RENEWABLE ENERGY WORLD®

SPECIAL REPORT

Renewables in the European Union: Prioritizing Access in Member States

With a revision to the European Union's Renewable Energy Directive looming, EU Member States are facing a potential renewable energy target of 35 percent for 2030, up from 27 percent. Increasing the renewables target means countries must address their own energy priorities, while EU organizations work to support their efforts. What programs are helping advance renewable energy in the EU, and what are EU Member States doing now that will ensure they can deliver on new long-term clean energy goals? Our guide highlights the work in the region that is prioritizing access for renewable technologies now and into the future.

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ORIGINALLY PUBLISHED SEPTEMBER 2016

Ancillary Systems for the Future: The SmartNet Project in the EU

by William Steel

A THREE-YEAR PROJECT funded through Horizon 2020 — the EU Framework Program for Research and Innovation — is aiming at re-thinking electricity grid operations to support higher amounts of renewable energy.

The SmartNet project — now well underway after commencing in January and operating with a budget of over €12 million (US $13.5 million) – will host a number of studies across Europe designed to investigate possible ways for extending procurement of ancillary services to distribution systems.

CREDIT: SMARTNET

Ancillary services typically include managing reserve and balancing, voltage regulation, and congestion management, at both local and system-wide levels and are considered crucial for ensuring effective grid operations. However, with the rise of renewable energy penetration, challenges have emerged.

Identifying Challenges and Solutions In Grid Operations

Explaining the motivation for SmartNet, the project's coordinator, Gianluigi Migliavacca, of Milano-based RD&D organization Ricerca sul Sistema Energetico (RSE), told Renewable Energy World: "Renewable energy systems themselves don't create a problem. The challenge lies rather in the non-programmable

nature of certain kinds of renewables — the intermittency problem — that means that it's not possible to plan with absolute certainty when power will be generated. In solar and wind power, for instance, we have only limited capacity to forecast generation. Balancing increasing amounts of variable injections into the grid, while also accommodating load demands — this is one of nowaday's big challenges."

Highlighting ancillary services as part of the solution, he said: "Flexible generation and loads are a resource potentially available to help solving this problem. In this frame, ancillary services markets are the mechanism where these issues could be dealt with so that national electricity grids continue to function effectively."

By extending to distribution grids — the basis for ancillary services purchase — and improving the design of the ancillary services markets themselves, Migliavacca said that the Italian transmission system operator (TSO) aims to optimize power dispatching and the overall functioning of national grids, as well as reducing the money paid for real-time services acquisition, which could ultimately result, on one side, in the reduction of electricity bills and, on the other, an increase in the hosting capacity of the network for renewable energy.

SmartNet is paying particular attention to analyzing interaction between TSOs operating at the national-level and distribution system operators DSOs.

"The subject of TSO-DSO cooperation is critical," Migliavacca said. "It may be improved through enhancing coordination and better exchange of information between TSOs and DSOs relating to monitoring of the distribution grid and for acquisition of ancillary services."

To this end, Migliavacca suggested that several coordination schemes attributing different roles to the figures of the TSO and DSO are possible.

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"They are the main object of study within the project: the main result will [be drawn from analysis] using an ad hoc simulation platform of the performance of such different schemes [demonstrated in] three national cases (Denmark, Italy and Spain) and draw conclusions case by case on their efficiency."

Today, ancillary services are purchased only from resources located in transmission, and the relevant market is managed by the TSO, according to Migliavacca.

But such a system is not ideal for a grid aiming for high levels of intermittent renewable energy.

"Distribution networks were planned with the philosophy of fit-and-forget: systems were designed to distribute electricity top-down from generation connected to the transmission level to end consumers, and distribution systems are designed accordingly so that there should be no congestion in it," he said. "By contrast, nowadays the level of penetration of distributed generation in distribution grids is increasing. Power often flows back from distribution to transmission and the amount of this flow is uncertain due to an important percentage of intermittent generation. Thus, local congestion becomes more likely and the need for reserves increases."

In contrast, flexible management of distribution can alleviate local congestion. It is this case that SmartNet will explore.

In Migliavacca's view, effective grid management relies on cooperation between TSOs and DSOs — something that may be achieved in several ways, which he refers to as 'coordination schemes.'

There are several options to be considered in this context: "One possibility is that TSOs continue to manage ancillary services centrally. Another is that reserves in distribution that are not used locally are aggregated by the DSO

and re-offered into the ancillary service market managed by the TSO. A third one is that DSO and TSO are each responsible in its own own area and a fixed energy flow is scheduled at the interface."

These varied options may involve changes to the status quo of typical responsibilities held by TSOs and DSOs respectively, as Migliavacca said: "[We will be] assessing whether transferring to DSOs some responsibilities — that are traditionally retained by the TSO — for the purchase real-time reserves might result in a more effective management of the system."

Additionally, SmartNet plans to consider aspects of market design.

"Ancillary market design, i.e., how ancillary market operates, is also a key factor influencing its efficiency and a subject of study for SmartNet," Migliavacca said. "Typically in Europe, balancing markets operate over 15-minute periods. But there are limitations to not updating system information more frequently, especially concerning real time treatment of system imbalance."

He added that, In the U.S. system, information is used much closer to real time, clearing ancillary services markets every five minutes.

"There are advantages to this that will be worth our considering," he said, noting that, taking into account generation forecasts for future time instants within the market resolution algorithm — even if known with a higher error margin — could help to achieve a "smoother" reserve management.

In all these aspects SmartNet will also explore regulatory implications and policy necessary to support novel TSO-DSO interactions in view of existing national and European regulations.

Physical Pilot Studies

SmartNet will be undertaking several real-world studies in an effort to investigate technological and communication issues present between transmission and distribution networks. Three pilot studies are currently underway in testing facilities located in Italy, Spain and Denmark.

According to Migliavacca, the three physical pilot studies will demonstrate methods for monitoring generators in distribution networks while enabling them to participate in frequency and voltage regulation and for enabling provision of flexibility services by flexible loads connected to distribution.

"The generators in these pilot studies are distributed systems that may be utilized for their storage capacity and special flexibility characteristics," he said. In Denmark, thermal inertia of swimming pools will be exploited by moderating water temperature ranges. While in Italy and Spain, local storage facilities of radio-base stations will be feature in tests.

A Question of Energy Storage

The nature of ancillary services begs the question of the role for utility-scale energy storage in future grids. Indeed, alongside pooling power from highly distributed power generators, storage is pitched to provide a vital compensatory function for the intermittency problem of renewables.

"Of course storage is one of the main challenges for the future," Migliavacca said. "If we want to compensate for increasing amounts of renewables, a reasonable solution is endowing variable generation sets with utility-scale storage to provide a buffer for balancing supply and demand (concept of virtual power plant)."

Another option would be to create large bulk storage facilities located in critical points of the transmission grid, where they could help to compensate large amounts of variable generation, he said.

Assessment of utility-scale storage is outside the scope of SmartNet, but Migliavacca said: "In my opinion, [despite on-going questions over technological maturity] a business case could still be possible; but [it] should be sought for in the employment of big storage facilities for ancillary services provision. Again, this demonstrates the great relevance of the themes treated by SmartNet.

Towards A Common European Grid

Looking to the future, key stakeholders have called for greater levels of energy sharing across an open European transmission system — with little doubt, it's a key part of Europe's vision for moving towards 100 percent renewables. Here, Migliavacca observed: "Another level of complexity [to grid management] comes with what happens when TSOs of multiple countries are interacting (by means of a coupling of ancillary services markets), sharing energy, and managing mutual interconnections. This is an important area for further work, but it's only marginally touched by SmartNet; however, SmartNet's investigation (mostly focused at national level) will provide a good foundation for future investigation on these issues."

The SmartNet project is being undertaken by a consortium of 22 partners from nine European Countries, including TSOs, DSOs, manufacturers, and telecommunication companies.

"This allows SmartNet to take into account the diversity of regulations in the different countries […] as well as all the major European institutions in the field," Migliavacca said. "Moreover, gathering the most important R&D centers in Europe guarantees exploitation of the most up-to-date theoretical knowledge and the application of the most advanced simulation techniques."

Altogether, SmartNet's exploration of concepts for future grid architectures is encouraging and a critical aspect to the transition to wholly renewable energy systems. The project's breadth of cooperation, while a necessary dynamic to comprehensively tackling issues at hand, also bodes well — providing a clear example of how multinational collaboration is paving the way to a cleaner future.

ORIGINALLY PUBLISHED DECEMBER 2016

SolarPower Europe Outlines Key Conditions for Fostering Solar Storage

by William Steel

SOLARPOWER EUROPE (SPE) has published 10 policy priorities geared at facilitating expansion of solar power and energy storage within the European market.

Targeting both front-of-meter and behind-the-meter contexts, the priorities concern matters of definition, market design, and remuneration.

IMAGE CREDIT: REC GROUP

SPE hopes its recommendations will resonate with the European Commission as it finalizes preparation of future energy legislation for the European Union.

Vice president of SPE, Riccardo Amoroso, stated: "Today we need European policy makers to put in place stable regulatory conditions including clear definitions and an appropriate market design to ensure a level playing field among competing solution providers. Such conditions will allow for further innovations and corresponding market growth."

Thomas Doering, policy analyst at SolarPower Europe, coordinator of the Task Force Solar & Storage, and co-author of SPE's Solar and Storage paper, told

Renewable Energy World: "Solar PV is already providing a good share of European generating capacity. Of course, solar is a variable resource. Storage allows us to overcome that variability and provide more stable, or dispatchable, power."

"We realize that to allow solar storage combinations to penetrate the market, there are certain barriers to be overcome," he said. "In particular there are needs in terms of regulatory requirements, and market design in particular."

Although challenges are manifold, Doering highlighted a crux issue:

"The market needs to adapt to storage as an energy asset in the system that is neither consumer nor generator, but both. At the moment, in many places storage is doubly taxed for its handling of electricity. Improving this situation necessarily begins with a definition for electricity storage."

Just days after publication of SPE's policy priorities, the European Commission issued a draft of new market design measures that included a definition of energy storage.

The move was welcomed by the European Association for Storage of Energy, and SPE.

Doering commented: "The definition is a first step in the right direction. We now have a basis from which we can start improving legislation. The definition is broad and includes double-conversion. Overall, this means also solar and storage combinations are included. However, based on this definition, storage itself is not yet recognized as a new asset and the double taxation problems are not yet solved. This is something we need to work on in the coming month."

Definitions are a sure foundation, but true evolution requires more systemic change.

Doering explained: "For solar storage solutions to make economic sense we need functioning, effective markets that storage can compete on."

He highlighted that reform of intraday markets is important in this respect.

"At the moment, solar-storage solutions are unable to compete on several markets, not because of some technological capability, but because of market mechanisms and design," he said.

Solar storage solutions are constrained on other levels too; for instance, by minimum capacity requirements and a lack of regulation for pooling over distributed resources.

SPE believes that with meaningful development in policy, solar storage solutions may significantly contribute to the recently announced target of 27 percent renewables in final energy consumption by 2030 (as part of the EU's revised Renewable Energy Directive).

"Both solar and storage are a highly scalable, flexible technologies — if we're to see them contribute more greatly to the energy system — as we believe they can — they need to be suitably rewarded, and fairly remunerated for what they bring to the market," he said.

Providing the Evidence

In support of its recommendations, SPE is preparing a report to feature case studies from a wide range of industry players, including DNV-GL, Enel Green Power, Tesla, and Sonnen.

The report is being prepared by a task force led by Doering who said: "The case studies will provide concrete examples of solar-storage solutions, how they contribute to their respective systems and by what mechanisms. In each case we'll

be providing contextual, background information on the markets in which they are installed."

Though too early to go into details, Doering said: "We have various projects featured in the case studies. In one, we consider an interesting pilot project testing the combination of a large solar plant coupled with a relatively large battery storage system; we consider how they balance the system, integrate it into the market, and work with forecasts."

"We hope to provide our report in the first half of 2017.

ORIGINALLY PUBLISHED SEPTEMBER 2016

Spain Closes In on 50 Percent Renewable Power Generation

by William Steel

OVER THE FIRST eight months of this year, Spain averaged an impressive 47.2 percent renewable energy share in its generation mix.

The achievement was reported by Spanish electricity transmission system operator, Red Electrica de Espana (REE).

Breaking down the renewable share reveals Spain to have developed a strong mix of renewable generating capacity: wind power (21.8 percent), hydroelectric (17.8 percent), solar PV (3.4 percent), solar thermal (2.4 percent), other (1.8 percent). (See Figure 1.)

LEAD IMAGE CREDIT: GAMESA.

The remaining 52.8 percent of the generation mix was made up by a variety of non-renewables, including: nuclear power (23.2 percent) and coal (10.5 percent).

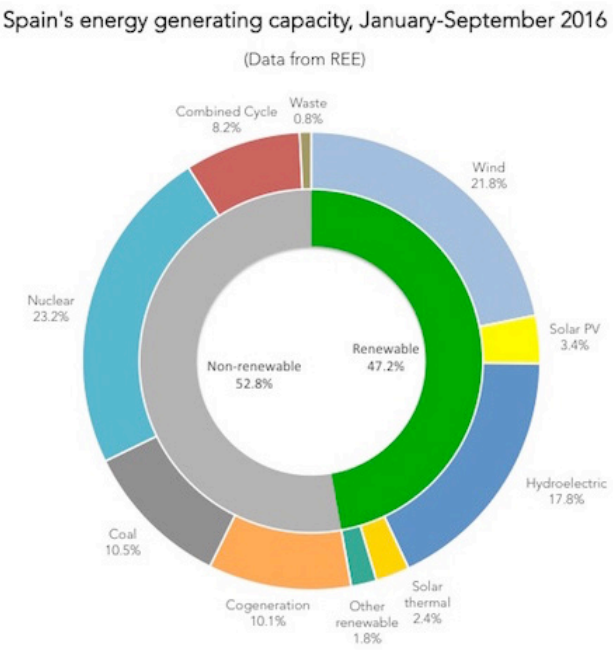
Demand over the same period on the Spanish peninsula from the population of 47 million was estimated at 167,133 GWh.

The top renewable source, wind power, generated 3,630 GWh, in the month of August — an increase of 12.2 percent over the previous year, and 17.6 percent of

total production that month. For some time now, Spain has held the second highest wind power capacity in Europe — over 23 GW.

Still Waters Run Deep

Behind these impressive figures, however, the landscape of industry, policy and economics relating to renewable energy in Spain is somewhat more complex and challenged than it might first appear.



Renewable Energy World spoke with David Robinson, Senior Research Fellow at Oxford Institute for Energy Studies, on this matter. Before anything else, he observed that there are three key successes that should be acknowledged.

"The first success is that Spain has indeed achieved a very high penetration of renewables," he said. "It's gone much further than most countries."

A key driver for this growth, a spokesperson at REE told Renewable Energy World, is European Union policy.

"We are also focusing on the safe integration of renewables, the development of initiatives aimed at energy efficiency and on incorporating innovative technologies to improve system efficiency," the spokesperson said. "All this is geared towards achieving the new energy targets set by the European Council for 2030: 40 percent reduction of CO2 emissions with respect to the 1990 values; and 27 percent renewables share."

Robinson said that Spain has been good at overcoming the challenges that come with operating a highly intermittent renewable system.

"Despite the fact that Spain is something of an electricity island (and is limited in the ability to export), it has been able to control intermittency quite well in several ways," he said.

There are several aspects to this endeavor, he explained: "Spain has introduced policies giving renewable operators incentives that do not exist in many other European countries. One example is that they [renewable operators] face the same obligations and penalties if they don't meet commitments to supply."

In addition, he said, "they've allowed renewables to trade on the ancillaries services market."

Essential in maintaining security of supply in the face of intermittency, is Spain's Renewable Energy Control Centre (Cecre). Commenting on its significance, REE's spokesperson said, "In order to integrate the maximum amount of generation from renewable energy sources into the electricity system, whilst ensuring quality levels and security of supply, in mid-2006 Red Eléctrica designed, put in place and started the operation of Cecre, a pioneering center of world reference regarding the monitoring and control of renewable energies."

Cecre operates 24 hours a day, every day of the year, the spokesperson said. That allows for real-time analysis of the current scenario to be performed, and insight into the operational measures necessary for the system to remain in a safe state.

Robinson added that much of Spain's progress has run in tandem with commendable "development of a highly successful industrial base for renewable energy, especially in the wind power sector."

In spite of successes, it's apparent that Spain is grappling with the challenges of transitioning to a renewable energy system. Several of these difficulties are synonymous with renewable energy, and are evident to varying degrees in other countries too; others, however, are idiosyncratic to Spain.

In either instance Spain's circumstances serve as examples of challenges countries not as far advanced in deployment of renewables may one day face themselves.

"Several serious problems have emerged with Spain's development of renewable energy," Robinson said. "Top of that list is its tariff deficit."

He explained: "For almost fifteen years, the Spanish electricity system has had a revenue — or tariff — deficit related to its regulated activities. It's the result of setting regulated (grid) 'access' tariffs too low to recover all the recognized costs of regulated activities. These access tariffs cover not only transport and distribution network costs, but also other regulated costs and subsidies, including the support to renewable energy, which became the most important cost component of the electricity tariff."

In addition to very generous remuneration, in particular to solar energy, Robinson added, "there was inadequate control over how much capacity was installed; especially with solar PV and CSP."

A key example of this situation was a feed-in tariff that paid 450 euros/MWh for solar PV for 25 years that was granted in 2008. Though it was designed to incentivize 400 MW of solar PV, the framework didn't include a capacity limit or cap on subsidies. With only an end date to the framework, projects amounting to more than 4,500 MW piled up.

But renewables are not the only reason for the tariff deficit. Bad tariff design, slow demand growth, absence of political will to undertake the necessary adjustments in the tariffs and other factors, contributed to the ever-increasing deficit, which

was only halted through emergency interventions introduced between early 2012 and 2013.

"The situation has stabilized somewhat now, but the accumulated deficit currently still stands in the region of 25 billion euros," Robinson said.

While the deficit remains a macroeconomic issue for the nation, importantly, its impact continues to exert significant influence over decisions concerning deployment of renewables.

"Because of the deficit and real anxiety about it increasing, and in the face of excess generating capacity, the government was very keen not to encourage any new capacity, especially if that new capacity meant any kind of guaranteed payments or subsidy," Robinson said.

While government's cautiousness has curtailed development from what it might have otherwise been, it casts uncertainty over what to expect for future growth for Spanish renewables.

Through 2015, no new wind power capacity was installed; and in 2014, only 27.5 MW was added — which the European Wind Energy Association reported as a result of "inadequate" policies.

Last year too, the Spanish government introduced the so-called "sun tax" — legislation that placed a levy on "self-consumption" of energy generated through solar PV systems. Highly contested, and contrary to ethos of emerging trend for empowering distributed renewable energy generation, it's legislation that Robinson cannot see being maintained too far into the future.

The Role of Interconnection Capacity

As with many European countries, an important factor influencing growth of renewables in Spain is its capacity to import and export power. The latter is especially crucial for Spain, where generating capacity easily exceeds demand, depressing electricity prices and hampering renewable energy development.

Although Spain has had success in regulation of its electrical grid and high penetration of renewables, historically it has faced constraints in its transmission capacity with neighboring nations. These persist to the present where interconnection capacity is only around 4 percent of total installed capacity, according to the International Energy Agency's 2015 national review.

Interconnection bottlenecks are "particularly apparent on the France-Spain border," Robinson said, and "have led to renewables generation in Spain shutting down at times, although the curtailment has been limited."

This situation is not ideal from a financial position for operators.

"Certainly one thing that would make a difference for renewable growth is potential to export," he said.

A welcome development for renewable industries, work to expand transmission capacity has been relatively successful in recent years and has political support. Motivating further development, Spain is actively working towards meeting the European Council's target of a 10 percent share of interconnection capacity in total installed generation capacity in every member country by 2020. However, this issue continues to be contentious due to the significant cost of expanding interconnection capacity.

Looking Forward

There are clear successes in Spain's transition to sustainable energy production; all of which have contributed to the nation coming close to a 50 percent renewable share in its generation mix. But the circumstances are nuanced, and an outlook for the future is hard to gauge.

Commenting on his forecast for renewable energy growth, Robinson said that Spain is likely to continue with its build out, but there is uncertainty over whether there will be a need for another round of auctions.

If there is an auction, he said, "it is likely to include a range of technologies, including wind and solar PV. However, due to slow demand growth, it may be possible to meet binding 2020 targets without major investment. Furthermore, there were a lot of bidders at the last auction, which ended up in a price of zero; it is not clear whether future auctions will yield a positive price."

Robinson also noted that 2030 renewable targets are currently non-binding on specific Member States, so investment in new renewable capacity before then will depend in large part on the economics of different renewables, on electricity demand and on government policies, which themselves depend on the which parties eventually form the new government.

For its part, REE is also cautious. Asked about the future landscape of energy production, REE's spokesperson said, "It depends on the policies about renewable energy. Red Eléctrica integrates the maximum amount of generation from renewable energy sources into the electricity system, whilst ensuring quality levels and security of supply."

ORIGINALLY PUBLISHED NOVEMBER 2016

France Sets Fresh Renewable Targets for 2023

By William Steel

THE FRENCH GOVERNMENT has announced fresh targets for renewable energy capacity to be installed by 2023.

The new objectives — published within France's multiannual program of energy — Plan de programmation pluriannuelle de l'Energie (PPE) — will serve as trajectories to be used in defining the priorities for the French government in relation to the development of renewable energy on mainland France between 2016 and 2023.

Target capacities for multiple renewable technologies are specified for 2018; alongside high and low scenarios for installed capacity in 2023.

The two 2023 scenarios are illustrated in the graphic below, with low scenario represented by the inner ring, and the high scenario by the outer ring.

For sake of comparison, France's renewable energy mix at the end of 2015 is also provided further down.

The PPE targets imply total renewable energy capacity of 69,980 MW in the low scenario, and 76,743 MW in the high scenario by 2023; delivering 150 and 167 TWh renewably sourced electricity per year respectively.

Damien Mathon, manager director of France's Renewable Energy Association (Le Syndicat des énergies renouvelables, SER) told Renewable Energy World: "Our organization is very satisfied with 2023 targets because these objectives are coherent with the law for energy transition."

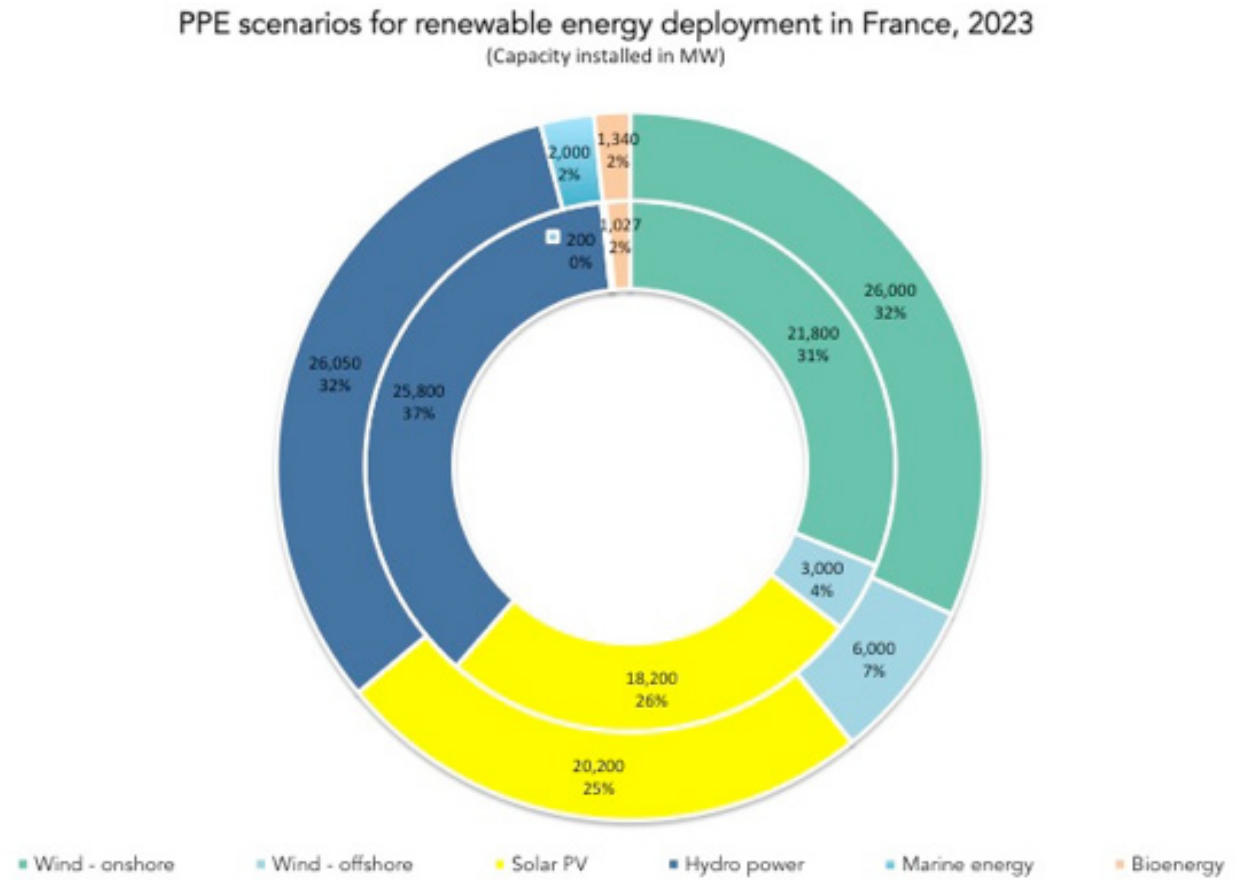
He continued: "Our only regret is the weak target for offshore wind despite economic progress. Otherwise, for all technologies, PPE gives a clear and ambitious vision of RES development."

Providing context in regards to how the trajectories build upon recent momentum for renewables development in France, Mathon said: "For solar and onshore wind energy, the PPE targets are going to double the current rhythm [annual rate of installation]. For instance, for solar from 1000 to 2000 MW, and for onshore wind from 1000 to 1800 MW."

Indeed, strong year on year growth of renewables was reported at the end of 2015: compared to 2014, installation of new wind power and solar PV capacity increased 23.3 percent and 25 percent.

With renewable capacity ably expanding in recent years, the PPE scenarios are roundly expected to add to investor and developer confidence that France will remain an attractive country for new capacity going into the next decade.

Alongside goals for enhanced electrification, continued demand for renewable energy in France is expected to be secured by national policy to reduce the share of nuclear power in electricity production from about 75 percent to 50 percent by 2025.



'BIOENERGY' REFLECTS only PPE targets for increased wood- and biogas-fired power plant capacity combined. France actually already generates a larger amount of power from bioenergy than forecast by the PPE targets, when accumulating all forms of bioenergy production (which the PPE does not). Data legifrance.gouv.fr.

Good news aside, the targets have left the wind industry wanting in some respects.

Matthieu Monnier, Industry and Offshore Wind Advisor for the national wind association (France Wind Energy) told Renewable Energy World: "We warmly welcomed the PPE targets for onshore wind power. It gives a true visibility for the industry and shows the state's ambition for renewables regarding the energy transition law."

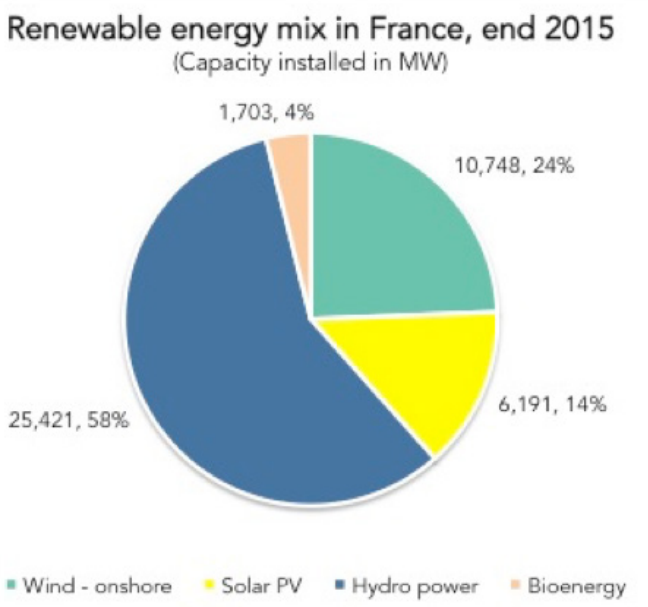
Enthusiasm is reduced for the offshore wind targets; with offshore pitched for just 500 MW by 2018, and between 3,000 MW and 6,000 MW by 2023. By comparison, 568.2 MW was grid-connected in the first quarter of 2016 alone.

Monnier calls for "stronger support" for offshore fixed-bottom wind projects. He continued, "The given visibility could have been higher; between 0.5 and 6 GW [of] additional capacities awarded by 2023 [is] quite unclear — we don't know how much [capacity] we can expect in a near future."

He added that France Wind Energy suggested that the state set up a clear plan with tenders and dates, as in Germany and the Netherlands.

"That is a strong factor for costs reduction, and it gives visibility for new potential investors," Monnier said.

Monnier added that the state should better support the offshore wind projects through reducing legal issues and simplifying administrative requirements.



BIOENERGY CAPACITY composed of household waste (871 MW), wood and other biofuels (400 MW), biogas (363 MW), paper waste (69MW). Corresponding figures in terms of power generation through 2015: solar PV (7.4 TWh); wind (21.1 TWh); renewable hydropower (53.9 TWh); bioenergy (5.9 TWh). Data from SER.

"A 'de-risking' process (of wind measures, geophysical, partial geotechnical and environmental surveys) and a complete permitting package before awards could, of course, boost and accelerate the development of the offshore wind energy, like in Denmark, the Netherlands," he said.

Floating wind — for which there is potential and industry appetite in France — is bracketed under the auspices of marine energy, with even lower targets.

France Wind Energy has proposed a higher objective of between 12 GW and 15 GW fixed bottom and 6 GW floating offshore wind power by 2030.

While Mahon views the PPE trajectories as encouraging, he highlights that presently France is set to miss key national targets.

One such objective is increasing the share of renewable energy to 23 percent of gross final energy consumption in 2020, and 32 percent of this consumption in 2030.

Mahon said: "We think that the current rhythm [should enable] 17 or 18 percent renewables in final consumption by 2020. But if 2020 targets are off, new targets for 2023 with good tools could be reached."

Responding To Change In Europe

By Nigel Blackaby, Director of International Conferences, PennWell

THE EUROPEAN ELECTRICITY sector is evolving at an unprecedented pace, requiring the entire industry to innovate, transform and collaborate in ways like never before. Electricity is set to become the medium for a clean energy future. But to achieve this, the industry will look very different from today.

Fundamental change is taking place in Europe in how electricity will be generated, delivered and consumed. In addition, essential new relationships with the heating, cooling and transportation are being forged. Digital technology is set to be the enabler of change and integration, empowering consumers, delivering sustainability and ushering in new participants providing vital energy services. The rise of decentralised and often variable renewable power sources, the move away from large, often fossil-fired generating units as a part of genuine strategies to decarbonize the power sector and the huge advances being made in the fields of power storage and e-mobility present both opportunity and challenge to this critical sector.

The move towards electrification of economic activity, another crucial step towards de-carbonisation, is a further significant driver in this process. In order to realise the potential gains of all these strategic directions, the whole sector realises the need to

become much "smarter" and this realization has underpinned the rise of smart grids and smart cities in the public consciousness.

In order for all of this to work, digitalization of large parts of the sector will be crucial. The much-anticipated Internet of Things (IOT), the Industrial Internet, Industrial Revolution 4.0 and whatever other terms are currently gaining traction, need to be addressed and clear thinking needs to be offered. Disruptive change, although bringing uncertainty, also creates opportunities for the smartest and best prepared.

Giants in transition

All of the major established power sector players including ABB, GE and Siemens are rapidly turning themselves into digital/industrial companies. The power sector is now becoming a platform on which the established utilities and technology providers are coming together with a plethora of new entrants from the IT, telecoms, fintech and tech start-up sectors. Partnerships are being developed, all designed

to accelerate the pace of change and make this sector as smart, clean, efficient and affordable as it can be.

These dramatic shifts are redefining the future of Europe's electricity market and at the same time creating uncertainty as to the eventual shape this sector will take. As the transition gathers pace, there is a genuine and vital need for a platform that provides clarity, facilitates connections, and defines the industry's roadmap.

For 25 years PennWell has been staging the POWER-GEN Europe conference and exhibition in major European cities and, over the years, created the largest annual gathering of power industry professionals. However, in response to the industry's transition, in the last few weeks, the organisers announced that from 2018, this event will expand its coverage to create a unique platform where the transitioning power sector can meet and develop the business relationship and technological solutions needed right across the electricity value network. Next year, POWER-GEN Europe will become "Electrify Europe", with the goal of becoming the continent's largest hub for information, networking and business opportunities connecting the varied range of industries, now converging to deliver a 21st century integrated power system.

Electrify Europe

Electrify Europe has been specifically designed to be the platform at which all these sectors can coalesce and address the future development of the industry together in a practical and realistic manner. As such, beyond the significant business networking, knowledge gathering and lead generation activity that one would ordinarily expect from a large conference and exhibition of this nature, Electrify Europe also offers its commercial investors and partners a platform at which genuine thought leadership is both encouraged and promoted – to a global audience.

Electrify Europe is the world's first platform event on the convergence of the power sector with the drivers of digitization, decentralization and electrification from both

within and outside the sector. It will combine the highly-respected POWER-GEN and DistribuTECH brands, which cover the industry value chain from electric power generation to transmission to distribution, establishing Europe's largest hub focused on the unprecedented convergence within the electric power industry, as well as with the ICT, IoT & AI, Telecoms and eMobility sectors.

Creating the narrative for change

By the careful curation of thematic clusters, reflected in both the conference content and on the exhibition floor, Electrify Europe will create a strong narrative on the contemporary and anticipated developments and trends in the ever-greater integration in the power industry and its digital transformation. The event will foster cross-sectoral co-operation and collaboration, enabling technical innovation to come together with advanced economic thinking and new value propositions that span the entire supply chain.

Electrify Europe will bring together the best and the brightest of the business and technology world, including industry luminaries, R&D spearheads, corporate and start-up visionaries, and political leaders to provide oversight and points of orientation for the development of technological, economic and political leadership in a market environment that is growing in complexity.

Electrify Europe will offer a dynamic and rapidly expanding ecosystem in which economic ideas, technical solutions and political visions co-exist, co-operate, collaborate, and co-create to take the power industry in Europe forward into a new, exciting future.

Electrify Europe will take place in Vienna, 19-21 June 2018. For more information, visit www.electrify-europe.com