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E|NEWS

Renewable Energies: Global Trends and Experiences

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> In this issue you can read:

In Focus

> Renewable Energy in India – Short interview with Michael Wekezer

1. Mr Wezeker, what do you think are the reasons why India is focussing so firmly on renewable energies?

India's economic growth, new technologies and a population density of already more than 1.3 billion increase the need for energy in the country. Besides, a nationwide supply of electricity cannot be always ensured; daily power black-outs are quite common in many parts of the country.

The country is increasingly relying on renewable energy in order to produce more energy in the future but also to reduce its dependence on imported fossil fuels.

Energy production from renewable sources (solar energy, wind energy, small hydropower, biomass) is continuously growing: from 18.2% in 2017 to an expected 40% in 2030 – this goal was accepted by the Indian government as part of the Paris Climate Agreement. Apart from China, the USA and Japan, India is one of the top renewable energy markets.

2. Why is solar energy so attractive to investors as compared to fossil fuels?

In India, a vast number of funding instruments is available from the federal government in Delhi and also from the federal states. Primarily, the public sector attempts to strengthen market demand. But also feed-in tariffs and direct subsidies have been additionally implemented. Moreover, the country boasts numerous large investments being a result of economic collaboration / development aid.

In the long term, in the area of renewables, India puts on solar energy as the future main energy source. The reason for this is that solar energy benefits from climate conditions providing solar radiation of 4 to even 7 kWh/ day (about 5,000 trillion kWh/ year) with about 300 days of sunshine per year.

Prices for PV panels from both foreign and domestic production are constantly falling. The costs of solar power are decreasing thus leading to steady improvement in the competitiveness of solar power plants. A positive tendency which will be favourable to India's ambitious plan can already be observed: In 2017, solar power was already partially cheaper than coal power.

3. An example: In which parts of the country are solar power plants currently used?

The list is long, just to name a few examples: one of the world's largest solar power plants is located in Tamil Nadu in the south of India and generates electricity with a capacity of up to 648 MW. An even bigger solar park with a capacity of 750 MW is being built in the northern part of the Federal State of Madhya Pradesh in Central India. India is also home to one of the world's largest wind farms which is being erected in the Indian Federal State of Gujarat and will have a capacity of 1,000 MW.

The world's first fully solar-powered airport is located in Cochin in the southern Indian state of Keral.

In addition, nearly 7,000 train stations all over the country will be supplied with electricity from solar energy in the next 5 years. Further 2,000 train stations are planned to join.

Particularly newsworthy are developments in the area of electric cars which are supposed to replace diesel and petrol cars in India by 2030.

The area of roof-top installations has been completely neglected in India so far but will speed up soon – no wonder given the progressive electricity rates. The same applies to power plants producing electricity to ensure the on-site power of industrial plants.

4. This sounds very promising. But are there any snags?

Currently, the lack of storage capacities and transmission lines is still a big challenge to India. India lacks the necessary number of high voltage lines; moreover, funding shortfalls and the shortage of professionals lead to difficulties in expanding renewable energy sources. The purchase of the land necessary for infrastructural projects is often a difficult process. In addition, the Indian administration is inefficient in many situations and shows a very formalistic approach.

5. To conclude our interview, a brief recap: Are renewable energies in India attractive to foreign investors?

Due to the enormous pace of the development, the structural deficits and, first of all, the high demand for electricity, the electricity market in India offers lucrative business opportunities to foreign investors.

However, German companies have not been very successful at winning contracts and/or making bids for public tenders so far, in particular in the solar industry. This is mainly attributable to the fact that many German companies are not prepared for the Indian market, they offer rather expensive high-tech products than inexpensive technologies adjusted to the market preferences. So, in tenders their offers have so far failed to adequately respond to the local requirements and the wishes of customers. On its local energy market, India currently still needs technically simple solutions, robust power plants operating at low cost and requiring small maintenance effort.

Therefore, it is inevitable to be well-prepared before entering the market. This includes an examination of the relevant funding instruments and of practical issues such as selecting the investment location, selecting an Indian partner, if any, and also the engagement of an adviser who is familiar with the legal framework and Indian practices. The trend report "Wachstumsländer Erneuerbare Energien" ["Countries with potential for growth in renewable energies"] published by Rödl & Partner in late 2017 is also intended to serve this purpose. An informative read describing six countries with strong potential for growth in the RE industry.

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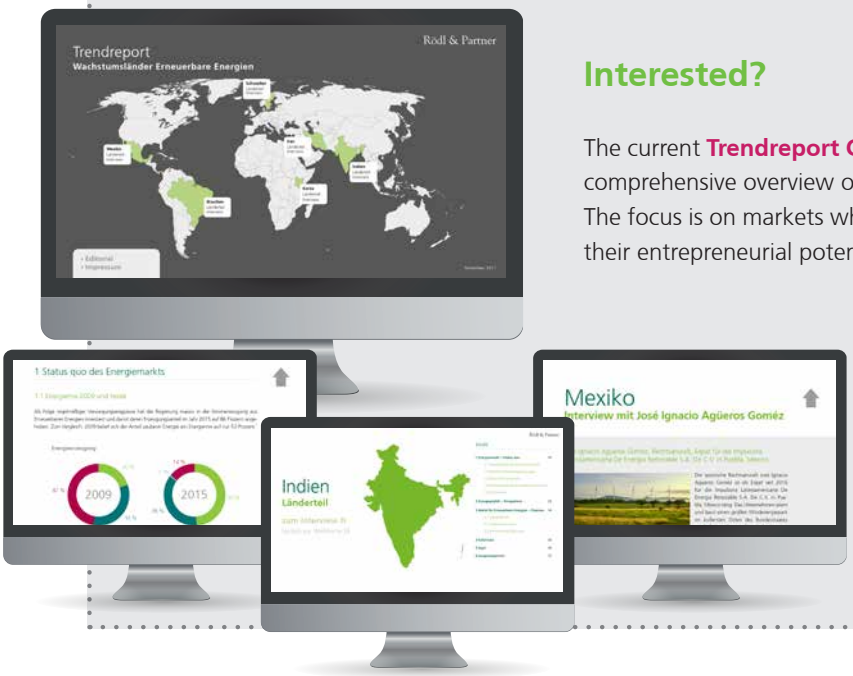

Interested?

The current **Trendreport Growth Countries Renewable Energies** should give you a comprehensive overview of opportunities and risks in selected, high growth countries. The focus is on markets where transformation processes are currently taking place and their entrepreneurial potential is not yet there Market players were recognized.

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Around the world

> Corporate PPA – Direct sale of electricity: Is it an option?

By Kai Imolauer

Corporate PPAs are already implemented on a global scale. They offer good opportunities for implementing projects on the basis of bilateral agreements on the sale of electricity. Even more opportunities will arise if energy wheeling agreements are concluded enabling electricity consumption at a different site from where it was produced.

In various countries, FIT (feed-in-tariff) systems are being more and more often replaced with auctions. On the one hand, of course, auctions significantly limit the market volume (see the planned PV expansion in Germany: 600 MWp per year according to the EEG 2017 [German Renewable Energy Act], § 28 Auction volume) and – despite numerous reports published by the BNetzA (German Federal Network Agency) stating otherwise – they significantly limit the diversity of bidders. From our own daily consulting practice, we see that many small developers but also utility companies, municipalities and citizen-owned energy co-operatives are deterred from bidding in auctions under the EEG only because of uncertainty as to the cent/kWh rate applicable under the EEG, the effort and expenditure connected with securing rights to land, and the planning approval procedure (e.g. with landfills). The venture is more capital-intensive and, thus, has created the need to raise venture capital in form of project developers or consultants. Moreover, depending on how they structure their purchase policies, large companies can achieve significant advantages as regards construction costs and, ultimately, the decisive electricity production costs. This is an even more important factor than financing conditions available on the basis of current interest rates and/or returns on equity.

Various project development companies and also power producers highly praise corporate PPAs, i.e. direct sale to private corporate offtakers (such discussions also took place at the Rödl & Partner Branchentag in November). In Germany, this model would be rather difficult to implement due to the EEG surcharge (such models are being tested as part of PV leasing models) but abroad, it could be quite a viable solution.

Eventually, two models can be distinguished: one where a power plant can be directly connected to the building where electricity is consumed, and one where energy wheeling is necessary.

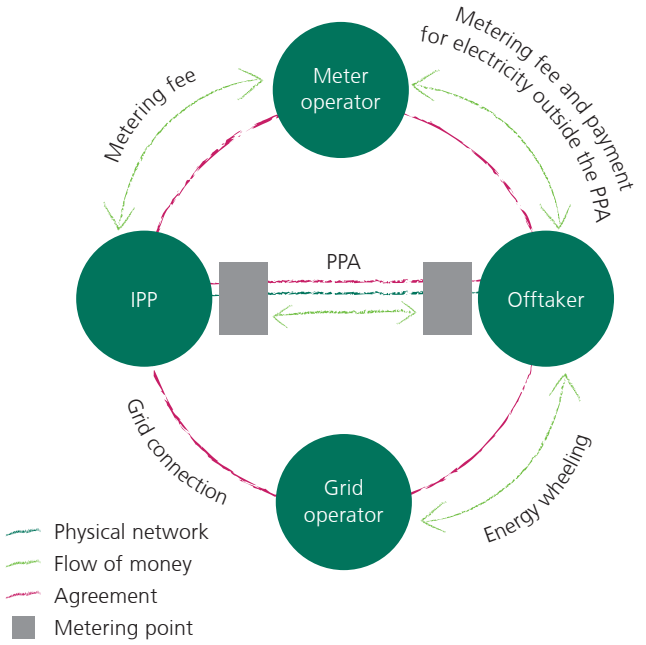
Surely, the first model will always be attractive if there are areas available on a specific land plot, e.g. for PV. Roof-tops, parking facilities and marginal areas can be used and the EPC/IPP will contribute its know-how enabling the construction of an optimal demand-oriented installation. Electricity is fed into the

grid assigned to the specific land plot and consumed on site (in some countries feed-in of surplus electricity or net metering is possible). In the medium term, amid decreasing prices for battery systems, also decentralised load management (peak shaving) will considerably gain in importance.

Any market research should first and foremost focus on the level of electricity prices in the industry because if savings cannot be generated no one will rather want to enter into any contractual commitments. In addition, a power purchaser should also conclude PPAs in foreign currency (dollar, euro) – this will simply allow for financing in countries with higher currency risks. It will be a bilateral transaction between the power producer and the consumer. Of course, such models should be also promoted by the regulatory framework in the long term – which is not the case in Germany but it is indeed in emerging countries.

The second model involving the use of a transmission system is a little more complex and requires more contractual ties but also offers considerable opportunities in particular for wind farms or large-scale PV installations since the power plant site and the site of the consumer can be remote from each other.

The model pictured in the graph is currently being implemented by a client in Ghana. There, high electricity prices for end-consumers, very good resources (in this case, the wind conditions at the coastal site) and a transparent regulatory framework are important factors which make the regulatory risk acceptable. Moreover, the PPA is concluded in dollars, which is not a problem for the exporting end-consumers and, thus, virtually eliminates the currency risk in financing. Ultimately, state influence is considerably avoided and a bilateral power supply agreement is concluded. The purchaser's creditworthiness is central but the operator's risk can be diversified by concluding agreements with several offtakers. Of crucial importance will be the price



level – if the offer is more attractive than the electricity price offered by the state utility (this is the case in Ghana) the bank will be inclined to favourably evaluate the risk related to the sale of electricity. In particular in the first project attempts, it will be advantageous to choose financially strong customers in order to reduce the difficulties in the pilot project. Especially mines could be of interest since, basically, they are a safe business, involving various locations and export.

What projects have already been implemented?

The following table shows corporate PPAs abroad and a few in Germany. The focus of the research was on large-scale projects. It would be rather impossible to capture the myriad of smaller „contracting" projects.

Power producer	Electricity consumer	Duration	Value	Technology	Costs	Year of conlusion	Country
International private companies							
Enel Green Power	Anheuser-Busch	n/a	152.5 MW	Wind farm	n/a	2017	USA
Avangrid Renewables	Google	n/a	196 MW	Wind farm	n/a	2017	USA
Lincoln Clean Energy	Amazon	n/a	253 MW	Wind farm	n/a	2017	USA
General Electric	Microsoft	15 years	37 MW	Wind farm	n/a	2017	Ireland
Reactive Technologies	Total Gas & Power	n/a	310 MW	Wind farm and Solar park	n/a	2017	UK
Beatrice Offshore Wind Limited	Danske Commodities	15 years	294 MW	Wind farm (offshore)	n/a	2016	UK
EREN	Iamgold	15 years	12.5 MW	Solar park	n/a	2017	Burkina Faso
Southern California Public Power Authority	ONGP LLC	26 years	150 MW	Geothermal power plant	7.6 US-Cent/kWh	2017	USA
Belectric UK	Rolls-Royce	25 years	3.4 MWp	Solar park	n/a	2017	UK
Luxcara	Axpo Nordic AS	n/a	111.2 MW	Wind farm	n/a	2016	Norway
Gamesa	Volkswagen	20 years	130 MW	Wind farm	n/a	2016	Mexico
GE / Green Investment Group	Norsk Hydro	19 years	650 MW	Wind farm	n/a	2019	Sweden

Power producer	Electricity consumer	Duration	Value	Technology	Costs	Year of conlusion	Country
International utility companies							
juwi	Usinas y Transmisiones del Estado	20 years	200.000 MWh	Wind farm	n/a	2015	Uruguay
juwi	El Paso Electric	30 years	70 MW	Solar park	n/a	2014	USA
Con Edison Development	NorthWestern Energy	25 years	25 MW	Wind farm	n/a	2017	USA
Greencoat Solar II LP	SSE Airtricity	15 years	75 MW	Solar park	n/a	2017	UK
ACEI	Senelec	20 years	151.8 MW	Wind farm	n/a	2013	Senegal
Northland Power	Delta / HVC Gruppe	10 years	600 MW	Wind farm	n/a	2016	Netherlands
Enercon	Usinas y Trasmisiones Eléctricas	20 years	117.5 MW	Wind farm	n/a	2016	Uruguay
Planer Deepwater Wind	Long Island Power Authority	n/a	90 MW	Wind farm (offshore)	n/a	2022	USA
Planet in Green Projects	SUNA	20 years	100 MWp	Solar park	n/a	2016	Iran

Power producer	Electricity consumer	Duration	Value	Technology	Costs	Year of conlusion	Country
Domestic private companies							
wpd	n/a	20 years	350 MW	Windpark	n/a	2021	Chile
wpd	BMW	n/a	2.5 MW	Windpark	n/a	2013	Germany
BayWa r.e.	Nationwide Building Society/SSE Energy Supply Limited	15 years	45 MWp	Solarpark	n/a	2016	England
enersol	L'Oreal	n/a	3600 MWh	Solarpark	n/a	2017	Italy
MunichRE	McDonald's Restaurant Ltd	n/a	27 MW	Solarpark	n/a	2015	England
BayWa r.e.	SSE Airtricity	n/a	851 kWp	Solarpark	n/a	n/a	Northern Ireland
BayWa r.e. / CEE	McDonald's Restaurant Ltd	20 years	17.7 MWp	Solarpark	n/a	2016	England
Planer Deepwater Wind	Long Island Power Authority	n/a	90 MW	Windpark (Offshore)	n/a	2022	USA
Planet in Green Projects	SUNA	20 years	100 MWp	Solarpark	n/a	2016	Iran

Conclusion:

When analysing markets you should also focus on the German manufacturing industry. From enquiries we receive we know that manufacturers are very willing to collaborate with German IPPs (Independent Power Producers) provided that those can raise the capital needed to erect and operate a facility in the long term. In the abovementioned countries such projects have already been implemented and opportunities for implementing projects without direct access to the electricity market have also become visible in emerging countries (e.g. Mexico) and even in developing countries. Direct access to electricity markets is, however, becoming increasingly difficult in European countries because the success of renewables could now turn into a burden: due to the constantly decreasing electricity production costs only short-term sale agreements are concluded (because of the risk related to the sale of electricity, if e.g. in 5 years power plants will produce electricity sold at even cheaper rates). While financing requires longer-term agreements. Spain, where the minimum price is state-guaranteed, is a country showing a possible solution that could be applied. But also corporate PPAs are an option provided that they will be appropriately accommodated in the regulatory framework of a given country.

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Around the world

> The first 10-year-PPA concluded in Spain

By Christoph Himmelskamp

The year 2018 heralds the beginning of a new era in European photovoltaics. Spanish PV installations are competitive, regardless of any type of state subsidy. Increasing market prices support this trend.

Foresight Group, a UK-based asset management company being the operator of the future PV installation Torre de Cotillas I in Murcia and EVU Enérgya-VM of the real estate group Villar Mir, concluded Spain's (and probably Europe's) first 10-year PPA for an unsubsidised solar park. No information as to the economic terms of the agreement were released to the press. The installation will be connected to the grid mid 2019 and have an installed capacity of 3.952 MWp. It is a relatively small installation compared to the installations currently being planned (and those planned in the past) but Torre de Cotillas I is intended to be only the first stage of a broader 18 MW development project. The installation will be developed and erected by Solarig Global Services, a Spanish and international EPC and project development company.

After hitting historical lows in the spring of 2016, the spot electricity prices quoted at the energy exchange OMIEL recovered and their annual average was 52.22 EUR/MWh, whereas the market prices in the "PV window" were again about EUR 3.5 higher. The trend was also reflected in the futures market, where the price amounted to 50.95EUR/MWh for the third quarter 2017 (source Nexus Energia). But also in other European countries the spot electricity prices increased noticeably in 2017 compared to the previous year.

Average prices at the European energy exchanges (in EUR/MWh)

	2016	2017
Spain	36.67	52.22
Germany	28.98	34.19
France	36.75	44.97
Portugal	39.44	52.48

Source: http://www.omie.es/en/files/mercado_electrico_2017_ing.pdf; http://www.bricklebrit.com/epex.html

It remains to be seen how the spot price will develop in Spain in the coming years. Factors that should be taken into consideration are: possible non-renewal of the operating licence for the nuclear power plants Vandellós II and Almaraz (2093MW in aggregate) in 2020 and Cofrentes and Ascó in 2021 (2059MW in aggregate), recovery of the Spanish economy, expansion of the European internal electricity market and extension of the electricity network connecting Spain to France.

But one thing is certain: in December 2017, the European Union already set a milestone for the expansion of the European electricity market and Europe's energy transition. On 18 December 2017, the EU Energy Council approved Brussels' legislative package "Clean energy for all Europeans". With the measures adopted as part of the package the European Union intends to make the European electricity market more flexible and, thus, fit for renewable energies. On the one hand, it is intended to massively promote the cross-border electric grid expansion so as to facilitate the exchange of electricity within Europe. As a result, operators of Spanish power plants could stronger benefit from increasing prices quoted at the electricity exchanges in other European countries. Moreover, it is intended to focus more on as undistorted competition as possible throughout Europe instead of capacity markets and, thus, to give impetus to investments. As part of the process, the funding of climate-damaging power plants will be gradually reduced. The European Union intends that in 2020, at least 20% of the overall energy consumption will be covered by energy from renewable energy sources, and in 2030 the ratio will be at least 27%. As it seems, thus, the future of Europe will be entirely under the banner of "clean energy".

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Around the world

> Solar energy in a country banking on nuclear power – latest developments in photovoltaics in Hungary

By Stefan Sieferer

In the past years, Hungary was not really regarded as a model country for investors in the field of renewable energy. The underlying reasons are complex and, not least, are related to the energy policy pursued by the Orbán administration which evidently has deliberately refrained from establishing a reliable regulatory framework for renewable energies in recent years. Orbán continues to bank on nuclear energy; about 50% of the electricity needed to cover national demand is generated in a nuclear power plant in Paks in the south of Hungary; currently, this power plant is even being expanded and added two new units with an investment volume of about EUR 12 billion financed by Russia.

According to estimates of the European Commission, the share of renewable energy in electricity production in Hungary might still currently level at only about 10%. In order to be able to achieve the government's ambitious goal of generating at least 14.65% of the electricity production from renewable energy sources by 2020, the government relies mainly on biomass and solar energy.

At least in solar energy a significant increase was recorded in the last two years.

In December 2017, the Minister of State holding the office of the Prime Minister announced at a press conference that, in the future, the Orbán administration will create further incentives for installing photovoltaic power plants in Hungary. Thus, in particular farmers will be given the possibility to take out loans at favourable conditions from the state for installing ground-mounted solar power plants. This measure will be underpinned by an additional guarantee for the purchase of the generated solar power at a guaranteed fixed purchase price.

"The intension is to encourage installing as many PV power plants in Hungary as possible", says the Minister. But the benefits apply only to comparably small power plants with a capacity of maximum 0.5 MW and installed on areas with a maximum size of 1 ha. Also potential investors will have facilitated access to agricultural land if they decide to install and operate power plants with the above-mentioned size parameters. It remains to be seen whether many PV developers will show interest in operating such micro-plants as part of a long-term investment. In the past year, PV projects >1 MW rather continued to be popular, with those projects having been planned and approved under the former incentive system (KÁT) which applied until the end of 2016. Currently, about half of the far over 2,500 permits granted until the end of 2016 are still attributable to such projects, which are still in the planning or building phase. In the meantime, i.e. at the turn of the years 2016/2017, the solar power funding system was overhauled and is now governed by new rules which to most of the – mainly foreign – investors are not as attractive anymore as the abovementioned "old" projects were (no purchase of electricity at a fixed price anymore but independent sale of the generated solar power by the producer on the market and payment of a "green premium" in the amount corresponding to the difference between the reference price determined by the grid operator MAVIR and the so-called "subsidised price" set by the energy regulatory authority HEA. In addition, the guaranteed terms of 20-25 years have been reduced to 13 years.) Therefore, from the aspects of planning certainty and sustainability, the most attractive PV projects in Hungary might still be new projects involving micro power plants with maximum capacity of 500 kW on an area of up to 1 ha. However, it should be taken into consideration that in cases where several investments are carried out by the same company involving the installation of PV power plants on adjacent areas, such investments might have to be considered as one aggregate (larger) investment.

It will be exciting to observe the further development of the renewable energy market in Hungary. Clearly visible activities are probably to be expected only in solar power plant construction and solar power will be the only green energy source that will notably contribute to the overall electricity production, apart from the overly powerful nuclear power.

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Around the world

> Significant changes to the Polish Renewable Energy Act (REA)

By Piotr Mrowiec

After more than six months of the notification procedure, the European Commission approved the modified principles for supporting renewable energy sources submitted by Poland. The draft amendment to the Renewable Energy Act (REA) is currently being publicly consulted and further auction rounds for renewable energy will not be conducted until the completion of the legislation procedure and the effective date of the amendment. Therefore, it is advisable to have a look at the major changes already now.

The foundations of the Polish incentive system for renewable energy will remain unchanged. Incentives will be granted based on auctions, except for micro power plants (power plants with maximum size of 40 kWp), which will continue to receive support in the form of net metering if certain conditions are met. In return for energy amounts fed into the grid a certain amount of electricity is given back to the plant operator. The settlement ratio will depend on the size of a plant. For power plants between 10 und 40 kWp the ratio will be 1 to 0.7 (the producer receives 700 kWh per 1000 kWh of electricity fed into the grid), for power plants of up to 10 kWp the ratio will be 1 to 0.8.

Auctions will continue to be the core tenet of the "Polish energy transition". The form of remuneration to be received by the winner of an auction will depend on the size of an installation. Installations of up to 500 kWp will receive a fixed feed-in tariff (FiT) offered by operators during an auction. Installations with a capacity of 500 kWp and more will be entitled to cover a negative balance between the average electricity price and the price received based on an auction bid – this form strongly resembles contracts for difference (CfD).

The most important change will be the introduction of a mechanism where the price offered in an auction will be reduced by the amount of the granted investment aid. This change lacks a clear definition of the term "investment aid". But it should be assumed that the definition includes all kinds of support aiming to reduce the capital expenditures (CAPEX), in particular EU funding or subsidies granted under national funding programmes for the construction of renewable energy plants.

The Renewable Energy Act in its current version includes a regulation stating that public aid can be combined with funding granted as part of the auction system. According to the current regulations it is not allowed to benefit from public aid in excess of a level that is established for every bidder as the product of the energy volume (offered by the bidder for sale in the auction) and the highest admissible price, the so-called reference price. The following example might help to better understand the change in the approach to combining incentives from different sources under current law and according to the draft amendment:

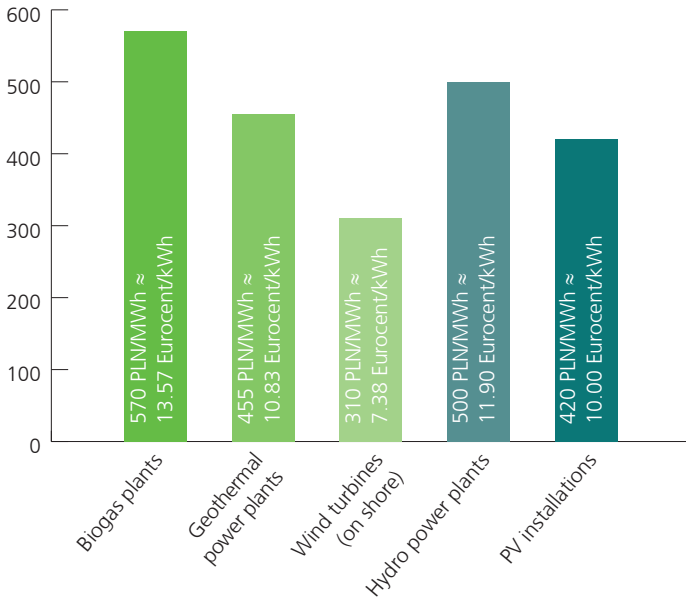
Currently, the funding cap greatly depends on the rate of the reference price. In 2017, for small photovoltaic installations this price amounted to PLN 450 per 1 MWh of electricity. Assuming that a 1-MWp photovoltaic installation produces 15,000 MWh of electricity over 15 years the maximum funding amount would be PLN 6 750 000 (450 x 15 x 1 000). If the operator receives, for example, additional incentives in form of an EU grant of PLN 2 million they will have to adjust the offered auction price so as to not exceed the value of PLN 4,750,000. Therefore, the offered maximum auction price may not be higher than PLN 316.66 per 1 MWh (PLN 4 750 000 / 15 / 1,000). This will inevitably make such bids much more competitive. But after the amendment is signed into law any additional investment aid will reduce the price received in an auction regardless of the ratio between the auction price and the reference price.

This change will be of importance not only for projects intended to be part of the next auction but also for installations that already won an auction but apply for an additional CAPEX incentive.

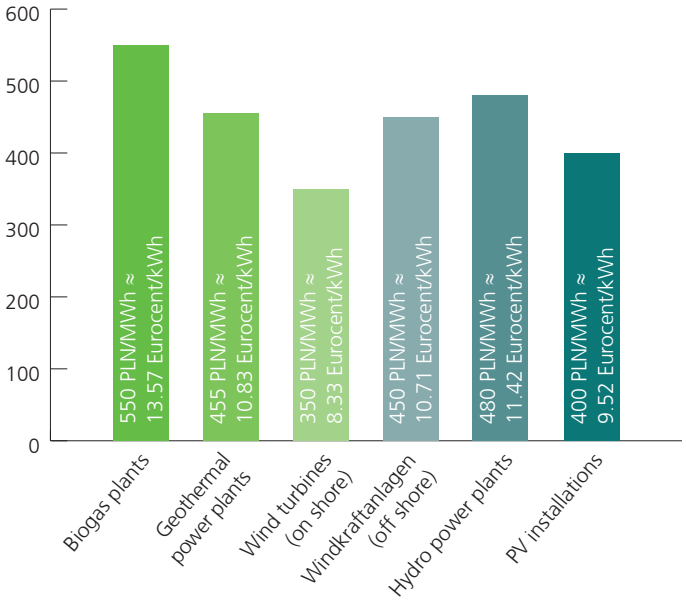
2018 Reference prices for selected technologies

As already mentioned, the next auction rounds will be organised only after the amended provisions become effective. According to cautious statements by the Ministry of Energy this might happen by the end of April; therefore it is also important to know the already published reference prices for 2018.

New RE power plants ≤ 1 MW



New RE power plants > 1 MW



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Around the world

> The key to Europe's district heating lies deep under the ground

By Marlene Orth and Benjamin Richter

As a CO2-free baseload renewable energy source with the greatest potential, but also one of the largely misunderstood climate-friendly energy sources, deep geothermal energy has huge potential for revolutionising the energy industry all over the world and making it future-proof. Especially in Eastern Europe, deep geothermal energy could supply the existing heating systems with electricity in a climate-friendly way and independently of fossil fuels, stabilise heating prices and create an added value on a regional level.

Basics: Deep geothermal energy

Geothermal energy is heat stored in rock layers deep beneath the Earth's surface. Part of the heat comes from the Earth's hot core, while most of it originates from radioactive decay of natural elements in the Earth's mantle. The deeper the rock layer, the higher the temperature. Importantly, at a temperature of 20-40°C, it is already possible to generate heat for use in residential heating systems.

Near-surface geothermal energy covers drillings at depth of about 400 m and temperatures of up to 25 °C and is used solely for generating heat. **Deep geothermal energy**, however, uses heat originating from much deeper rock layers part of which have a temperature of over 100 °C and are thus also suitable for generating electricity. This article, however, will focus only on generating heat from deep geothermal energy. Deep geothermal energy can be stored either in water-bearing layers located deep in the earth, the so called aquifers (**hydrothermal systems**), or in hot dry rock (**petrothermal systems**). Due to their nature, hydrothermal systems are easier to exploit in technical and economic terms, because the warm water can be pumped directly to the surface (production well), where it heats up – by means of heat exchangers– another medium (e.g. water) which is then used for district heating or for generating electricity. The cooled thermal water is then pumped back into the water-bearing layer (reinjection well), where it heats up again and can be used again. In petrothermal systems, however, water must be first pumped into the hot dry rock layer where it heats up and can be used then. This system is also called EGS („enhanced geothermal systems"). As long as the geothermal energy resources are exploited wisely, they are – as far as possible to tell– a limitless source of energy.

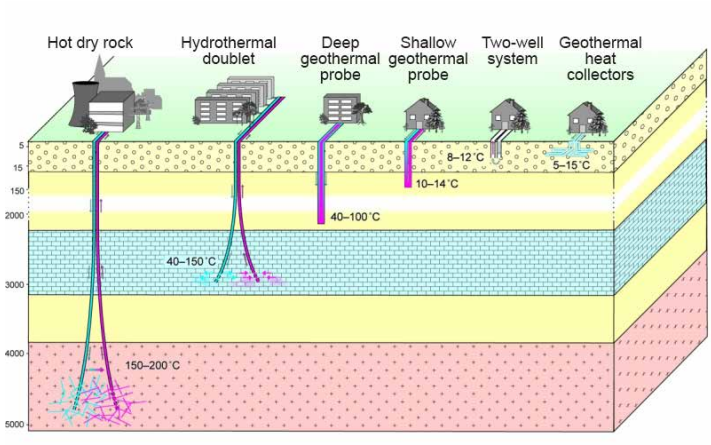

Figure 1: Procedure for exploiting geothermal deposits at various depths (source: Bavarian State Office for the Environment)

Although, unlike hydrothermal systems, petrothermal resources technically can be deployed for universal purposes, their economically viable use is currently limited only to a first pilot geothermal power plant in France's Soultz-sous-Forets (50km north of Strasburg). The majority of projects in Europe, however, are implemented in form of water- and vapour-dominated geothermal systems.

Advantages of deep geothermal energy

In addition to the fact that geothermal energy is completely **emission-free and thus climate-friendly**, one of the prominent advantages of this source of energy lies in its **base load and controllable nature** As opposed to other renewable energy sources such as wind and solar, which can be used only periodically if not stored, it is possible to produce heat from deep geothermal energy at any time depending on the level of demand. This enables deep geothermal energy to supersede regional base load power plants which are currently still oil- and gas-powered. Thanks to the controllable nature of this form of energy generation, **no daily or seasonal storage** is necessary. As far as possible to tell deep geothermal energy is **available limitlessly**, which is advantageous both for suppliers and for consumers, because there are usually no bottlenecks in the power supply and thus **stable supply** can be **ensured**.

The transition from conventional energy sources to deep geothermal energy allows the relevant regions more **independence of fossil fuel imports**, such as e.g. crude oil or gas, and of their naturally volatile prices. The transition to this CO2-free alternative also helps avoid particulate matter pollution inevitable in fossil fuel heating systems.

In addition, geothermal power plants take up much **less space** than for example solar power plants offering the same supply levels. Thus, also in terms of land use deep geothermal energy is a quite promising form of energy for the future.

Not least, the local use of deep geothermal energy also creates **an added value on a regional level:** From creating new jobs and exploring new energy sources and opportunities for exporting know-how to increasing the standard of living thanks to low-emission heating technology – deep geothermal energy is beneficial both to the region and to the entire country in the long term.

In Germany, exploitation of geothermal energy is subject to the Federal Mining Law. This legal framework is very **investor-friendly** and guarantees that the investor retains ownership of the resource. In addition, when it comes to feeding in the generated electricity, electricity projects enjoy a preferential treatment and **fixed tariffs** over a period of 20 years. In the area of heat, the minimum term of agreements is usually 10 years.

Challenges

Naturally, energy projects involve a range of challenges. As is the case for most renewable energy projects, the largest part of the costs is incurred for the construction of the power plant. When it comes to deep geothermal energy, the high start-up investment costs arise from the cost-consuming exploration and drilling phases. Here, investor consortia can become involved in order to acquire the required capital and enable developers to generate the desired rate of return.

In addition, it is necessary to conduct a range of preliminary surveys such as e.g. seismic tests, which will help initially assess where to explore deep geothermal energy resources in as risk-free as possible a manner; such surveys are a prerequisite for preliminary geological research and for obtaining permits.

Despite the surveying activities, it cannot be ruled out that a borehole turns out to be „dry", that is, that it will not be possible to exploit enough energy from there. Even if, for example, in Bavaria, only 2 out of 37 boreholes turned out to be unsuccessful, then –at the level of an individual project– this would mean hefty losses. Naturally, investors prefer therefore projects ensuring professional and independent risk management. Informed risk identification helps to take measures necessary for either completely avoiding or limiting, mitigating or transferring such risks. As shown on figure 2, risk policy measures enable mitigating the general financial risk, leaving the residual financial risk at an acceptable level – something that project developers can take.

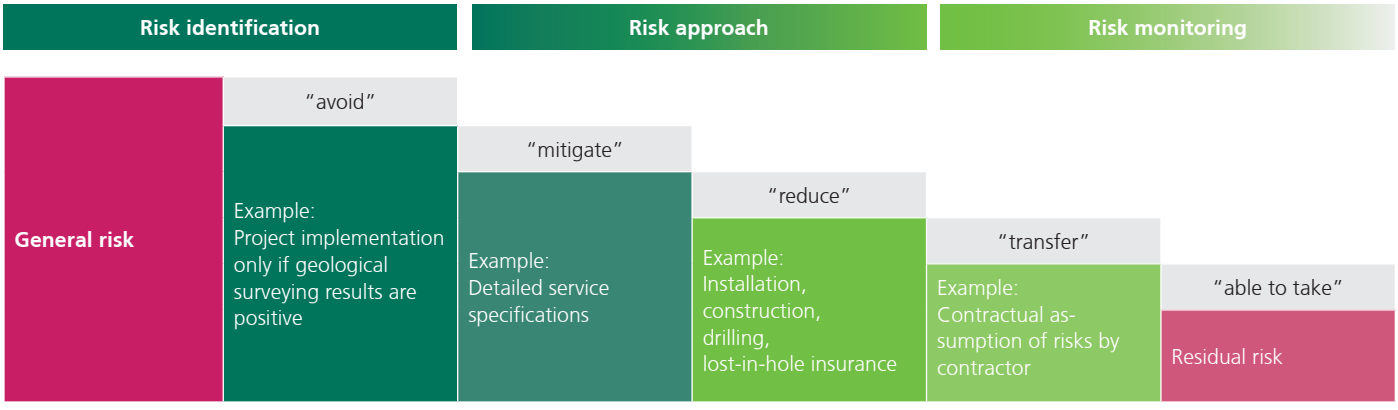

Figure 2: Risk management phases

Another challenge is the fact that a relatively high amount of venture capital will be tied up in the investment over a relatively long term. In terms of particularly financially attractive electricity projects, this means a venture capital requirement running to the tune of tens of millions of euros per project. In the case of heat projects, the share of drilling costs is lower.

In addition, geothermal energy is subject to a host of court rulings from different areas. Depending on the country, geothermal exploration activities are subject to mining law, while hydrothermal resources are governed by water law. In this context, it is necessary to obtain, for example, permits for the exploration of heat in a specific geographical area, or drilling and construction permits, or to conduct environmental impact assessments (EIAs). Well-founded project management which takes into account appropriate time expenditure and workload for such activities, and appropriate legal consulting can be valuable instruments in the project implementation here.

Currently, geothermal energy is being accused by the heat sector of not being competitive with heat obtained from conventional energy sources, such as gas or crude oil, because their prices are currently record-low. But because these prices will increase again in the long term due to the more and more costly exploration and limited availability, as well as measures regarding the price of CO2 certificates, geothermal energy will have a significantly greater competitive edge in the future than conventional energy sources. Professional project management can also be a tool to ensure that the most attractive heat clients are bound by long-term agreements already before the start of the drilling phase.

Current status: Geothermal energy in Europe

Currently, there are over 5,000 district heating networks in Europe, located mainly in Western and Central Europe and in Scandinavia, out of which only 280 are powered using geothermal energy. But the potential for geothermal district heating is much greater.

From all European countries, Iceland was the country to produce by far the largest volume of geothermal-sourced district heat in 2015 (6,421 GWh). Iceland completely outpaced France, which took the second place (1,335 GWh) and significantly outdistanced Germany (662 GWh).

Top 7 countries (Heat energy production in GWh, 2015)			
1		Iceland	6,421
2		France	1,335
3		Germany	662
4		Hungary	380
5		Austria	272
6		Italy	249
7		Serbia	243

Table 1: Top 7 countries heat generation in 2015 (source: EGEC, 2017[1])

Potential for future development of deep geothermal energy especially in Eastern Europe

The potential of geothermal district heating is still largely untapped in Europe, given the fact that this technology has the potential for becoming a solution for supplying Europe with heat in the long term independently of fossil fuels and sustainably in a CO_2-free manner. Western Europe is already prepared for advancing this trend, but Eastern Europe, where there are abundant geothermal resources, is still lagging behind.

Especially the Pannonian Plain is a relatively good site to explore the geothermal potential because there are hydrothermal reservoirs with temperatures of 90 °C and more at only 2000 metres under the ground. The following figures illustrate the distribution of the resource in this region:

Figure 3: Water-bearing permeable rock layers in the Pannonian Plain (source: http://geodh.eu/)

Figure 4: Temperature distribution map at depth of 2000m in the Pannonian Plain (temp. > 90°C)

A detailed analysis of data concerning geoDH[2] (a study which analysed the potential and market conditions for geothermal district heating in overall 14 European countries) shows that there are over 120 district heating networks of this kind in Hungary, Slovenia, Croatia and Slovakia alone, which are currently fuelled using fossil fuels while being located close to geothermal resources with temperatures of over 90 °C at only 2000 metres under the ground, which are perfectly suitable for exploiting

[1] EGEC, 2017. Geothermal Market Report 2016: Key Findings. Available from: https://www.egec.org/wp-content/uploads/2017/05/EGEC-Geothermal-Market-Report_KF_final_web.pdf
[2] Geo = geothermal; DH = district heating

deep geothermal energy for district heating purposes. The figure below shows the distribution of those networks in the said four countries.

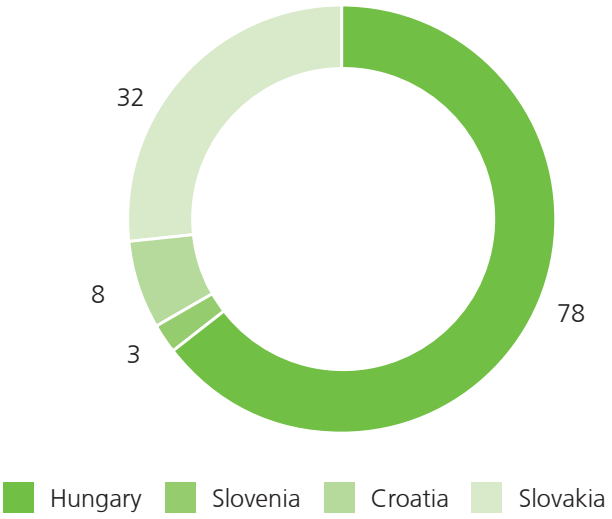

Figure 5: Number of district heating networks close to areas with high deep geothermal energy potential in Hungary, Slovenia, Croatia and Slovakia (total: 121)

These countries offer in particular the opportunity for switching from ageing fossil-fuelled district heating systems to deep geothermal. This enables district heating network operators to operate their heating systems not only in a more consumer-friendly manner but also independently of fossil fuel imports, and at the same time create an added value for the region due to the climate-friendly supply of heat.

In terms of figures, the switch to geothermal for those 121 heating systems alone would enable saving over 119 million tons of CO_2 equivalent. Because currently the majority of district heating networks in Hungary, Slovenia, Croatia and Slovakia are powered using natural gas[3], the following sample calculation assumes that only natural gas is used for the entire energy generation: Assuming that a geothermal power plant for one of such networks has an average installed base load capacity of 15 MW_{th} and operates all year round (8760 hours per year), all power plants can generate 16 TWh in consumable heat per year[4]. According to the following table, this represents about 4 million tons of CO_2 equivalent per year.

Heat generation using 100% gas	CO_2	CH_4	N_2O	CO_2-equivalent
Emissions [g/kWh]	228	0,72	0,002	250

Table 2: Greenhouse emissions for heat generation using 100% gas (Source: GEMIS, available from: http://iinas.org/gemis-download-121.html)

In a horizon of over 30 years, this means CO_2 equivalent emissions savings of over 119 million tons alone in these four countries, which is more or less equal to the level of annual emissions produced by all cars in Germany, Croatia and Hungary altogether. In financial terms, these avoided CO_2 emissions mean savings of nearly EUR 916 million in der region over the said 30 years.

In financial terms, these 119 million tons of CO_2 equivalent emissions savings translate to savings in the CO_2 avoidance cost in the region. Apart from the four discussed countries, there are numerous other district heating networks all over Central and Eastern Europe in close proximity to geothermal resources which are also perfectly suitable for the supply of heat.

The option to switch the already existing district heating networks to geothermal DH systems instead of constructing completely new geothermal district heating networks could be a reasonable way of furthering the topic of producing heat from deep geothermal energy in the region. First of all, this technology enables saving costs which would be otherwise incurred for the construction of completely new district heating networks and helps learn more about technologies of exploring deep geothermal reservoirs. This experience and finding can be then used for implementing projects with significantly greater scopes.

In some cases, it will even be difficult to switch the existing district heating networks completely to deep geothermal energy at once; here, the first step could involve partial integration with deep geothermal energy. Depending on the size of the network, for example, 30% or so of the network could be first switched to the new technology. A deep geothermal power plant with 10MW_{th} capacity alone can replace nearly 88 GWh p.a. of heat from fossil fuels.

Deep geothermal energy is developing into one of the most important sources of renewable energy alongside wind and solar power: In 2017, geothermal capacity of 792 MW was installed worldwide for use in electricity, which increases the capacity to a total of 14,060 MW_{el}[5]. For this electricity production, thermal capacity of over 140 GWh_{th} is constantly required. The key to Europe's long-term climate-friendly supply of heat lies in deep geothermal energy, and manifold opportunities for implementing various heat projects are opening up to investors and contractors implementing deep geothermal energy projects.

[3] Mikulandric, R., Krajacic, G. (UoZagreb): Faculty of Mechanical Engineering: "Perspectives of district heating systems in Eastern Europe" [PDF] (24 – 26 March 2013) available from: http://bit.ly/2o7C7He

[4] 15 MW_{th} installed capacity x 8760 h p.a. x 121 power plants = 15.8 TWh

[5] Richter, 2018. Top 10 Geothermal Countries based on installed capacity – Year End 2017. [Website] Think Geoenergy. Available from: http://www.thinkgeoenergy.com/top-10-geothermal-countries-based-on-installed-capacity-year-end-2017/?utm_source=ThinkGeoEnergy+List&utm_campaign=abf2165bfc-TGE_Newsletter_RSS1&utm_medium=email&utm_term=0_657e42f767-abf2165bfc-415248997

Challenges of deep geothermal energy development in Eastern Europe

Potential deep geothermal energy project developers in Central and Eastern Europe currently see themselves faced with a number of barriers whose complexity and scope vary from country to country. For example, in Slovenia, the district heating market is partially closed to market newcomers, or gas prices are regulated and the connection to the gas grid is mandatory. The last barrier is also present in Bulgaria, the Czech Republic, Poland and Hungary, which naturally strongly hinders competition in the heat sector. Countries such as Poland and Slovakia barely support deep geothermal energy endeavours; but Slovakia's Energy Minister László Sólymos is currently considering phasing out coal power and transitioning to renewable energy sources, as part of which the region around the city of Nitra in Western Slovakia could switch to the deep geothermal energy technology[6].

The lengthy and burdensome administrative procedures in Slovenia and Hungary or regulatory gaps (such as e.g. lack of regulatory law on the exploitation of deep geothermal resources) in the Czech Republic are another factor hindering the development of the deep geothermal energy sector.[7]

These barriers are the reason why the existing deep geothermal energy resources are not exploited yet in some (Eastern) European countries despite their large potential for use in heating systems.

In order to untap the immense technical and financial potential for deep geothermal heating, the geoDH study[8] identified the following key factors that should be included in a comprehensive framework enabling the development of this technology:

- National and regional rules must include a definition of geothermal energy resources and related terms in line with Directive 2009/28/EC.
- The rules concerning the authorisation and licensing procedures must be proportionate and simplified, and transferred to regional (or local, if appropriate) administration level. The administrative process must be reduced.
- Information on geothermal resources suitable for district heating networks should be freely available and easily accessible
- Ownership rights should be guaranteed
- Rules for district heating (DH) should be as decentralised as possible in order to be adaptable to the local context; in addition, the minimum share of renewable energy sources in the total energy consumption should be determined in line with Article 13.3 of Directive 2009/28/EC
- In line with Article 13 of Directive 2009/28/EC, administrative procedures for geothermal licensing should be simplified as far as possible and the burden on the applicant should reflect the complexity, cost and potential impacts of the geothermal project which the license or authorisation is being applied for
- A unique authority issuing permits for geothermal energy exploration projects should be established
- Policy-makers and civil servants should be well informed about geothermal energy
- Technicians and energy service companies should be trained in geothermal technologies
- Legislation should aim to protect the environment and set priorities for the use of underground resources: for example, deep geothermal energy should be given priority over other uses (e.g. over fossil fuels, CO_2storage, or nuclear waste repositories)
- The public should be well informed about geothermal energy and consulted about geothermal project development in order to build greater public acceptance for geothermal projects

In Africa and Latin America, the following funding initiatives have been successfully implemented so far to support geothermal projects: The Geothermal Development Facility (GDF) fund in Latin America offers investment grants at all project implementation stages from the research phase through to drilling and construction to creating a forum in order to encourage the dialogue with political decision-makers and partnering governments. As the first climate initiative in the Latin American region, financed by multiple sponsors such as KfW Entwicklungsbank, Central American Bank for Economic Integration, CAF – the development bank of Latin America, and Inter-American Development Bank, the GDF initiative plays a pioneering role in this concept developed by Rödl & Partner. Similarly as the GDF, the Geothermal Risk Mitigation Facility (GRMF) fund of the African Union Commission (AUC) and KfW Entwicklungsbank, where Rödl & Partner acts as the fund manager, supports geothermal projects in East Africa by providing funds contributed by the German Federal Ministry for Economic Cooperation and Development, the EU-Africa Infrastructure Trust Fund, and DFID (UK). To considerably encourage the development of deep geothermal energy in Eastern Europe, a comparable fund would be a perfect solution for the above-mentioned reasons to support the market in Eastern Europe. The EGEC/IGA associations are already in talks with the EU Commission about it.

[6] Richter, 2018. Geothermal energy could help in transition from coal to Slovakia. [Online article] Available from: http://www.thinkgeoenergy.com/geothermal-could-help-in-transition-from-coal-in-slovakia/

[7] geoDH, 2015. Developing geothermal district heating in Europe. [PDF] available from: http://geodh.eu/wp-content/uploads/2012/07/GeoDH-Report-2014_web.pdf

[8] ibid

Although a geothermal project is economically viable also without financial support, it is nevertheless important that municipalities with district heating networks close to deep geothermal resources do not cease to insist on obtaining support, both financial and regulatory, for the exploration of those deposits from both their national and the EU government.

Rödl & Partner has wholly owned offices or reliable associates in nine of the ten countries with the largest installed geothermal capacity. We have long experience in all phases of implementing geothermal projects, from risk and capital raising, through to feasibility studies, to well-founded project management and optimal coordination of geological, technical, financial, legal and organisational aspects of the project.

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Around the world

> Consequences of the US tax overhaul and industry trends

By Ralf Rüdenburg

In record time, the US Congress drew up a joint tax reform bill and presented it to the President for his signature shortly before Christmas. Donald Trump signed the bill on 22 December 2017 and thus the tax code rewrite was signed into law. This feature discusses the essential implications for the renewable energy industry and presents the current industry trends.

Summary of the text:

> The US tax reform reduces or repeals tax credits in some areas. Some changes will not be effective until after 2018. The investment tax credit and production tax credit remain unchanged. This is a success for the renewable energy industry.

> There is no direct impact on the state legislation in terms of renewable energy resulting from the tax overhaul.

> 25 percent of all new electric generating capacity brought on-line in the U.S. from January until September 2017 has come from solar. However, the Solar Energy Industry Association is concerned about the possible impact of some new tax regulations on tax equity financing, and the final outcome of a trade dispute to impose tariffs on crystalline silicone PV and cell imports from all countries. This could hurt the industry because of supply shortages as the solar industry depends heavily on imports from other countries.

> The American Wind Energy Association welcomes that the Production Tax Credit and the Investment Tax Credit remain unchanged. The Association expects 85 billion USD worth of investments and 20.000 new workplaces in the industry until 2020.

> The Renewable Energy Industry managed to eliminate new tax provisions with potentially negative impact on the industry. This shows the importance and power of the industry to impact the legislation process. German companies should follow the development and watch out for business opportunities especially on a state level.

Significant legislative changes on federal level

Implications for the renewable energy industry arise from the following significant legislative changes.

> For wind energy producers, the new law repeals inflation adjustment for tax credits. At the same time, it reduces the tax credit from 2.4 US cents to 1.5 US cents per kWh. The legislative change applies to wind turbines whose construction starts after the effective date of the tax overhaul.

> For companies investing e.g. in small-scale wind turbines, fuel cell plants and CHP power plants, whose construction starts before 1 January 2022, subsidies change as follows. The tax credit is reduced for power plants whose construction starts in 2020 from 30 percent to 26 percent and to 22 percent in the case of power plants whose construction starts in 2021. If a fuel cell plant or a wind turbine is not commissioned before 2024, the tax credit will be 10 percent.

> For private individuals operating fuel cell plants, geothermal power plants and small-scale wind turbines to generate electricity as prosumers, the subsidies will be prolonged until 31 December 2021. Nonetheless, the percentage rates for power plants commissioned in 2020 will be reduced from 30 percent to 26 percent and to 22 percent in the case of power plants commissioned in 2021.

> The tax credits for solar and geothermal power plants will be repealed effective 2028.

Despite those changes, the renewable energy industry doesn't see only negative aspects of the tax overhaul. Maintaining the Investment Tax Credit and the Production Tax Credit is celebrated as a success. The sector's lobby group could impact the legislative process so that the needs of the industry were taken into consideration and, thus, the rules adopted by Congress in 2015 have remained unchanged.

Implications of the tax overhaul on state level

The tax rewrite has no direct implications for the state legislation. It remains to be seen how the federal legislative changes will affect the forecast growth in the renewable energy sector.

Other latest developments

The most recent market report by Solar Energy Industries Association states that the capacity installed in the third quarter of 2017 decreased year-over-year and was 2,031 MW. The report notes that the main reason for this decrease were shortages of supply. It also emphasises that 25% of all new electric generating capacity brought online in the USA in the first three quarters of 2017 has come from solar. Only the share of natural gas is higher.

The Solar Energy Industries Association sees, in particular, two sources of risk for the further economic growth.

> Due to the reduced tax rate and certain Base Erosion Anti-Abuse Tax („BEAT") provisions, investors could be willing to pull back from financing projects. This would be a severe blow to the industry. In the past, the so-called tax equity financing had established itself as a popular approach to financing projects. As part of this financing form, investors provide equity to special purpose vehicles and, thus, avoid external financing and the related interest payments. The aim of this form of financing is, in particular, to generate positive returns and enjoy the tax credits for renewables. This is because the use of a tax credit is possible only when there is a tax liability. It remains to be seen whether the feared investor pullback will materialise. By all means, it should be stated that one of the prerequisites for applying the BEAT provisions is that the company must generate at least USD 500 million p.a. over a period of 3 years.

> It is also not known yet what the final outcome of the petition filed to the U.S. International Trade Commission for imposing import tariffs on solar cells and solar modules will be. Suniva, a solar cell and module manufacturer, filed the petition in a bid to protect US manufacturers. The authority to decide on this matter rests with President Trump. The decision must be made by 26 January 2018 and was not yet known as of the editorial close date for the February issue of ENews. Imposing protective tariffs could, however, have unexpected consequences. If imports decreased, the reliance on foreign-manufactured products could lead to a decline in the installed MW capacity that should not be underestimated and could negatively affect companies and jobs. In addition, the costs of solar modules and solar cells would probably increase due to the constrained availability and would also contribute to the decline in the installed MW capacity if investors became more conservative due to the higher costs.

The American Wind Energy Association particularly welcomed the fact that the Production Tax Credit and Investment Tax Credit have remained unchanged. It is projected that investments of USD 85 billion will be made and 20,000 jobs created by 2020. The report for the third quarter of 2017 emphasises that the number of wind projects in the construction phase increased by 27% year-over-year. The capacity being installed as of the end of the third quarter was 29,634 MW and thus the highest since the publication of figures. Texas, Indiana, Oklahoma and California are the leading states in terms of installed capacity.

Conclusion

This overview shows that the latest developments present a very mixed picture. Positive is that the renewable energy sector managed to reduce or even eliminate the planned changes to the subsidies law, which would have had a hugely negative impact if adopted. This shows the importance and power of the industry to impact the legislation process. German companies should continue to follow the developments on a state level with particular attention. This is because more and more states are starting to incentivise the use of renewable energy sources and this creates business opportunities. Meaningful is that 37 states and 4 territories have already committed to switching their electricity supply systems to a large extent to renewables in the years or decades ahead (until 2040).

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Around the world

> Self-consumption and direct sale of electricity in South Africa: An option for German enterprises?

By Anna-Lena Becker

Electricity prices continue to rise strongly in South Africa. Due to improved legal framework conditions regarding the requirement to hold a licence for electricity generation, installations for self-consumption or direct sale of electricity could be an attractive alternative for energy-intensive companies in the future.

In the past, many manufacturing companies chose South Africa as a location for their production facilities due to favourable electricity prices, among other reasons. Since 2008 however, the electricity price has been continuously rising by more than 15% p.a. on average. Also for the coming years, further strong electricity price increases are expected.

In South Africa, there is no free choice of electricity supplier. Electricity is supplied either by the national electricity group "Eskom" or by the relevant municipality, depending on the region of the country where the electricity consumer is located. Generating more than 90% of the electricity, Eskom is also the dominant power producer in South Africa.

If an electricity consumer wishes to no longer be supplied with electricity by Eskom or a municipality they basically have the options of self-consumption or a direct purchase of electricity based on a power purchase agreement (PPA). Since the so-called wheeling is a relatively new feature in South Africa (one of the few known examples is a biogas plant supplying BMW) and requires individual negotiations with Eskom and/or the municipality, power production plants on a company's own site are particularly attractive.

In the past, one of the major hurdles to such projects was the requirement to hold a licence for electricity generation (the so-called "generation licence"), which is issued by the national regulatory authority "Nersa". Since a legal amendment in late 2017, however, the following six situations have been exempt from the requirement to hold an electricity generation licence:

1. Grid-connected power plants with an installed capacity of up to 1 MW without energy wheeling;
2. Grid-connected power plants with an installed capacity of up to 1 MW allowing for energy wheeling;
3. Grid-independent power plants with an installed capacity of up to 1 MW;
4. Power plants for demonstration purposes;
5. Power plants where electricity is generated as a co-product, by-product, waste product or residual product of an underlying industrial process;
6. Power plants serving exclusively for standby or backup electricity supply.

Each of these exceptional situations includes further prerequisites. So, for exceptional situations 1 and 2, it is required, among other things, that the MW volume specified for grid-connected power plants of this type in the Integrated Resource Plan („IRP") has not yet been reached. The IRP is an official strategy paper determining the energy mix for the whole country. The current IRP does not yet provide for grid-connected self-consumption power plants; however, it is being revised and is expected to include them. Information on the current IRP and the planned revision may be found at http://www.energy.gov.za/files/irp_frame.html. In all the six exceptional situations the registration of a power plant with Nersa will be required instead of obtaining an electricity generation licence. Details regarding this registration (registration procedure and fee) are not known yet.

Whether such power plants can feed surplus electricity into the national grid depends on the region where the power plant is situated because no nation-wide applicable provisions regarding feeding-in electricity exist and regulations are determined by the relevant municipality or by Eskom.

If a power plant feeds electricity only into the grid assigned to the specific land plot of a given company but not into the national grid it could fall within the scope of either exceptional situation 1 or 3. Which of these exceptional situations will be applicable in the individual case, in our judgment depends on whether feeding electricity back into the national grid can be prevented by technical means. Especially with solar, such a feature can be secured already when designing the installation and arranging the modules. **Consequently, the operation of a power plant and the sale of electricity to a given consumer on the land plot would be exempt from the requirement to hold an electricity generation licence.** Where an electricity generation licence is required for a given power plant, power producers are currently facing the challenge that grid-connected power plants have not been included in the latest IRP. In this case, Nersa requires them to obtain an approval from the Minister of Energy for a given project.

We recommend that energy-intensive companies in South Africa have their electricity consumption estimated based on a load profile in order to analyse possible advantages of using e.g. a rooftop PV installation on their own site for producing electricity for their own use or for direct sale via power purchase agreement. A power plant should be designed so that the prerequisites of one of the above-mentioned exceptional situations are fulfilled in order to avoid the difficult hurdle of obtaining an electricity generation licence. We expect that this legislative overhaul will result in an increase in the number of power plants on company sites (operated by the companies themselves or via PPA). The integration of such an energy-efficient power plant simply helps unlock the local potential and can, of course, be used as an advantage of South Africa as a business destination and create a competitive advantage. However, should load shedding become necessary again, this would have a considerable advantage in that backup power (from generators) would probably be much cheaper at such times. And, last but not least, the environment would benefit if power generated from black coal was replaced with electricity from energy-efficient installations.

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News on international renewable energy incentive programmes

> GET FiT Zambia – First tender round planned for early 2018

After 2 tender rounds for PV installations were already conducted in Zambia under the World Bank's Scaling Solar Programme, this year will witness the first tender round within the framework of the GET FiT Programme. The programme is supported by Kreditanstalt für Wiederaufbau (KFW). An overall volume of 100 MW will be available for bidding as part of a two-stage auction procedure; the size of individual projects will be capped at 20 MW. Stage 1 of the procedure, „Request for Qualification", is scheduled for the first quarter of 2018.

Basically, bidders are free to choose projects to be submitted for tender but the proposed projects must feed into the ZESCO grid. The distance between project site and the interconnection point may be not more than 10 km; in addition, limitations may apply to sites depending on the results of a conducted grid impact assessment. Detailed information on this has been published at **https://www.getfit-zambia.org**.

More tenders for hydro power, biomass and geothermal energy will follow

> Heating networks 4.0 – Investment grants for development and expansion of heating networks in Germany

Under the German National Action Plan on Energy Efficiency the Federal Government has set itself the objective of reducing the share of fossil fuels in the primary energy demand of existing buildings by 80% by 2050. Moreover, the share of renewable energies in the final consumption of heating and cooling should be upped to 14% over the next three years. The fourth-generation heating networks should guarantee highly efficient and environment-friendly supply of heating and cooling and, nevertheless, it should be possible to operate them in an economically viable way at competitive heating prices holding the ground against energy production from conventional sources.

The funding consists of two modules:

- Module I offers co-funding for the analysis of the implementability and profitability of a concept based on a feasibility study. The level of funding is up to 60% of the costs or maximally EUR 600,000.
- Module II offers grants for the implementation of a heating network 4.0 where a new heating network is installed or an existing one transformed. The grant may amount to up to 50% of the costs eligible for aid or maximally EUR 15 million.

Several conditions must be fulfilled for a heating network to be recognised and funded as a system 4.0

- The share of renewable energy and waste heat in the annual volume of heat fed into the grid must be at least 50%
- Heating prices must be at the same level as prices for heat from conventional networks or lower.
- At least 100 consumers must be connected to the grid or consumption must reach at least 3 GWh p.a. (exceptional regulations are possible for smaller-scale networks)
- The heating/cooling network must have a low temperature level and a supply temperature of between 20 and 95 °C.
- Seasonal thermal energy storage systems must be used as long as no reasons for the inefficiency of such storage can be presented.
- Electricity consumers/producers connected to such systems/network must ensure operation that is favourable to the grid and the integration into a smart grid system.

Municipalities, companies, municipal enterprises and special purpose associations, registered associations and registered cooperatives are entitled to apply for funding. The application including the required documentary evidence should be filed prior to implementing a measure; the application form can be downloaded from the website of the Federal Office for Economic Affairs and Export Control (BAFA).

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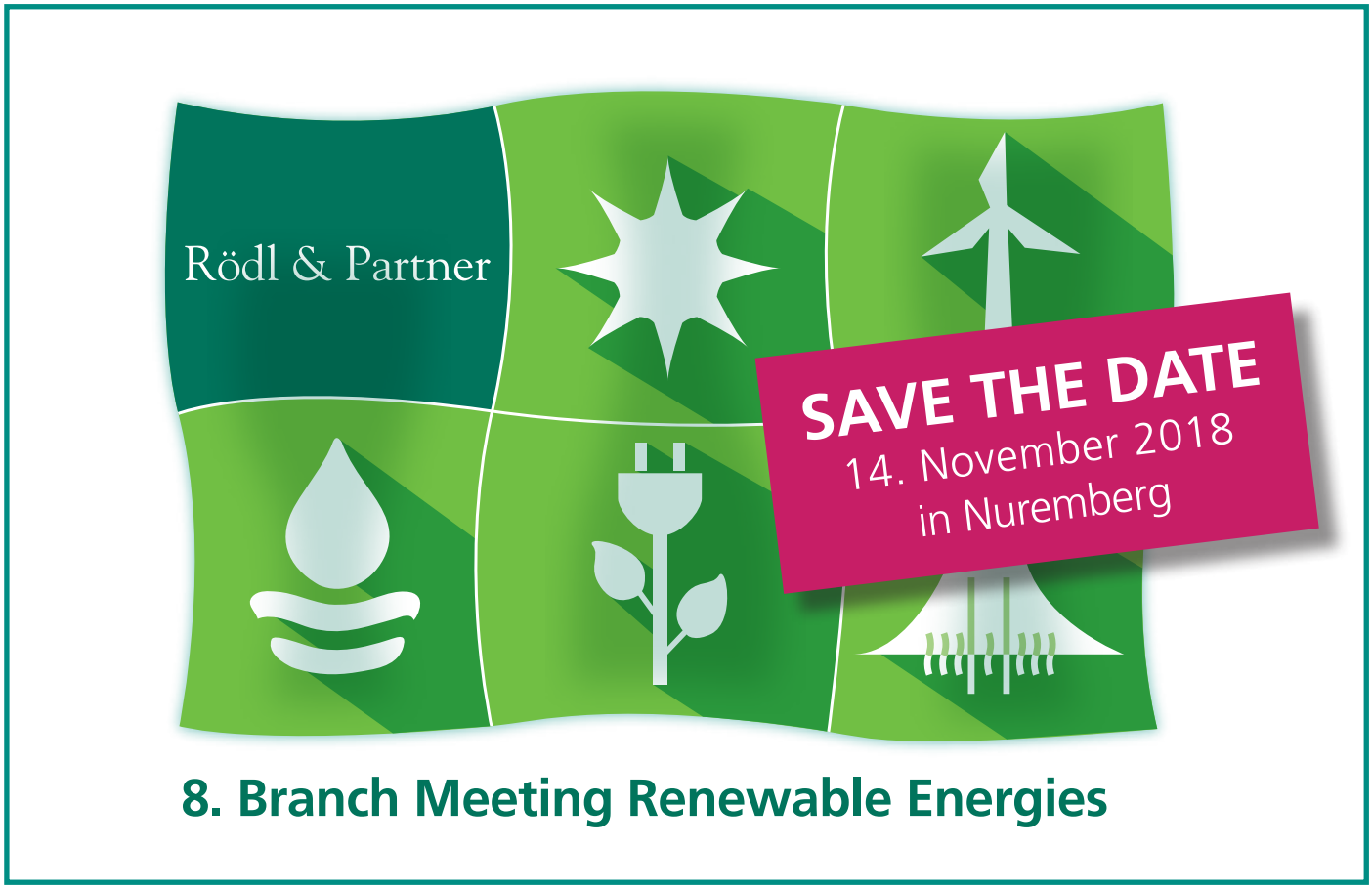

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Castellers de Barcelona

„Each and every person counts" – to the Castellers and to us.

Human towers symbolise in a unique way the Rödl & Partner corporate culture. They personify our philosophy of solidarity, balance, courage and team spirit. They stand for the growth that is based on own resources, the growth which has made Rödl & Partner the company we are today.
„Força, Equilibri, Valor i Seny" (strength, equilibrium, valour and common sense) is the Catalan motto of all Castellers, describing their fundamental values very accurately. It is to our liking and also reflects our mentality. Therefore Rödl & Partner embarked on a collaborative journey with the representatives of this long-standing tradition of human towers – Castellers de Barcelona – in May 2011. The association from Barcelona stands, among many other things, for this intangible cultural heritage.

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