusion of distributed and behind the meter solar energy projects, that is also expected.

Guarantees of origin
The former renewables regime – still applicable to the power plants licensed until 2012 (and receiving feed-in tariffs) – had foreseen the creation of green certificates to be in force at the end of guaranteed remuneration schemes. These certificates could be traded and would represent a way of delivering environmental and social benefits of energy production through renewable sources.

However, green certificates are not yet duly regulated or implemented in Portugal, and it is less and less likely that they will be.

A different scheme is now expected to be implemented, consisting of the issuance of guarantees of origin for the renewable energy generated. Guarantees of origin differ from green certificates in that suppliers are not required to acquire a minimum amount of them, and they are consequently not a support scheme.

Guarantees of origin aim solely to verify the source of electricity and to provide a means of that information being traded in a free market. One use of guarantees of origin are as a means for industries to prove to society that they are green – i.e. they satisfy their needs with renewable energy.

The issuance of guarantees of origin for renewables has been provided for in the Portuguese legislation for a long time but it has not been implemented yet, for several reasons. However, this year the Portuguese government has stated its intention to implement guarantees of origin regime and has commissioned the task of issuing the guarantees to the transmission system operator – a clear indication to the market that this regime will be put in place. Guarantees of origin may be a source of supplementary revenue to renewable energy generators.

The terms of emission and conditions of trade of guarantees of origin will be regulated in an autonomous legislation which, according to the information from the authorities, could be approved by the end of this year.

Overpowering of wind farms
Wind power is a substantial part of the Portuguese installed capacity of renewables.

In the near future, it is expected that only a few new wind farms will be commissioned. The expansion of wind capacity will come through:

(i) overpowering of wind farms – adding or replacing wind turbines resulting in an increase of installed capacity.
(ii) repowering of wind farms – replacing wind turbines without increasing installed capacity but increasing electricity generation through a higher load factor.

Currently, overpowering of wind farms is allowed if generators accept the electricity generated through the additional capacity is remunerated at EUR 45/MWh, with no increase for inflation. Repowering requires the obtaining of a new production license for the replacement wind turbines.



Romania

Author: Varinia Radu

1. Brief overview of the renewables sector

Obtaining energy from renewable sources has become a reality in Romania over the last ten years, prompted by the need to gradually replace energy sources from finite and pollutant raw materials. The emergence of renewables required government support at first, before guaranteeing a satisfactory profit for investors. In 2008, Law 220/2008 introduced a support scheme to promote electricity from renewable sources by providing renewable energy producers with an additional gain to supplement the energy they sold on the market. Through this mechanism, renewable energy producers – wind, solar, biomass and micro-hydropower plants – were certified by the National Energy Regulatory Authority (ANRE) and were entitled to receive monthly a number of green certificates (GC), issued according to the quantity of MWh of energy produced and delivered to the electricity network – either to suppliers or directly to final consumers. Suppliers and some energy producers are obliged to purchase GCs every year, with the number allocated by ANRE through specific procedures.

The support scheme, together with the opportunities and geographical advantages offered by Romania, has seen the renewable energy market of Romania experience an unexpected investment boom in the wind and solar energy sector. In 2011, Romania was the eleventh of the 40 countries listed in the Country Attractivity Index in renewable energy, drafted by E&Y. Under the support scheme, in 2013 Romania installed more than 1GW of photovoltaic parks, placing the country in a category that includes global players such as Italy, India, Greece and the UK. Small, medium and large sized photovoltaic solar parks were built.

The support scheme only applies to the renewable energy production capacities put into operation by the end of 2016, and it has an applicability of 15 years from the date of commissioning. Starting in 2017, no renewable energy production capacity has become operational in Romania (except for very small photovoltaic parks). Starting in 2013, the support scheme for renewable energy regulated by Law 220/2008 was subsequently amended and changed. The changes have reduced (temporarily or permanently) support for renewable energy sources (RES) power plants, and the direct or indirect measures sought to diminish the financial impact of the support scheme on the final consumers.

In 2018, 41.28% of Romanian electricity production was from RES, including hydropower.[1] Romania had an installed renewable electricity generating capacity of 4,878MW at the end of December 2018, including 1,358MW of solar energy and 2,959MW of wind energy, according to data provided by the system operator, Transelectrica.[2] In March 2019, wind energy represented 13.77% of the total energy delivered to the grid, solar energy contributed 1.7%, hydro energy 26.67% and biomass energy 0.17%.[3] At the end of 2018, there were 28 power plants using biomass, biogas and waste gas.[4]

Even before it has completed the first phase of collective efforts to decarbonise and diversify the energy mix, Romania is one of the countries that has reached its proposed 2020 target – reaching, according to public data, a share of approximately 27% of green energy in 2019, including generation capacities from hydropower.

2. Recent developments in the renewables sector

The Romanian Energy Strategy 2019–2030, which also projects forward to 2050, foresees an increase in the Romanian energy sector through: the construction of new generating capacities; the repowering and modernisation of energy production capacities, transport and distribution; and encourages the growth of domestic consumption under the energy efficiency targets.[5]

The strategic investment projects mentioned in the strategy document include: Groups 3 and 4 from Cernavoda NPP; the pumped storage hydro unit from Tarnita-Lapustesti; the 600MW Group from Rovinari; and the Tunu Magurele Nicopole Hydrotechnical Complex in partnership with Bulgaria.

To realise these projects, Romania will need investments in the energy sector worth EUR 15–30bn for the period 2018–2030, with a central estimate of around EUR 20bn.

Another important step is the publication, by the Ministry of Energy, of the Project of the Integrated National Plan in the field of Energy and Climate Change 2021-2030.[6] Its purpose is to implement, at the national level and in a way that adapts to Romania's specific energy mix, a strategic plan that integrates measures against climate change in line with the EU's accession to the Paris Agreement and the energy policies harmonised with the rules on energy union governance. The document stipulates an objective of achieving 27.9% of the global share of energy from renewable sources in the final gross energy consumption by 2030. However, in June 2019, the European Commission analysed Romania's proposal and recommended an objective of 34% of renewable energy by 2030.

Romania has yet to align itself with the EU's goals and with the specific legal provisions in force for the common energy market. Beyond the confirmed potential of the country for favourable green technologies locations, especially for wind and solar, investor appetite depends, among other political-economic considerations, on a stable, predictable, competitive legislative and regulatory framework, along with a proper taxation regime.

After several years of significant decline in investment, 2018 and 2019 have seen major legislative changes. Some of the changes aim to improve or to rectify practical situations related to functioning of the green certificates market; others aim to create new investment opportunities in the future – i.e. a more flexible and favourable framework for large project finance.

Law 184/2018 – passed on 23 July 2018 – approved the Government Emergency Ordinance No. 24/2017 (GEO 24/2017) amending and supplementing Law No. 220/2008 on the establishment of the promotion of the renewable energy production system. One of its notable provisions is the definition of "prosumer". Prosumer is a final customer who owns energy generating installations with a maximum installed power of 27kW, including cogeneration, and whose specific activity is not the production of electricity, but primarily consumption. The prosumer can store and sell electricity produced in its own building, including an apartment building, residential area and offices, provided that these activities are not their main object of activity or their professional activity.

[1] https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=5&cad=rja&uact=8&ved=2ahUKEwj2g_WA-7TkAhXFilwKHZeuAogQFjAEegQICBAC&url=https%3A%2F%2Fwww.anre.ro%2Fdownload.php%3Ff%3DhqmEhA%253D%253D%26t%3Dvdeyut7dlcecrLbbvbY%253D&usg=AOvVaw226U5hIIF8aodgTS5jKiS3

[2] https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&cad=rja&uact=8&ved=2ahUKEwintpy--rTkAhUGa8AKHQXfDcIQFjABegQIABAC&url=https%3A%2F%2Fwww.anre.ro%2Fdownload.php%3Ff%3DhqiDiQ%253D%253D%26t%3Dvdeyut7dlcecrLbbvbY%253D&usg=AOvVaw1uJneOdA7U3EKciLmH4bZi

[3] https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=4&cad=rja&uact=8&ved=2ahUKEwjhoIz__LTkAhXbQRUIHaw0DIEQFjADegQIARAC&url=https%3A%2F%2Fwww.anre.ro%2Fdownload.php%3Ff%3Dhq18iQ%253D%253D%26t%3Dvdeyut7dlcecrLbbvbY%253D&usg=AOvVaw1kyhHd_1Vb-FdavlWx3CGQ

[4] https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&cad=rja&uact=8&ved=2ahUKEwintpy--rTkAhUGa8AKHQXfDcIQFjABegQIABAC&url=https%3A%2F%2Fwww.anre.ro%2Fdownload.php%3Ff%3DhqiDiQ%253D%253D%26t%3Dvdeyut7dlcecrLbbvbY%253D&usg=AOvVaw1uJneOdA7U3EKciLmH4bZi

[5] http://energie.gov.ro/transparenta-decizionala/strategia-energetica-a-romaniei-2019-2030-cu-perspectiva-anului-2050/

[6] http://energie.gov.ro/wp-content/uploads/2019/02/NECP_EN_COM.pdf

Another important aspect of the law is a set of measures regarding the treatment and marketing of green certificates. This means that all green certificates (CVs) issued between 1 April 2017 and 31 December 2031, including deferred CVs from trading, are guaranteed if the final consumption does not fall below the average value established for the period 2017–2022.

Electricity producers and public authorities holding electricity production capacities of up to 3MW – that benefit from or have benefited from the support scheme and hold the CV – can conclude directly negotiated contracts only with the suppliers for the sale of electricity and/or CVs (by way of derogation from Art. 23 of the Electricity and Natural Gas Law).

From 1 April until 31 December 2020, producers with production capacity for solar energy accredited by ANRE up to 31 December 2013 will be temporarily suspended from trading two CVs for every 1MWh produced and delivered. The CVs can be recovered starting from 1 January 2021, in monthly instalments until 31 December 2030.

The quantity of electricity subject to the obligation to purchase the CVs includes electricity produced in Romania and sold by the suppliers to consumers or suppliers outside Romania, through bilateral electricity transactions, in the countries with which the Romanian government has signed bilateral agreements.

3. Forthcoming developments/opportunities in the renewables sector

Romania is working on a viable alternative to the green certificates support scheme and beyond. The Ministry of Energy, together with the National Energy Regulatory Authority, is developing a new scheme designed to support the production of clean energy in the form of a fixed price for the type of technology, which is added to the average price of electricity resulting from transactions on the centralised electricity markets. This could provide an alternative to the GC support scheme.

Overall, the Romanian energy production system needs massive investment in the coming years. In order to address the issues related to the extended use of the existing capacities, and to help in the transition to clean energy and a new mix including an increasing share of renewable energy sources, the Ministry of Energy has considered the introduction of a support scheme to support investments in new generation electricity capacities with low carbon emissions. A public debate on a document presenting this new support mechanism in the form of a scheme based on paid capacity tenders on the type of Contracts for Difference (CfD) has recently concluded.

The new proposed scheme is inspired by the British system of CfD (contracts for difference) covering sectors, renewables and nuclear, and "clean" technologies. Through this mechanism, eligible producers may enter into a private law contract (CfD contract) with the nominated counterparty and agree on a "strike price". Producers sell electricity on the competitive market; but if the market price (reflected in the so-called "reference price") falls below the strike price, the counterparty will reimburse producers the difference. Likewise, if the market price exceeds the strike price, the producers will reimburse the difference to the counterparty.

Completion of the legal framework is long awaited, as the first stage undertaken by the Ministry has seen long debates with the business community which is keen to see: a clear perspective for future possible investments; the priorities of the Romanian state regarding a long-term assurance of the sustainable energy mix; and market development in trend with international technologies and practice. Long-term recovery investments in electricity generation require financial instruments that may support financing of the magnitude required by the profile of these projects. This type of CfD has proved to be a viable instrument in the US and other European markets, both within capacity auctions organised by the states, and in a private framework of bilateral contracts concluded between market participants in similar terms.

Romania's energy law currently provides that all the produced energy is sold exclusively on the trading platform in a transparent and competitive way, and does not offer the possibility for producers to conclude freely negotiated bilateral contracts. However, a recent draft law amending the Energy Law No. 123/2012 introduces a provision that allows investors in energy projects to trade the energy expected to be produced by the new capacities, before they are authorised by ANRE and put into operation[7]. The intention of the legislator and the regulator is to be welcomed, as this change would remove one of the biggest barriers to new investors entering the market. It will provide the possibility to conclude long-term contracts for future production, which would ensure a predictable revenue stream and therefore may attract external financing sources.

Assuming that the above-mentioned legislative proposal will be approved, these long-term contracts could be concluded on a special platform established for this purpose, as it results from OPCOM's statements. A trading platform for long-term power purchase agreements is therefore expected to be launched soon, within a framework of pre-selection of counterparties and contract terms that is much more flexible than before. Moreover, the Bucharest Stock Exchange (BVB) and OPCOM announced earlier this year a common project aimed at establishing a Central Counterparty, completely eliminating the risk of a characteristic counterparty of the two markets and creating the conditions for launching futures-type contracts, with electricity as active support.[8] It is expected that this project will be finalised and will become operational during the year 2020, which would represent remarkable progress regarding the diversification of the products through which the energy market can be financed, especially for the long-term, and will provide investors, especially financial ones, with sophisticated trading options.

[7] https://www.senat.ro/legis/PDF/2019/19b275FG.pdf

[8] https://www.bvb.ro/AboutUs/MediaCenter/PressItem/BVB-and-OPCOM-present-the-cooperation-project-between-capital-and-energy-markets-as-Central-Counterparty-is-in-sight/4890

In mergers and acquisitions, we notice an increase in the flow of transactions involving assets representing capacities of energy generation from renewable sources. There is also interest in greenfield investments, in particular in wind power generation, provided that long-term energy sales contracts can be concluded. Energy derivative financial contracts would certainly be a plus in the local and regional trading market. The return to a completely liberalised market is one of the major desires of any investor, in line with European policies and the practice of EU countries. The most important transactions announced this year are those involving Enel and CEZ, the largest renewable energy producers, and the trajectory of these big players is being watched closely as there is an expected change in their major shareholders. Vestas recently announced the sale of its Romanian wind portfolio to Ikea. In 2020, Hidroelectrica is expected to get a listing on the Bucharest Stock Exchange and the London Stock Exchange.

Romania's legislative and regulatory framework in the field of clean energy is undergoing dramatic changes and the progress made over the last year must be continued in a coherent manner. This will enable Romania to face the challenges generated by an accelerated transition in this field, and these transformations could generate multiple opportunities – for the renewal of the national system with new generation capacities, for the implementation of highly efficient modern technologies, and for the long-term development of a market that offers consumers a safe, sustainable and affordable energy supply.

Russia

Author: Dominique Tissot (October 2018)

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% by 2020, excluding large hydropower plants of more than 25MW. 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% 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: Ivan Gazdić and Igor Đorđević

1. Brief overview of the renewables sector

Serbia adopted its Energy Law in 2014, aiming to harmonise Serbian energy legislation with the EU's Third Energy Package. The Serbian market then faced a long wait for by-laws that allow the full implementation of renewable projects. This finally happened in 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" – consist 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 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 closure. As in the preceding years, the development and construction of onshore wind capacities is Serbia's most developed renewables sector. Currently, there are four

minor wind farms that are fully operational and produce electricity (having approximately 25MW in power in total) and one major wind farm – the 104.5MW Kovačica wind farm, which has been connected to the grid in July 2019. Importantly, significant increase in power produced from wind is expected in the years ahead – at least 370MW, possibly more.

Some of the sub-sectors are still under-developed, however. Solar is a case in point, where the government allowed for only minor capacities in its incentive measures (10MW overall), that have already been awarded and completely exhausted. Once new capacities are introduced for solar, we expect it will finally gain momentum in Serbia, as their investment costs have decreased over the past years and will most certainly continue to fall.

Biomass is becoming an emerging sector too, with a notable number of projects currently in the preparation phase, the majority of them 1 to 5MW projects. The same holds true for co-generation from waste-to-energy projects, where the facilities are expected to produce both electricity and heat from waste treatment operations. However, Serbia is still lacking true RDF (refuse derived fuel) projects.

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 more than 1,000MW – despite the current statutory cap on incentivised FiTs of only 500MW. Notably, the Incentive Decree's period of validity has been extended for a year, until end the of 2019. Still, it is unlikely that the extension of the Incentive Decree's period of validity will result in major projects being developed. There are two main reasons. First, the statutory cap on incentivised FiTs for wind and solar has already been reached and exhausted. Second, a one-year period is surely not enough for the development of more complex renewable energy projects. Consequently, it appears that biogas, biomass, small hydropower plants projects and other projects relying on technologies not covered by the FiTs are the ones that could benefit from the extension.

Big and small hydro projects are also in various phases of development around the country. There are reportedly over 100 small hydropower plants currently operating in Serbia, and according to the publicly available data over 700 small hydropower plants are due to be constructed in the coming years. According to the adopted "National action plan for renewables until 2020", the total planned capacity of small hydropower plants is 1,092MW. However, it should be noted that small hydropower plants have recently been criticised by different groups for their alleged damaging effects on the environment, so investors should be highly diligent and ecologically conscious when developing these projects.

Interest in Serbia for wind, hydro, biomass and solar projects is increasing among investors and companies from all over the world. Companies including Enlight Renewable Energy, Elicio, 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 financial closure.

During 2017, Serbia's Ministry of Mining and Energy made significant 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 launch of a major programme "Promotion of Renewable Energies: Developing the Biomass Market in Serbia", focused on facilitating a switch from fossil fuel to more environmentally friendly solutions, was a key step. The initiative has led to a partial switch to biomass in DHC systems in several municipalities, following the commissioning of reconstructed biomass-fuelled boiler rooms. Several more projects are either planned to be completed or are planned to start in 2019. 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-fuelled boiler rooms, projects that will lead to the further development of the Serbian biomass market.

3. Forthcoming developments/opportunities in the renewables sector

Despite the significant improvements introduced by the PPA package decrees, the new model PPA still has not remedied all of 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 in its accounts, and therefore it remains to be seen whether they will be perceived as adequate collateral by lenders. Amendments to the PPA are possible, but only with

the approval of the competent Ministry that can potentially allow some other forms of collateral (such as a bank guarantee). 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.

We look forward to seeing whether Serbia will succeed in implementing the policy measures outlined in its action plan and reach its renewables target (27%) of gross energy consumption by 2020.

In wind energy, the statutory cap – currently set at a total of 500MW – is already reserved and exhausted. Thus, it remains to be seen whether the government will continue to incentivise renewables from 2020. Certainly, increased quotas for wind would attract further investments in the sector and bring Serbia closer to achieving its renewables targets in gross energy consumption by 2020. On the other hand, according to Serbia's Ministry of Mining and Energy, introduction of the long-awaited auction system – instead of the 'first come, first served' quotas mechanics – is likely to happen in 2020, but this is yet to be officially confirmed.

As solar has been a major failure so far, there is a growing expectation among the stakeholders that the Serbian government will allow further incentives. Significantly, the Serbian Ministry of Mining and Energy says that preparatory work has already taken place on the regulatory framework needed for the introduction of 'net metering' in Serbia. This initiative – if implemented correctly – will surely encourage private investments in the Serbian solar sub-sector and will hopefully facilitate its further development in the coming years.

Singapore

Authors: Marc Rathbone and Adrian Wong

Introduction

Singapore, with one of the highest population densities in the world, is quite restricted when it comes to renewable energy options. Space for ground-mounted solar farms is limited, and being sheltered geographically results in lower wind speeds. Lack of tidal wave power offshore and limited water sources also puts a strain on hydropower generation. Much of Singapore's electricity is therefore generated from gas-fired power plants mainly run on imported fuels.

Despite this, Singapore remains competitive, seeking opportunities to prove itself as a serious contender in the global renewables arena. With an average annual solar irradiance of over 1,500kWh/m^2/year (EMA) solar energy, coupled with significant urbanisation and technological advancements across the city state, Singapore is an ideal platform for rooftop solar energy generation via the installation of solar panels run by photovoltaic (PV) systems.

In 2019, global bank ING made a pioneering SGD 50m loan deal for sustainable energy firm Sunseap to fund a 50MW portfolio of approximately 20 rooftop solar projects in the country. Sunseap has since secured a further SGD 43m loan to support this effort. Also in 2019, Singapore banks OCBC and DBS indicated an end to their financing of new coal power plants, further evidence of Singapore's growing commitment to renewable energy.

1. Brief overview of the renewables sector

Key statistics

The total electricity generation capacity in Singapore peaked at 13,614.4MW last year, with over 95% of the nation's fuel mix coming from natural gas.

Singapore has made significant ground in the use of green energy in recent years with the number of grid connected solar panel installations increasing more than 80 times from 34 to 2,873 in the last decade. Total capacity of solar energy generated hit 226.4MWp at the end of the first quarter of 2019. Ongoing solar projects from public sector agencies – such as the Housing & Development Board and the Economic Development Board's deployment of more solar PV systems through the SolarNova project (currently in its fourth phase) – this figure is expected to reach the committed value of 350MWp by 2020.

In the first quarter of 2018, Singapore's waste-to-energy incineration plants contributed 256.8MW to a total generation of 13,614.4MW, placing Singapore in first place among ASEAN Member States for waste-to-energy capacity.

Research and development
Singapore aims to be a centre for research and development (R&D) in the renewable energy sector. In 2018, a Singapore R&D project – a floating solar PV testbed – won the ASEAN Energy Awards in the Renewable Energy Category. In February 2019, a two-year trial R&D project testing the capability of waste water sludge and food waste to generate biogas showed promising results according to the National Environment Agency. The method is set to be applied to the Tuas Nexus (comprising the Tuas Water Reclamation Plant and the Integrated Waste Management Facility) operations in 2025. Singapore's Energy Market Authority (EMA) is partnering with PSA Singapore and Shell to develop local energy solutions and nurture start-ups. The partnership will include a joint R&D grant call for innovative solutions in smart technologies, and energy management for container ports at Pasir Panjang Port.

Singapore is also at the forefront of encouraging youth participation in R&D projects and as part of stakeholder discussions. Singapore's engagement of the nation's youth is promising and gives the future leaders of tomorrow's renewable energy sector a platform to share their views and contribute to shaping outcomes today.

2. Recent developments in the renewables sector

Singapore's national water agency, PUB, has announced its plan to install one of the world's largest single floating solar PV systems in the Tengeh Reservoir by 2021. PUB is currently seeking proposals from companies to design, build, own and run the plant. Covering an area the size of about 45 football pitches, the floating solar farm is intended to operate at 50MWp and can power up to 13,500 four-room Housing Board flats each year. This is an exciting development and demonstrates Singapore's intention to further its use of renewable energy and to one day turn its reservoirs into "energy batteries".

Around 21,000 solar panels are set to be installed on the rooftops of six CapitaLand buildings by the end of the year, in partnership with Sembcorp Industries. Upon completion, this will be the largest combined solar facility in Singapore by a real estate company. The solar farms hosting the 21,000+ panels will, together, be able to generate approximately 10,292MW hours of energy annually. This is the equivalent of powering around 2,300 four-room Housing Board flats each year. Additionally, any surplus solar power generated will be channelled to the grid. This solar energy system will assist in eliminating over kg 4.3m of carbon dioxide emissions annually – the equivalent of taking 937 cars off the road, or planting over 52,000 trees.

In April 2019, Geneco, one of Singapore's leading electricity retailers, in conjunction with the Sustainable Energy Association of Singapore (SEAS), a non-profit business association representing the interests of companies in the sustainable energy sector, hosted a sustainability forum. Targeted at carbon space experts, business owners and energy managers, the event saw external speakers sharing thoughts on the way in which global climate action results in direct cost impacts on businesses in Singapore, and focused on how companies can transit to a low-carbon business model.

3. Forthcoming developments/opportunities in the renewables sector

A proposed USD 20bn Australia-Singapore power link project consisting of a 10GW solar farm, coupled with a 20–30GWh storage facility in the Tennant Creek region of Australia, is set to be the world's biggest solar-plus-storage plant and has received major project status by the Australian Northern Territory (NT) government. Solar power harvested in Australia is proposed to be exported to Singapore via subsea cables with Singapore developer Sun Cable set to enter into contractual negotiations with the NT government.

Early in 2019, the Singapore Economic Development Board (EDB) issued a request for information to explore the possibility of a 100MWp floating solar PV system for private sector consumption, starting with studies at Kranji Reservoir. It is estimated that this project could save 52kt of carbon emissions each year, which is the equivalent of taking 11,200 cars off the road annually.

In the energy from waste sector – a growing market in Singapore – energy provider SP Group has created a 6m long enclosed system that will turn food, plastic and general waste into thermal energy at 650 degrees Celsius. The thermal energy is then to be used by outlets at Gardens by the Bay in Singapore. Albeit on a small scale, investors speculate that if this scheme is successful there is an appetite for the technology to be rolled out on a much larger scale.

Semakau Island, Singapore's only landfill site, is producing 100% renewable energy. Since the end of February 2019, the deep-sea fish farm on the island has been running on 100% clean energy harnessed from different solar and wind sourced plants. This is the first of its kind in South East Asia, with four of the eight micro grids up and running and it is expected that the remaining four will become operational in late 2019.

Recent trends have shown that, in addition to demand and technological innovation being key drivers of renewable energy trends, electricity retailers on the supply side also have a part to play. iSwitch is one of the few retailers in Singapore that provides 100% green electricity to customers for both commercial and residential electricity. To date, iSwitch has helped over 50,000 residential customers save the equivalent of 35,000 tonnes of carbon dioxide emissions. This trend is only set to increase and is a market with clear growth prospects.

Overall, Singapore remains an important member of the Asian community in driving renewable energy opportunities and this presents an exciting outlook for the near future.

Slovakia

Authors: Petra Corba Stark and Michaela Nemethova (October 2018)

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 and Urša Jozelj

1. Brief overview of the renewables sector

Under EU Directive 2009/28/EC on the promotion of the use of energy from renewable sources (RES), Slovenia must achieve a 25% share of renewable energy in gross final energy consumption and a 10% share of renewable energy in transport by 2020. In 2017, RES accounted for 21.5% of gross final energy consumption. As the share of RES in gross final energy consumption needs to be increased by 3.5%to reach the target, it seems that Slovenia might not meet the 25% target by 2020.

In June 2019, Slovenia amended the Energy Act (EZ-1), the main act in the field of energy. The amendments to EZ-1 tackle the renewables sector and the provisions regarding the subsidies for renewables. Previously, power plants were only eligible for guaranteed purchase by the support scheme for energy production from renewable energy sources and high-efficiency cogeneration if their maximum power was less than 1MW. The new amendments have halved that limit to 500kW.

To make investment in renewables infrastructure easier, the amended EZ-1 provides that obtaining a building permit is not required for the erection of installations to produce electricity from renewable energy sources and high-efficiency cogeneration. However, the Slovenian government is yet to adopt a regulation setting out the types of installations for energy production from renewable energy sources and high-efficiency cogeneration that do not require a building permit. This will simplify investing in renewables, and is a welcome change as procedures for obtaining building permits in Slovenia can be time consuming.

2. Recent developments in the renewables sector

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 from late 2016 onwards.

The Slovenia Energy Agency is the competent authority for tenders for the subsidies scheme. Power plant operators, awarded by public tender, may choose between guaranteed purchase and operating premium. If they choose guaranteed purchase, the Centre for RES/CHP in the framework of Borzen, d.o.o. (Borzen) buys the electricity from the producer and sells it to the market. In the case of the operating premium, the producer sells the energy on the market and Borzen only pays a premium as the difference between the full ("guaranteed purchase") price and the market price, which is determined yearly ex-ante.

In the first half of 2019, electricity production within the subsidies scheme – in the 3864 power plants with a nominal power of 414MW – amounted to 508.2GW, which is 4% more than in the same period in 2018. The subsidies were awarded as follows:

- solar power plants – EUR 31.9m for producing 133.8GWh
- hydropower plants – EUR 2.3m for producing 55.2GWh
- biogas power plants got EUR 5m – for producing 43.4GWh
- wind power plants – EUR 0.2m for producing 3.1GWh
- biomass power plants – EUR 9.3m for producing 71.2GWh
- high-efficiency cogeneration powerplants on fossil fuels – EUR 16.3m for producing 198.9GWh
- other plants – EUR 0.6m for producing 2.6GWh.

Net-metering

In March 2019, the Slovenian government adopted the renewed Regulation on Self-Reliance on Electricity from Renewable Sources, which regulates the net-metering model. The net-metering model was first introduced in Slovenia in 2015 and has proved to be a great success. At the end of 2018, there were around 2,000 self-supply power plants in Slovenia. The recently adopted Regulation, applicable from 1 May 2019, makes several amendments to the model, and three types of self-supply are now possible: individual self-supply, self-supply of multi-dwelling buildings, and self-supply of "RES communities".

While the same person had to own the power plant and the metering point under the old self-supply regulation, the new regulation allows a third party to own the power plant.

By allowing "RES communities" to be supplied by energy from RES, the net-metering model is now available to end-users whose buildings preclude power plant construction – because, for example, the building location has low solar irradiation. The first solar power plant on a multi-dwelling building in the city of Jesenice was installed in early 2019.

Infrastructure for alternative transport fuels

The Slovenian government adopted the three-year "Action Program for Alternative Fuels in Transport" for the implementation of the national "Strategy for the Development of the Market for Establishing an Appropriate Infrastructure in the Transport Sector" in June 2019. These are documents adopted under the Decree on establishing the infrastructure for alternative transport fuels, which transposed Directive 2014/94/EU on the deployment of alternative fuels infrastructure.

Given the number of registered electric vehicles (EVs) in the country, Slovenia has an adequate charging infrastructure for EVs and for liquefied petroleum gas vehicles. Slovenia has also decided to develop its filling infrastructure for biomethane, biofuels, synthetic and paraffin fuels, and hydrogen.

3. Forthcoming developments/opportunities in the renewables sector

Slovenia has significant potential to increase the share of renewable energy. The country enjoys abundant sunshine, its forest areas (63% of the land area is wooded in Slovenia) are a major resource, and it has an existing network of hydropower plants. However, there has been a backlog in building new hydropower plants in recent years, and environmental concerns mean that Slovenia's entire hydropower potential cannot be exploited.

Even so, there have been plenty of recent (co)financing opportunities for investment in the energy sector, especially in renewables. In addition to tenders for the subsidies scheme, which are published around twice a year, there are additional co-financing mechanisms available. For example, a new public invitation to tender to co-finance the purchase and installation costs of the photovoltaic power plants for the period 2019-22 was published in March 2019. Loans by SID Bank, the Slovenian development and export bank, are available to public sector and ESCO companies for the energy renovation of public sector buildings. Eco Fund, the Slovenian Environmental Public Fund, provides several options for obtaining non-refundable funds for investment in energy efficiency.



Spain

Author: Ignacio Grangel Vicente

1. Brief overview of the renewables sector

The production of electricity from renewable sources represents 49.3% of Spain's power generation capacity, with over 108,000MW installed. Of the 261,020GWh of electricity produced in Spain in 2019, 36.8% came from renewable technologies, which led to the commissioning of almost 5,000 new megawatts of capacity during the year.

The development of renewable energies has coincided with the regulation of these technologies and the approval of various remuneration schemes. Following the Electricity Sector Act 54/1997 of 27 November, economic arrangements[1] were created which triggered a sharp increase in renewable energies, especially wind-based facilities (with a current installed capacity of 25,000MW), and contributed towards achieving the 2000–2010 Plan for the Promotion of Renewable Energies.

The subsequent enactment of Royal Decree 661/2007 of 25 May, regulating electricity production under a special scheme, enabled the construction of small-scale photovoltaic facilities totalling 4,000MW in capacity. Investors were guaranteed a reasonable rate of return on their investments based on remuneration for the energy produced at a fixed price (feed-in tariff). The costs attributable to the grid were passed on to consumers, also at a reasonable rate.

However, an increase in all grid-related costs, including remuneration to transmission and distribution networks and capacity-based payments, meant that consumer bills failed to include the entirety of these costs and led to the accumulation of an annual deficit in the grid. This forced a review of all remuneration types in a bid to halt the build-up of debt within the system.

A remuneration scheme was created based on recovering investments and obtaining a rate of return which would ensure reasonable profitability for renewable energy producers within a sustainable grid framework. This reform was developed by way of Royal Decree-law 9/2013 of 12 July, adopting urgent measures to guarantee the financial stability of the electricity system, and the Electricity Sector Act 24/2013 of 26 December.[2]

[1] Royal Decree 2818/1998 of 23 December on the production of electricity at facilities supplied with renewable energy sources or resources, waste and cogeneration and Royal Decree 436/2004 of 12 March outlining the methodology for the review and systematic approach towards the legal and economic arrangement of electricity production under a special scheme.

[2] Both regulations have been developed by Royal Decree 413/2014 of 6 June regulating the production of electricity from renewable energy, cogeneration and waste and Order IET/1045/2014 of 16 June 2014 approving the remunerative parameters for ordinary facilities applicable to certain electricity production installations using renewable energies, cogeneration and waste.

Under this reform, all facilities became regulated by the same laws and earned income from participation in the market, receiving – where applicable – two kinds of supplementary remuneration. First, a price per unit of installed capacity (EUR/MW), covering the costs of investment for ordinary facilities which cannot be recouped through the sale of energy (return on investment). Second, an operations-based price (EUR/MWh) covering the difference between operating costs and income from ordinary facilities' participation in the market (operations-based remuneration). The return on investment mechanism also includes a remuneration rate which could reach a reasonable rate of return, abolishing the feed-in tariff arrangement.

The annual cost of remuneration through this specific scheme for the grid exceeds EUR 7bn, with the electricity system boasting financial stability or even a surplus since 2015.

Later, in 2016 and 2017, auctions were called in Spain which awarded 9,300MW of renewable capacity, mainly from wind and photovoltaic sources. The facilities which won the auctions must be commissioned before 1 January 2020 in order to continue to benefit from the specific remuneration scheme. Under that scheme, these facilities will only receive income from the grid when the price obtained from the sale of electricity in the market is lower than the floor offered at auction (the return on investment offered was zero).

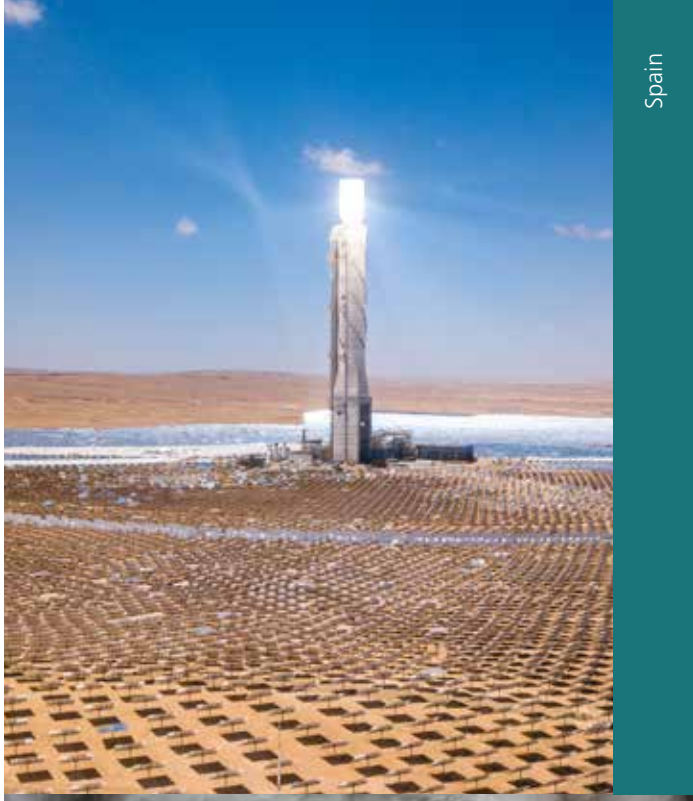
Both 2018 and 2019 have witnessed an increased number of wind farms and photovoltaic plants which are not included under the specific remuneration scheme. These facilities receive the market price directly or enter into long-term agreements with customers who purchase their energy and take on the risk of price fluctuation to recover their investment.

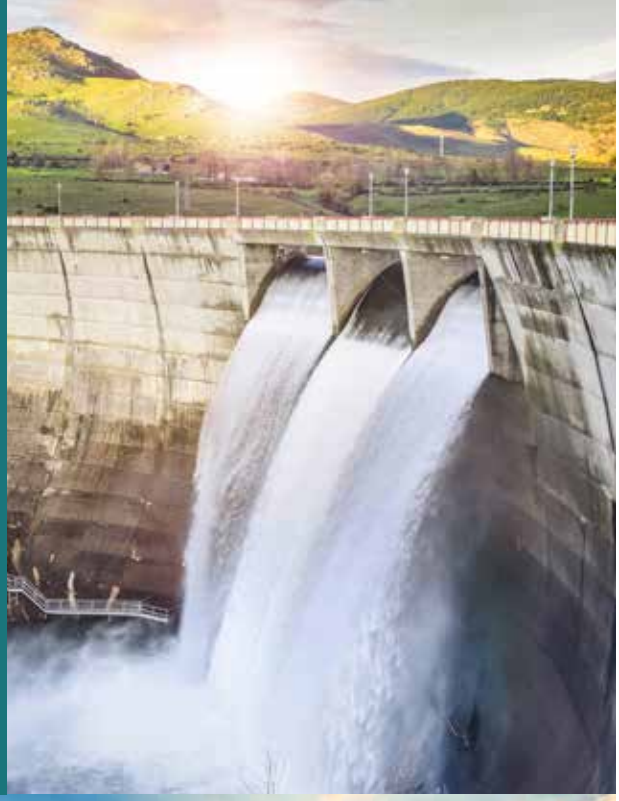
2. Recent developments in the renewables sector

Facilities entitled to remuneration under the 2019 scheme

The specific remuneration scheme, Royal Decree-law 17/2019 of 22 November introduces urgent measures for the essential adjustment of electricity grid remuneration parameters and addresses the process of decommissioning thermal power stations.

For facilities eligible under the scheme (renewables, cogeneration and waste), this regulation sets out the reasonable rate of return applicable to the remaining regulatory lifespan of ordinary facilities. This figure will be used to review and update the remunerative parameters to be applied during the second regulatory period (2020 to 2025).





Accordingly, all facilities receiving specific remuneration – following the former Royal Decree 661/2007 and subject to Royal Decree 413/2014 – will be able to receive it (2016 and 2017 auctions). Future facilities, possibly following new auctions, which are entitled to receive a return on their investment when the rate for the following regulatory period is set, will receive a rate of return of 7.09% or 7.398%.

Facilities commissioned before 2013 will receive 7.398% from 2020 to 2031 where they have not filed or agree to waive legal action or arbitration proceedings against the Kingdom of Spain due to the 2013 regulatory amendments.

Private consumption

Royal Decree 244/2019 of 5 April regulates the administrative, technical and economic conditions for the private consumption of electricity ("RD 244/2019"). It incorporates a section of the content of Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources into the Spanish legal system.

The Electricity Sector Act 24/2013 of 26 December was the first law to create a legal framework for private consumption, which is considered to be a source of power generation aside from the grid. It is defined as consumption by one or several consumers of electricity from facilities close to or linked to where consumption takes place. This act sets out the different forms of private consumption: individual or collective; and with or without excess generation. Energy consumed privately which comes from renewable sources, cogeneration or waste is exempt from all types of charges and tariffs.

Royal Decree-law 15/2018 of 5 October, on urgent measures for the energy transition and protection of consumers, highlights private consumption as an essential element to ensure that consumers are able to obtain cheaper and cleaner energy. It also stipulates the exemption of charges and tariffs in a bid to promote private consumption with distributed renewable generation.

These regulations have triggered the development of private consumption facilities at homes and in industry, representing a key increase alongside photovoltaic plants.

Regulatory developments

Royal Decree-law 1/2019 of 11 January covers urgent measures to adapt the remit of the Spanish Competition Authority to EU law requirements in relation to Directives 2009/72/EC and 2009/73/EC of the Parliament and of the Council of 13 July 2009 on Common rules for the internal market for electricity and natural gas. It sets out new responsibilities for the regulator and will enable greater independence when it comes to regulatory decision making, specifically the approval of regulations which affect the technical management of the grid and remuneration-related aspects.

3. Forthcoming developments/opportunities in the renewables sector

The plans to develop renewable energies in Spain are covered by two main regulations which are both linked to the European-wide goal of reducing greenhouse gas emissions and fulfilling the commitments assumed under the Paris Agreement. The key regulatory texts are as follows:

1. The EU Winter Package – "Clean energy for all Europeans" – is the Europe-wide mechanism for driving the transition towards clean energy. It sets out the EU's goals for 2030 in relation to the reduction of greenhouse gas emissions, as well as energy efficiency and renewable energy incorporation objectives. The binding goals set for the European Union as a whole are:
   - To cut greenhouse gas emissions by 40% in relation to 1990 levels.
   - 32% of final energy consumption to come from renewable sources.
   - An increase in energy efficiency of 32.5%.
   - To ensure total electricity interconnection with neighbouring states of at least 15%.

2. The Integrated National Energy and Climate Change Plan (the PNIEC). Following the guidelines set out under the Governance Regulation, the Spanish government has included specific goals for Spain in this document, some of which appear significantly more ambitious than those set by the EU. The goals include:
   - A 21% reduction in greenhouse gas emissions in relation to 1990 levels.
   - 42% of final energy consumption to come from renewable sources.
   - An increase in energy efficiency of 39.6%.
   - 74% of electricity to come from renewable sources

The PNIEC forecasts total installed capacity in the electricity sector of 157GW by 2030, 50GW of which will be wind energy, 37GW solar energy and 7GW thermoelectric.

Total investment is expected to come in at around EUR 236bn, with 80% private sector investment against 20% public sector investment. This investment will be made through:

- Development of transmission and distribution networks. To achieve the PNIEC goals, the electricity system requires significant investment to integrate new renewable capacity. Spain has begun to pass through a new 2021–2026 plan for transmission networks aimed at facilitating an increase in installed and evacuation capacity for new renewable energy facilities.
- New auctions for innovative renewable energy facilities, technologies under development and those which contribute to the management of the grid may be called.

In addition to these two main regulatory texts, other notable developments include:

- Spain is working on an energy storage regulation which will enable greater viability in terms of evacuation and the management of electricity produced at renewable energy facilities. New projects are expected to be presented in 2020.
- Projects which enable hydrogen to be obtained from solar panels are currently being investigated, and further advances are predicted which will pave the way for disruptive technology in the energy sector.
- Energy transition has led oil and gas companies to develop green gas and renewable gas projects in a bid to comply with CO_2 emission regulations.
- Significant regulatory changes are expected in relation to network access and connection permits, which could restrict the acquisition of these rights for projects that are not effectively developed.

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 2018, more than 650 hydropower plants producing an average of approx. 36,448GWh per year, are being operated within Switzerland. More than 85% of these hydropower plants are run-of-river power plants; the other 15% consist of storage power plants, with around 2% 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 2018, 4% 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 entered 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 December 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

Authors: Döne Yalçın, Levent Bilgi and Taner Elmas

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 2018, the country generated 22.4% of its electricity from the 636 hydropower plants in the country, with a total installed capacity of 27,912MW. This is the equivalent of only 32% of the total potential.

Wind

Turkey's estimated wind energy potential is 48,000MW. Wind energy is a particular focus for the country and the legislative framework is favourable 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.

In 2018, Turkey generated 19.882bn kWh of electricity from the wind power plants in operation with a total installed capacity of 7,005MW.

The market has seen regular announcements by the 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 for potential 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 2,741 hours (7.5 hours per day), and the total solar energy derived per year is 1,527 kWh/m^2 per year (4.18 kWh/m^2 per day).

At the end of 2018, there were 5,863 solar power plants, with a total installed capacity of 5,063MW. In the future, more than 98% of the installed capacity (4,981.2MW) will be generated by the unlicensed solar energy-based power generation plants.

Geothermal
As Turkey is situated on the Alpine-Himalayan orogenic belt, the country has relatively high geothermal potential. Turkey's geothermal capacity is 35,500MW, and 78% of the areas with geothermal potential are situated in Western Anatolia. 90% of its geothermal resources are low- and medium-heat and are suitable for direct exploitation (heating, thermal tourism, the output of minerals, etc.), while 10% are suitable for indirect exploitation in uses such as power generation. Turkey has more than 1,000 geothermal resources located all over the country. However, the country has 239 geothermal fields currently in use and ten of these are suitable for electricity production.

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

In 2018, Turkey generated 3,216GWh of electricity from biomass power plants with a total installed capacity of 811MW.

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 May 2019, the Ministry of Energy and Natural Resources (MENR) held the second RERA tender – for a wind energy project for four different locations (Balıkesir, Çanakkale, Aydın and Muğla), each with a capacity of 250MW for a total installed capacity of 1,000MW. The Turkish energy company Enerjisa Üretim Santralleri A.Ş. (joint venture company of Sabancı Holding and E.ON SE) and Enercon Rüzgar Enerji Santrali Kurulum Hizmetleri Ltd. Şti. submitted the lowest bids to construct the wind farms – USD 3.53 per kWh for Balıkesir by Enercon; USD 3.67 per kWh for Çanakkale by Enerjisa; USD 4.56 per kWh for Aydın by Enerjisa and USD 4 per kWh for Muğla by Enercon.

MENR's first tender – for a wind energy project under RERA – was for the development of wind farms with a total capacity of 1,000MWs on renewable energy resource areas. A consortium of the German company Siemens and the 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.

Furthermore, in March 2017 the MENR held the first RERA tender – for a solar energy project of 1,000MWs. A Turkish/Korean consortium, consisting of Kalyon and Hanwha Group, 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.

In addition to onshore RERA tenders, the MENR announced that Turkey's first and the world's largest offshore RERA tender – for a wind energy project, which is expected to yield investment of USD 2 – 3bn with a total capacity of 1,200MW, should start generating electricity by 2023. The details of the tender process are expected to be published in the coming months.

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 licenses who carry out 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.

The deadline for applying under YEKDEM for the coming year is 31 December 2019. However, time is running out for companies that want to take a part in YEKDEM, as the programme will end on 31 December 2020. According to the Turkish government's recent statement, the due date of YEKDEM will not be extended beyond 31 December 2020. The government intends to ensure competition in the sector while improving the investment environment through RERAs.

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. The project's estimated closing date is 31 March 2021.

3. Forthcoming developments/opportunities in the renewables sector

Turkey's short-term plan between 2015–2019 will be finalised at the end of 2019. It focuses on eight key issues:

(i) energy efficiency
(ii) security of energy supply
(iii) good energy governance
(iv) local and international activity
(v) research and development, technology and innovation
(vi) improving investment conditions
(vii) the efficient and productive processing of raw materials
(viii) security of raw materials supply.

In the future, 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%.
- Maximising 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.

Ukraine

Authors: Vitaliy Radchenko, Volodymyr Kolvakh and Maryna Ilchuk

Introduction

Renewable energy generation is one of the key priorities for the Ukrainian energy sector and national economy. However, the current share of energy generated from renewable energy sources – wind, solar, biomass, biogas and small hydro (RES), as well as by big hydropower projects (greater than 10MW) – in Ukraine's energy mix is still quite insignificant. By 1 July 2019, the share of renewables (including big hydro generation that exceeds 10MW) had reached only 8.8%. According to the "Energy Strategy of Ukraine until 2035", the government anticipates that the renewable energy share of total energy consumption will exceed 11% by 2020 and reach 25% by 2035.

Ukrainian power generation structure in the 3Q of 2019

● Nuclear ● TPP and CHP ● RES* ● Other
*Including big hydro generation (exceeding 10MW)

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 renewable technologies, especially 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 infrastructure budget to ensure the availability of the grid's off-taking capacity for wind parks.

1. Brief overview of the renewables sector

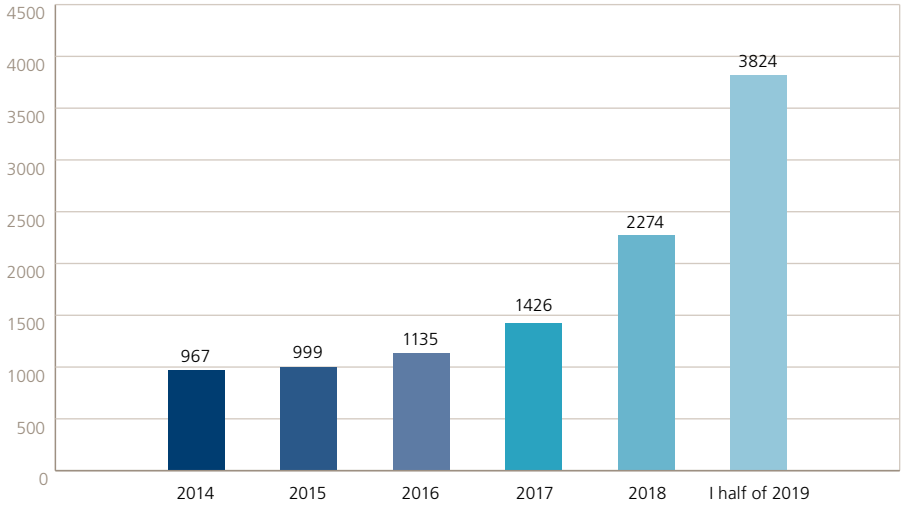
Key statistics

According to the national energy regulator, as of 1 July 2019 the total installed capacity of active renewable energy projects was around 3,824MW, close to 4% of the country's total energy generation. Almost two-thirds of this capacity (69%) is from industrial solar (around 2,640MW), 20% from wind (around 777MW), 5% from household solar (around 190MW), 2.6% from small hydro (around 100MW) and the rest (3.4%) from biomass and biogas. That does not include big hydro generation (exceeding 10MW), which is not eligible for state support.

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 and highest insolation.

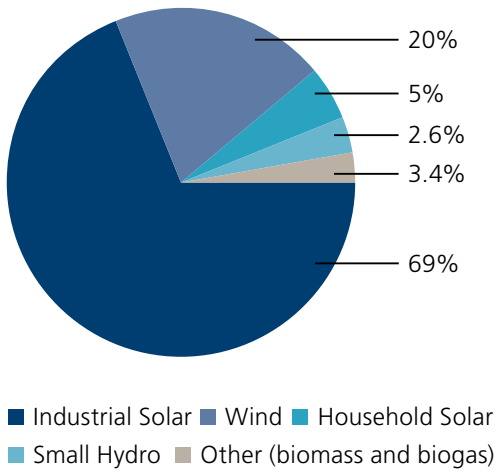
In light of the anticipated phasing out of the feed-in tariff support scheme for new projects by 1 January 2020 and transition to auctions, commissioning of renewable energy projects in Ukraine has increased significantly in 2018-2019. In just six months of 2019, the total capacity of commissioned power plants reached 1,336.363MW – significantly greater than during the whole of 2018 (848MW).

Growth of RES projects' installed capacity over the years*



*Excluding big hydro generation (exceeding 10MW)

Structure of installed RES Projects*



*Excluding big hydro generation (exceeding 10MW)

Subsidy schemes
The state provides various supports to renewable power producers (RPPs).

Green tariff
The feed-in tariff (known as the "Green Tariff" in Ukraine) will be the main state support mechanism for RPPs until 1 January 2020. The Green Tariff was introduced on 1 April 2009 as a special preferential price for electricity produced from RES, to be paid until 1 January 2030. It is set by the regulator separately for each RPP and for each technology.

The Green Tariff 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, currency fluctuations of the Ukrainian hryvnia do not have an adverse effect on the payouts to RPPs.

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

Green tariff rates (Eurocents / KWh)						
Type of generation*	**Commissioned before 31 December 2019**	**Commissioned before 31 December 2020**	**Commissioned before 31 December 2021**	**Commissioned before 31 December 2022**	**Commissioned before 31 December 2024**	**Commissioned before 1 January 2025**
Solar (ground based)	15.03	11.26	10.88	10.50	10.12	9.75
Solar (roof based)	16.37	12.28	11.88	11.47	11.04	10.66
Wind (>2MW)	10.18	9.05				7.92
Biomass	12.39					
Biogas	12.39					
Mini Hydro (0.2 – 1 MW)	13.95	12.55				11.15
Small Hydro (1 – 10 MW)	10.45	9.42				8.35

*Certain insignificant RES types were not included

On 22 May 2019 the "Auctions Law" – On Introduction of Certain Changes to Laws of Ukraine regarding Ensuring Competitive Conditions for Generation of Electricity from Alternative Energy Sources No. 2712-VIII dated 25 April 2019 – came into effect. The Auctions Law narrowed the scope of application of the Green Tariff support system and implemented a new quota auction support system (see below). As a result of these changes, only the following renewable projects may still benefit from the Green Tariff:

- projects of any capacity and any RES technology commissioned before 31 December 2019
- projects of any capacity and any technology that by 31 December 2019 have executed a power purchase agreement (PPA) with the offtaker. These projects must have: land use rights; construction permitting documentation; and a grid-connection agreement
- wind power plants with capacity below 5 MW and not more than two wind turbines
- solar power plants with capacity below 1 MW
- projects other than wind and solar power plants, irrespective of their capacity.

Quota auction support system
The Auction Law implemented a new quota auction support system for renewables. All RES projects are eligible for the quota auction support system.

Under the quota auction support system, the state will provide a 20-year support from the date of commissioning of the renewable project through the guaranteed offtake of electricity within the quota and at the tariff determined by auction. For 2020–2022, the yearly quota will be split into three categories – wind (no less than 30%); solar (no less than 30%); and other types of renewable energy sources (no less than 15%).

According to the law, the Cabinet of Ministers of Ukraine must conduct a pilot auction before 31 December 2019. Starting from 2020 auctions will be held regularly twice a year. In order to participate in the auction, applicants must secure land rights, grid connection and provide a bid bond (EUR 5 per 1kW). The auction winner is also required to provide a performance bond (EUR 15 per 1kW) to the offtaker to secure its obligations under the PPA.

The auctions model will be a single-stage static sealed-bid auction with winning bids based on the lowest offtake tariff offer. Tariffs will be fixed in EUR as of the date of the PPA, in accordance with the official exchange rate of the national bank of Ukraine.

Other incentives
RPPs may also receive a premium of 5% or 10% on top of the Green Tariff or auction tariff for using Ukrainian equipment (elements) of renewable energy plants, such as PV modules, trackers, rotor blades, nacelle, metal frames, boilers, anaerobic digestion reactors, pumps, etc. Ukrainian origin of these elements must be certified by the Ukrainian Chamber of Commerce and Industry.

The state also guarantees the mandatory offtake of all electricity from renewable energy producers, irrespective of whether they receive support through the Green Tariff or quota auction support system, and gives renewables priority in dispatch and settlement.

In addition, the Ukrainian Parliament exempted from Ukrainian VAT various types of renewable energy equipment until 31 December 2022. The equipment includes wind power generation units, PV cells and panels, and some types of transformers and invertors.

2. Recent developments in the renewables sector

New electricity market
On 1 July 2019, Ukraine launched a new liberalised electricity market compliant with the 3rd Energy Package of the European Union. The former electricity market, organised under the obsolete single-buyer model, was divided into several new submarkets: the bilateral contracts market; the day-ahead market; the intraday market; the balancing market; the market for ancillary services; and the retail market.

RPPs mainly operate on the bilateral contracts market, selling their output at the fixed tariff directly to the state's offtaker – the so-called Guaranteed Buyer. The latter then re-sells the electricity on the day-ahead and intraday markets. The difference between the feed-in tariff and the price of electricity sold at the day-ahead and intraday markets is reimbursed to the Guaranteed Buyer by the transmission system operator (TSO), as a payment for the Guaranteed Buyer's services for the increase of the share of electricity generated from RES.

RPPs selling electricity at the feed-in tariff must also enter the special balancing group where the Guaranteed Buyer (as the party responsible for balancing on behalf of all such RPPs) must settle imbalances emerging within the balancing group. In turn, RPPs must reimburse to the Guaranteed Buyer costs associated with the settlement of imbalances. The share of this compensation will gradually increase from 10% in 2021 to 100% from 2030.

3. Forthcoming developments/opportunities in the renewables sector

With the exponential increase of renewable generation from solar and wind resources in the last few years, the grid is becoming more and more in need of balancing capacities. In this respect the new market has opened opportunities for the evolution of a completely new segment of balancing services and auxiliary services.

According to the Ukrainian government, stability of the grid can be ensured by implementing the following measures: installing highly manoeuvrable "peak" generation, such as gas-fired power plants; implementing advanced demand management systems; and building energy storage. It is estimated that the grid would require around 2GW of new peak covering capacity and about 500MW of energy storage by 2025.

The switch to the auction system for solar and wind should attract more attention to other renewable technologies which will not be affected by the quotas. Bioenergy projects definitely top that list, given Ukraine's huge potential in the agricultural sector, e.g. the production of biogas from animal manure, and solid biofuels from agricultural residues, and demand in the waste management industry.

Other opportunities can be seen in the continuously increasing microgeneration sector – a growing market for household PV systems (up to 150kV are eligible for the Green Tariff); decentralised off-grid generation; and the development of smart grids.

United Arab Emirates

Author: Amir Kordvani

1. Brief overview of the renewables sector

The United Arab Emirates (UAE), known for its oil and gas reserves, has become a regional leader in the development of the renewable energy sector.

The discovery of vast hydrocarbon reserves in the 1960s and 1970s helped the UAE rapidly become a global financial and economic hub. The growing population (3m in 2000 to almost 10m in 2019), combined with continuous economic industrialisation, has seen energy consumption and carbon emissions surge. At present, over 90% of the UAE's power consumption is met by natural gas. The proliferation of international agreements to reduce fossil fuels mean that continued reliance on gas-powered power stations is neither desirable nor sustainable.

As the UAE is moving from its reliance on natural gas, the cost and efficiency of renewable technology, particularly solar photovoltaic (PV) systems, has developed. As a result, the electricity produced through renewable technology has become a competitive and affordable alternative for generating power in the UAE. As the UAE is located in the world's 'Sun Belt' and enjoys high solar irradiation, it is highly suitable for various forms of renewable energy technology, especially solar PV. The new energy strategy will therefore involve natural gas, along with nuclear and solar energy, which will cover most of the UAE's energy needs.

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 in order to get ahead of the curve.

2. Recent developments in the renewables sector

UAE Energy Plan

The UAE is still on track towards implementing its Energy Plan 2050 (the "Energy Plan 2050"), announced in January 2017. The Energy Plan 2050 sets out ambitious targets which aim to put clean energy centre stage in the UAE's economic and environmental future. This also represents the UAE's strong commitment to apply the terms of the 2016 Paris Agreement and the United Nation's Sustainable Development Goals. The Energy Plan 2050 aims to cut CO_2 emissions by 70% and improve energy efficiency by 40%. Solar power is given special importance in the Energy Plan 2050. The 2050 target is a UAE energy mix of 44% clean energy with solar power accounting for 25%, 38% natural gas, 12% clean coal and 6% nuclear. It is expected that an

investment of up to USD 160bn will be made to achieve the UAE clean energy vision. The UAE State of Energy Report 2015 reported that the share of power generated from natural gas will drop from 98% in 2012 to less than 76% in 2021, as clean energy enters the mix and energy efficiency grows. Research has indicated that if the UAE achieves its clean energy goals, it could save up to USD 192bn by 2050 in the energy sector.

Recent projects

In addition to the UAE's federal policy, the individual emirates are now setting independent renewable energy targets. Accordingly, several significant renewable projects are being developed. For instance, Dubai has introduced a Clean Energy Strategy 2050, with the aim of having clean energy contribute 25% of total energy output in Dubai by 2030 and 75% by 2050.

In Abu Dhabi, the Abu Dhabi Water and Electricity Authority commissioned 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 one of the largest CSP facilities in the world.

In January 2019, Noor Abu Dhabi – the world's largest single-site solar project with a capacity of 1,177MW and capable of generating enough power for 90,000 people – has started its commercial operation. The solar plant is located in Sweihan in Abu Dhabi and is a joint venture between the Abu Dhabi government and a consortium of Japan's Marubeni Corp and China's Jinko Solar Holding. The project will enable an increase in renewable energy production and a reduction in reliance on natural gas in electricity generation. This will help to make energy more sustainable and efficient as well as reducing the emirate's CO_2 emissions by 1m metric tonnes per year.

The region's first wind turbine was installed in Abu Dhabi, on Sir Bani Yas Island. The wind turbine, which stands 65 metres high and has three rotor blades each with a 52-metre wingspan, has a production capacity of 850KW/h. In addition, a further onshore wind farm on this island, with a capacity of up to 30MW, is expected to be developed by Masdar and Abu Dhabi's Tourism Development and Investment Company (TDIC) to bolster the wind energy offering. Abu Dhabi will also soon see its second major solar PV project as the Emirates Water & Electrical Company (EWEC) has set a bid deadline of 31 October 2019. This 2GW plant will involve financing, construction, operation and maintenance under a long-term power purchase agreement.

As of March 2019, Dubai's Electricity and Water Authority (DEWA) has installed and connected approximately 1,276 solar panels on the roofs of residential, commercial and industrial buildings, with a total capacity of about 81MW. The first rooftop solar system installed was a 30KW system at Al Maktoum International Airport.

DEWA has been very active and dedicated to implementing the Energy Plan 2050 by administering the Shams (meaning "Sun" in Arabic) Dubai Program, which allows customers to connect their PV systems to the DEWA grid and offset any excess generation from future electricity bills. DEWA also connected several solar projects on its own premises, such as a 1.5MW system at Jebel Ali Power Station. It has collaborated with 19 government organisations, sponsoring approximately 37 projects under the Shams Dubai program, including schools and mosques.

Notably, Mohammed bin Rashid Al Maktoum Solar Park is the first project to be implemented using the IPP (independent power producer) model. The project is currently being rolled-out in four phases, with a total investment of AED 50bn (USD 13.5bn), and a planned capacity of 5,000MW by 2030. The 13MW PV first phase became operational in 2013, whilst the 200MW PV second phase was launched in 2017. It is expected that the third phase will be fully operational by 2020, adding a further 800MW. When all four phases are completed in 2030, the solar park will cover 214 square kilometres and will provide power for around 800,000 households.

Dubai is also developing clean coal projects and the first phase should begin operating in 2020. This is in line with Dubai's Integrated Energy Strategy 2030, which calls for 12% of generating capacity from clean coal, 12% from nuclear, 5% from solar facilities and 71% from natural gas by 2030.

Dubai is also investigating the potential for a hydro-energy storage site. In January 2018, DEWA signed a memorandum of understanding with Belgium's Dredging, Environmental & Marine Engineering Group (DEME) and the GCC Interconnection Authority (GCCIA) to explore this possibility. This follows DEWA's launch of the 250MW pumped storage innovation in Hatta, where water will be stored in the Hatta Dam and in an upper reservoir built into the mountains.

3. Forthcoming developments/opportunities in the renewables sector

The development of regulatory frameworks will significantly increase the development of renewable energy and the implementation of the Energy Plan 2050. The UAE Federal government should continue to encourage private sector participation in order to achieve its ambitious targets. Planning and participation under the Energy Plan 2050 will be key to introducing the relevant regulatory framework and a federal law governing the renewable energy sector.

The UAE is now positioning itself as an innovator and is providing investment opportunities in the renewable energy sector. It is anticipated that a wider variety of renewable technologies will be implemented in the short- to medium-term, such as wind and landfill gas, which will add further diversity to the UAE's clean energy mix.

For instance, in 2010, the UAE cabinet approved the Green Building and Sustainable Building Standards to be applied across the country. Application of these standards started at government buildings in early 2011 and the project is expected to save around AED 10bn by 2030 and contribute to a 30% reduction in carbon emissions.

Another example of the UAE's clean energy strategy in action is the Dubai Autonomous Transportation Strategy, which intends to transform 25% of all transportation to autonomous means by 2030. The Dubai Supreme Council of Energy has also launched initiatives to support electric vehicle owners, including free charging, free parking and free registration fees.

The UAE is moving in the right direction to cut its reliance on hydrocarbons as a source of electricity production and, as a result, there has been a push to attract investment in and the development of clean energy. A development in the regulatory framework, including a federal law on renewable energy, will further push the Energy Plan 2050, placing the UAE as the regional revolutionary leader in the renewable energy sector.

United Kingdom

Authors: Munir Hassan and Dalia Majumder-Russell

Introduction

The UK government has introduced legislation committing the UK to reducing its net contribution to greenhouse gas emissions to zero by 2050. This commitment makes the UK the first major economy to enshrine such a commitment into law. However, the Committee on Climate Change has noted that while the UK is on track to meet its 2018–2022 carbon reduction commitments, the carbon reduction targets for the 2023–2032 need further efforts to decarbonise.[1]

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 generation capacity is forecast to be provided by new nuclear and possibly clean gas with carbon capture and storage (CCUS) technology, this is subject to concerns about both delay and commercial viability. Separately, the UK Government in March 2019 announced plans to support 30GW of offshore wind to be commissioned by 2030 signalling that offshore wind will continue to be a focus for renewable generation.

Like other maturing renewables markets, many of the UK's main renewable technologies do not have subsidy support which has led to development of new contractual structures and increased the value of long-term revenue contracts secured with corporate offtakers rather than utilities.

The UK's position is unchanged from 2018 and it's in 8th 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 increased in 2018 to a record 33%. As at the end of 2019 Q1, installed renewables electricity capacity stands at 45GW, a 7.9% increase from the previous year. Onshore and offshore wind contributed to 49% of this growth continue to make up half of total renewable capacity in the UK. Onshore wind capacity stands at 13.8GW, which represents 30.6% of all renewable capacity, the highest share of renewable technologies. Solar PV (29.5%), offshore wind (18.9%), and bioenergy (16.8%) are the next biggest contributors to the UK's renewable capacity.

[1] https://www.theccc.org.uk/wp-content/uploads/2019/07/2019-Progress-Report-Summary.pdf

Subsidy schemes
The main support scheme for new renewable generating stations is through the CFD (contract for difference) mechanism which was introduced under the Energy Act 2013. The other schemes such as the Renewables Obligation scheme and the feed-in tariff scheme for certain renewable generators with a maximum capacity of 5MW have now closed (March 2017 and April 2019 respectively).

Small-scale generation is still supported through a smart export guarantee regime which requires electricity suppliers of a certain size to offer to enter into contracts with owners of small, low-carbon electricity generation installations. This will provide a guaranteed route to market for small-scale renewable generation in the absence of the feed-in tariff regime. The regime, introduced by the Smart Export Guarantee Order 2019 is expected to come into force on 1 January 2020.

2. Recent developments in the renewables sector

CFD auction results
In November 2018, the Department for Business, Energy & Industrial Strategy (BEIS) announced the third round of CFD allocations for the "less established technologies" – Advanced Conversion Technology (ACT), dedicated biomass and offshore wind. A new addition for this allocation round was the inclusion of wind projects located on remote Scottish islands. The strike prices set for these projects could not be bid at above GBP 82/MWh which is a 46.4% increase on prices that offshore wind projects could bid for (onshore wind is excluded).

The results of the third allocation round announced in September 2019, demonstrated the rapid decrease in the cost of offshore wind. Nearly 6GW of capacity in the 2023/2024 and 2024/2025 delivery years was awarded CfD contracts with falling by 30% since the lowest strike price seen in the second CfD auction in 2017. As a reminder in 2017 the strike prices achieved were (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).

In 2019, the offshore wind, remote island wind and advanced conversion technologies achieved strike prices of GBP 39.65/MWh (2012 prices) for delivery year 2022/23.

Given that the CFD is the main method by which a project can achieve investment certainty, the continuing fall in prices and the dominance of large offshore wind projects demonstrates this sectors confidence in being able to deliver profitable projects at prices almost on part with wholesale electricity prices.

These results are driven by improvements in technology, supply chains and cost of capital make the technology less reliant on support mechanisms. Therefore, while fewer projects may be able to secure additional revenue support through CFDs, there is growing appetite for "subsidy-free" CFDs which offer the price stability but not the additional revenues.

A subsidy-free approach appears to be a viable consideration with recent reports such as that by Baringa in April 2017 which 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. Technological advancements in the capacity and productivity of renewable technology (such as turbines), significant reductions in capital costs, revenue stacking capabilities and increasing O&M efficiency amongst other factors have seen the UK's first subsidy-free projects emerge. Anesco's 10MW solar farm and the Withernwick II 8.2MW wind farm are examples of such subsidy-free projects.

The ongoing exclusion of "established technologies" – comprising Energy from Waste, Hydro (>5MW and <50MW), Landfill Gas, Sewage Gas, Onshore Wind (>5MW), and Solar PV (>5MW) – and the absence of tidal and geothermal projects continues to raise questions about their development in the UK. At least in the context of onshore wind and solar PV projects there is some suggestion that these technologies may have already achieved grid parity and therefore are reliant on securing long term offtake contracts separate from seeking revenue support through subsidies.

Offshore Wind Leasing Round 4
The Crown Estate and Crown Estate Scotland are in the process of their latest round of offshore wind leasing, known as "Round 4" and "ScotWind" respectively. Round 4 launched in September 2019 and ScotWind is expected to launch by the end of 2019.

The Crown Estate has altered the bidding process for Round 4 in that there is to be a multicycle bidding process with a single project and site awarded per cycle. The bidding process is designed to award at least 7GW, with the maximum possible 8.5GW to be awarded. The Crown Estate has defined 'innovation' as one of its key objectives and has offered a 50% discount for the first five years' of rent for up to 10% of the project's capacity where there is deemed to be qualifying 'innovation'.

ScotWind differs from Round 4 to the extent that no capacity cap has been designated and there is likely to be a focus on floating offshore projects. There is also an intention to have prescribed bands of option fees, allowing developers to select which band they would be willing to pay. This is in comparison to the competitive option fee process in Round 4 where bids are to be ranked by price and the site with the highest Option Fee Price will be selected.

Corporate PPA growth

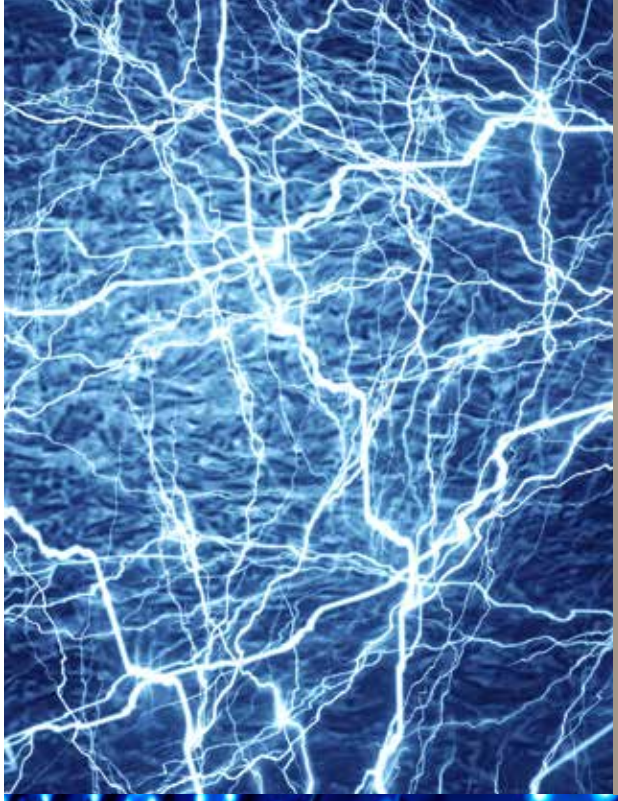
Whilst Power Purchase Agreements (PPA) have been utilised for a long time, the emergence of the 'Corporate PPA' is still relatively new. Corporate PPAs are transactions between a generator and a corporate end-user. Corporate PPAs offer a solution to renewable energy developers seeking to mitigate the problems they face in the form of reduced subsidies and also large energy users, such as corporates, looking to secure a hedged position against volatile or increasing energy prices and source a percentage of their energy from a renewable source. Whilst attractive to both parties in this regard, the agreement is often complex and can be most complex. Despite this, 13.4GW of clean power were purchased in 2018, up from 6.1GW the year previous, by 121 corporates in 21 different countries.

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 and help the UK to meet EU targets for renewable energy and its own ambitious net-zero target whilst also playing an important role in the future grid's resilience.

Where only 20MW of commercial batteries were in operation in 2016, there was nearly 400MW of battery storage deployed in 2018 alone demonstrating the industry's growth. UK storage capacity now stands at over 3.3GW and planning consents had been handed to a further 5.4GW of capacity at the end of 2018, with battery storage accounting for 4.8GW of this.

The UK government has acknowledged the potential for consumer savings with the deployment of technologies that provide flexibility, such as storage, and has incentivised the development and deployment of such technologies through funding competitions such as BEIS' 'Storage at Scale' competition launched in January 2019 and recent industry consultations to explore how best to stimulate growth.



Hydrogen and EV developments

The UK government anticipates electric vehicles (EVs) shall transform the domestic transport sector. Transport remains the largest emitting sector of CO_2 in the UK and the electrification of the industry is seen as pivotal to meeting emissions targets. Together with the net-zero commitment and the domestic policies in large cities (such as the low vehicle emission charge in London), electrification and hydrogenation of transport is seen an increasingly expanding sector for renewable investors. BEIS has recommended that the government brings forward its target of new vehicle sales to be emission free by 2032 from its original target of 2040.

Global stock of EVs increased to 5.1m in 2018, an increase of 2m the year before and there are forecasts that the number of EVs could reach 125m by 2030. The UK currently ranks fourth globally by market share with EVs making up 1.7% of all new car and van sales. Projections show that UK stock could rise as high as 36m by 2040. Policies such as the government's 'Road to Zero Strategy', tax benefits and proposals to implement a requirement for all new homes to be fitted with EV chargepoints are testament to the UK's commitment to wide-scale deployment of EVs.

In the context of public transport (such as buses and trains), the role that hydrogen will play will also need to be explored and this is beginning to gain traction in the UK. The Office for Low Emission Vehicles' Hydrogen for Transport Programme is supporting 33 hydrogen fuel cell electric buses for Aberdeen, Belfast and Liverpool while all London buses are pledged to become emissions free by 2037. The UK is forecast to have its first hydrogen trains operating as early as 2022

No Priority Access & Dispatch

The new EU legislative energy package (titled "Clean Energy for All Europeans") has now largely abolished the "priority access & dispatch" regime for renewables. The RED directive (Directive 2009/28/EC) provided renewable projects with the right to (1) transmit and (2) be dispatched in priority to other sources of generation. However, the recast RED Directive (Directive (EU) 2018/2001) has removed this on the basis of the low marginal costs of renewables, which should mean that they are already within merit order for dispatch[2].

Although a "light" priority for certain projects regime is already in force (Regulation (EU) 2019/943), it will begin to apply from 1 January 2020. This means that under the EU (Withdrawal) Act 2018 (as it currently stands) the new regime will not be treated as directly applicable EU legislation part of "retained EU law" (i.e. domestic law) if the UK exits the European Union prior to 1 January 2020. This is on the basis that only "operative" EU regulations will be retained in domestic law – i.e. EU legislation that is both (1) in force and (2) applies before the UK's exit. Therefore, unless the UK specifically legislates to include the recast electricity regulation within "retained EU law", then new "light" priority regime will not be implemented in the UK.

For the rest of the recast RED directive, which has a transposition deadline of 30 June 2021, the UK's position will also depend on whether it implements the recast RED directive before it exits the European Union. Otherwise, unless the current legislative and regulatory framework is amended to remove the current priority access and dispatch regime, renewables in the UK will continue to benefit from the existing right to be dispatched in priority and receive access the transmission system.

3. Forthcoming developments/opportunities in the renewables sector

The Energy White Paper

Although widely anticipated to be published in Summer 2019, the UK government did not publish its Energy White Paper (as at the time of publication of this guide). However industry sources, including Utility Week, reported that the unpublished energy white paper includes the following policy commitments:

1) to decarbonise the heating systems of up to four million homes by 2030
2) making energy efficiency a national infrastructure priority.
3) a target of up to 40GW of new low-carbon baseload comprising new nuclear and power stations fitted with CCUS (carbon capture use and storage) technology.
4) a target for CCUS projects to capture 10m tonnes of carbon by 2030.

Much of this policy thinking is already subject to consultations published in Summer 2019 so the result and the ultimate policy trajectory depends in part on the consultation responses, and more importantly on the political leadership of BEIS.

For further details on net zero, green finance, energy storage licencing, CCUS, the offshore wind sector deal, and EVs, please see our recent articles on these subjects on Law Now.

[2] A "light" version of the priority dispatch (but not access) regime for renewables is preserved in the recast electricity regulation (Regulation (EU) 2019/943, which is directly applicable in Member States). The regime under the recast regulation gives priority dispatch to a limited set of renewable projects, namely: (1) projects with an installed capacity of less than 400kW, (2) demonstration projects for innovative technologies, and (3) projects that were commissioned before 4 July 2019 and, when commissioned, were subject to priority dispatch under the previous RED Directive (i.e. projects that will be grandfathered under the old regime).

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