THE SPRING 2017 LEGAL GUIDE TO:

The Renewable Energy Investment Outlook for Central-Eastern Europe

Possible impact of the Energy Union's Fourth Energy package

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INTRODUCTION

The Energy Union's Third Energy package, adopted in 2009, stipulated renewable energy investments in the whole of Europe by setting binding targets for 2020. Following an investment boom in recent years in almost all EU member states further investments have stopped for the time being, although not all member states will meet their specific 2020 Renewable Energy Sources targets. This is mainly caused by a substantial change of the support system for renewable energy implemented by the EU 2014-2020 Energy and Environment Aid Guidelines ('EEAG'), which oblige member states to grant operative support via an auction system for all new investments with at least 1 MW installed capacity starting from 2017. This change of the support system provided an investment gap in many member states.

Furthermore, the new draft of the Energy Union's Fourth Energy package, presented by the European Commission on 30 November 2016 as the 'winter package', has provided further uncertainty for the future legislative framework and market environment. Much uncertainty will remain until its implementation, expected by the end of 2018. However, this may act as a momentum for project development to benefit first from the market environment in the coming decade.

The very detailed European Commission proposals and the obligation of EU member states to submit draft National Energy and Climate Plans with binding targets for 2030 by the end of 2017, and a perspective up to 2050, should again provide more transparency. By the end of 2018 these plans have to be agreed in the region and notified with the EU. In addition, it is also planned to implement the 'winter package' by the end of 2018. It is not yet clear whether this timeframe will be postponed by a year, however, EU member states are already obliged to provide a coherent integrated strategy for the future low/zero-emission economy. In particular, those member states which face severe problems with air quality, such as Bulgaria and Poland, must move faster to avoid high penalties.

PONTES is pleased to provide you with a market outlook for renewable energy investors in CEE for future investment decisions in a challenging regulatory and market environment, based on the current state of the Energy Union, the PRIMES EU reference scenario, published in July 2016 as a base scenario for specific National Energy and Climate Plans, the regulatory framework set by the 'winter package', and the newly implemented renewable energy support systems, including the legal framework for project development.

Christian Schnell, PhD, Editor

Warsaw, May 2017

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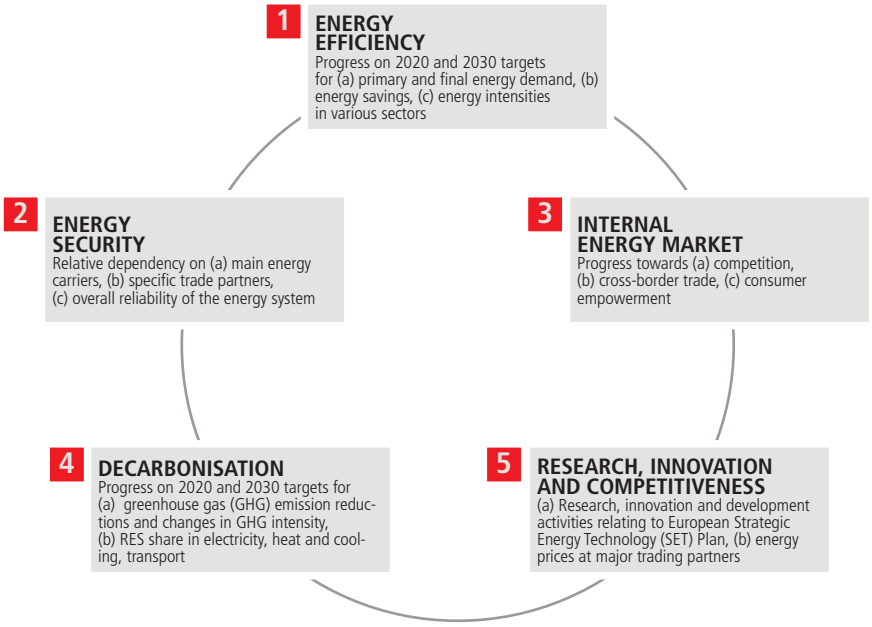
1.
ACTUAL STATE OF THE ENERGY UNION IN CEE

On 1 February 2017, the European Commission published its Second Report on the State of the Energy Union, which monitors progress towards the Energy Union's objectives.

The report is a further step towards implementing the Energy Union's Fourth Energy package, following the October 2014 decision of the European Council setting the 2030 low emission targets with a 2050 perspective, the 2015 EC country factsheets, the 2016 PRIMES reference country scenarios, and the 2016 first report on the state of the Energy Union. Additionally, the EU is currently strengthening the Emission Trading Scheme by further legislative measures.

The Second Report on the State of the Energy Union provides key indicators for the five dimensions of the Energy Union following the same structure as the Energy Union's Fourth Energy package, whereas according to EC, the legislative package is guided by an "energy efficiency first" approach. However, political discussion in CEE about future energy mix is often dominated by questions related to energy security due to obvious historical reasons.

FIGURE 1 | **FIVE DIMENSIONS OF THE ENERGY UNION**
Source: EC, Clean Energy for all Europeans, 30 November 2016



ENERGY SECURITY

Generally, import dependency in EU member states stabilised in the last 10 years at a level between 52% and 55%, however most CEE countries have observed a decrease of net import dependency. In countries with a notable increase of indigenous renewable energy production (mainly Austria, Bulgaria and Romania – lessons learned from the Transnistria crisis) energy security has increased substantially, whereas in countries with a high share of indigenous fossil fuel production, i.e. hard coal, energy security has decreased due to reduced competitiveness of the domestic mining sector, however at a reasonable level (mainly Poland and Czech Republic).

THE LARGEST IMPORT DEPENDENCY IS OBSERVED FOR CRUDE OIL, WHICH INCREASED AT UNION-LEVEL FROM 81.3% IN 2005 TO 87.9% IN 2014 – ONE OF THE KEY ARGUMENTS FOR DEVELOPING E-MOBILITY.

The largest import dependency is observed for crude oil, which increased at Union-level from 81.3% in 2005 to 87.9% in 2014 – one of the key arguments for developing e-mobility. Additionally, for natural gas a high import dependency can be observed, whereas the import dependency increased to 90% in 16 EU member states. A significant decrease in import dependency for natural gas has been observed in Romania, mainly due to an increase of indigenous renewable energy production from peak load technology, i.e. solar power. Additionally, import dependency for hard coal rose at Union-level from 55.7% in 2005 to 67.9% in 2014 – in this year only the Czech Republic was a net exporter of hard coal, and even Poland was a marginal net importer of hard coal. In 2015, 90% of natural uranium was imported from outside the EU.

The supplier concentration index rose from 8.1 in 2005 to 9.7 in 2014. Mainly CEE countries rely to a large extent on fuel imports from Russia, such as Bulgaria, Hungary and Slovak Republic, in particular natural gas, but also oil and uranium. However, Poland and Austria are also to a high degree dependent on gas imports from Russia.

TABLE 1 | **GAS IMPORTS FROM RUSSIA**
Source: EC, 2nd report on the State of the Energy Union, 1 February 2017

	Gas imports from Russia in 2015 in [%] of total natural gas demand
Austria	60%
Bulgaria	99%
Czech Republic	12%
Hungary	66%
Poland	54%
Romania	3%
Slovakia	81%
Germany	60%

A high dependency on specific combined technology and fuel import, i.e. nuclear power, can also be observed for Hungary and Slovak Republic – in both countries the share of nuclear power exceeded 50% of total electricity production. This dependency goes in line with full reliance on uranium fuel from one supplier. Therefore, for both countries strengthening the inner energy market is inevitable to avoid 'politically motivated' blackouts; however the import capacity, 37% in the case of Hungary and 59% for Slovakia, provides certain comfort.

A further increase of combined technology and fuel imports for new nuclear power plants from Russia should be seen as counterproductive for increasing energy security in the EU. Also, the increase of the supplier concentration index for natural gas from 7.6 in 2005 to 8.8 in 2014 – mainly due to Russian gas imports, is worrying. However new gas interconnections and LNG terminals should led to a greater security of gas supply. In particular, the disruption of the gas supply in South East Europe resulting from a gas dispute between Russia and Ukraine in early 2009 should have resulted in more effective measures at Union level; however Bulgaria and Rumania subsequently increased their share of indigenous renewable energy production. It is worth noting that even the supplier concentration index for hard coal has more than doubled from 5.3 in 2005 to 11.1 in 2014 – a supplier concentration comparable higher than uranium or natural gas supply. In this case Russia is the most competitive supplier in Europe, having a large reserve of low-cost high-quality hard coal available.

IN CONCLUSION, MAINLY AN INCREASE OF INDIGENOUS RENEWABLE ENERGY PRODUCTION WILL PROVIDE LESS IMPORT DEPENDENCY, AS A HIGH SHARE OF INDIGENOUS FOSSIL FUEL PRODUCTION, I.E. LIGNITE AND HARD COAL, WILL INCREASE IMPORT DEPENDENCY DUE TO LACK OF ITS COMPETITIVENESS AGAINST IMPORTS.

In conclusion, mainly an increase of indigenous renewable energy production will provide less import dependency, as a high share of indigenous fossil fuel production, i.e. lignite and hard coal, will increase import dependency due to lack of its competitiveness against imports. Additionally, the EU strategy to diversify gas imports has not been very effective so far, as Russia, the main supplier, will stay the most competitive supplier for the time being.

TABLE 2 | **NET IMPORT DEPENDENCY**
Source: EC, 2nd report on the State of the Energy Union, 1 February 2017

	NET IMPORT DEPENDENCY [%]	
	Net imports [% of gross inland consumptions + bunkers]	Absolute change 2005 - 2014 [pp]
Austria	65.9%	-5.8%
Bulgaria	34.5%	-12.2%
Czech Republic	30.4%	2.4%
Hungary	61.7%	-1.4%
Poland	28.6%	11.0%
Romania	17.0%	-10.7%
Slovakia	60.9%	-4.4%
Germany	61.6%	-1.2%

Finally, nuclear power as combined technology and fuel import further increases import dependency, as in the case of extension of the Paks nuclear power plant located south of Budapest. Therefore, the extension of EU internal transmission infrastructure and strengthening combined trading power of the EU is a must to secure energy supply for the time being - before RES and storage are technically able to fully take over supply.

As the Energy Union's Fourth Energy package intends to strengthen intraday markets, it is worth noting that in December 2016 for the first time, battery storage won agreements as part of the UK's latest Capacity Market auction, winning over 3.2 GW of contracts according to provisional auction results. Generally, energy security will push policy makers towards decarbonisation. EURELECTRIC, the sector association of the electricity industry in Europe, recently advised not to invest in any new coal power plants after 2020; however this declaration was not signed by Poland. The phase out of coal power plants for the time being generally promotes new gas power plants providing higher import dependency, a tendency also observed by LNG exporters – including the US.

INTEGRATED INTERNAL ENERGY MARKET

New electricity connections have been observed in recent years, e.g. the LitPol Link I between Poland and Lithuania, which increased the interconnection level of Poland from 2% to 4% in 2016 (LitPol Link II is intended as a sea cable between Klaipeda and Wladyslawowo). Furthermore, for several years now, mainly due to technical limitation by loopflows of cheap northern European wind power within the Phelix trading area, i.e. between Germany and Austria, mainly through Poland and Czech Republic, the already very low import capacity of Poland has been partly blocked. Currently, phase shifters have been installed at both interconnectors between Germany and Poland, blocking loopflows, and from summer 2018 the Phelix trading area will be divided. However, this measure has resulted in higher wholesale prices in Austria most likely for the time being.

TABLE 3 | **INTERCONNECTION CAPACITY**
Source: EC, 2nd report on the State of the Energy Union, 1 February 2017

	INTERCONNECTION CAPACITY [%]	
	% of installed capacity	Absolute change 2005 - 2014 [pp]
Austria	29	0%
Bulgaria	7	-4%
Czech Republic	19	2%
Hungary	37	8%
Poland	4	2%
Romania	8	1%
Slovakia	59	-2%
Germany	7	-3%

Over the last 10 years concentration in the electricity generation market has decreased in practically all member states, indicating an increase in the level of competition. Wholesale electricity prices fell in most member states between 2013 and 2015, largely due to falling coal and gas power prices, the gradual penetration of wind and solar power, and reduced demand. However, Poland and Romania are notable exceptions. Both countries have a low electricity interconnection capacity, whereas in Poland, due to blocked import capacities and implementation of capacity market, payments developed in the opposite tendency as all other markets in Central Europe, mainly dominated by the largest power market in the region, the German market. As for Romania, its electricity market is connected with the Serbian, Moldavian and Hungarian power markets for historic reasons, so its price development is to a very limited extent related to the Central Europe market. As the Hungarian market observes comparable high wholesale prices, consequently the Romania wholesale prices recently further adapted to the Hungarian level.

Due to relatively high wholesale market prices it can be expected that price levels in Poland and Hungary will most likely decrease in the near future, whereas Hungarian utilities have an interest to increase GHG prices due to its high share of zero-emission nuclear power, and Polish utilities have an interest to keep greenhouse gas prices as low as possible to its 85% share of high-emission lignite and hard coal. So, Visegrad countries do not have a joint approach to the Energy Union, as the Czech Republic, Slovakia and Hungary power mix is dominated by nuclear power plants, and they even plan further investments in the near future, whereas Poland's energy mix is dominated by coal power plants – and the strong political will to protect economically linked, internationally non-competitive domestic coal mines.

DUE TO RELATIVELY HIGH WHOLESALE MARKET PRICES IT CAN BE EXPECTED THAT PRICE LEVELS IN POLAND AND HUNGARY WILL MOST LIKELY DECREASE IN THE NEAR FUTURE

In recent months it has become clear that Poland is generally isolated by its approach to the future of its internal energy market. This will result in a different approach by the Polish government in the near future, and we expect that following negotiating implementing capacity markets for existing coal power plants the Polish government will be forced to move to a low-emission energy mix. The longer coal will be part of the Polish energy mix – this is highly likely as coal power plants, including storage peak technology, generally compete in the same market segment as gas power plants – the higher the share of renewables must be to decrease CO2 emissions to an acceptable level.

TABLE 4 | **WHOLESALE ELECTRICITY PRICES**
Source: EC, 2nd report on the State of the Energy Union, 1 February 2017

	WHOLESALE ELECTRICITY PRICES	
	EUR/MWh	Relative change 2013 - 2015 [pp]
Austria	31.8	-16.0
Bulgaria	No data available	No data available
Czech Republic	32.4	-11.9
Hungary	40.5	-4.3
Poland	37.8	2.2
Romania	36.4	3.1
Slovakia	33.6	-9.7
Germany	31.7	-16.3

Concentration in the electricity generation market has decreased over the last 10 years in practically all member states, indicating an increase in the level of competition. The cumulative market share of power capacities of main entities having more than 5% of national electricity generation decreased significantly in Czech Republic, Poland and Romania, but also in Bulgaria and Slovakia. However, Austria and Hungary experienced a slight increase. Retail prices of electricity generally rose in the last five years, due to the modernisation of grid infrastructure at distribution level, support systems for renewable energy, and an increased tax component. Switching rates in CEE countries are still well below more competitive markets, such as Germany, the UK and Scandinavian markets. The roll-out of smart meters is well behind more advanced Western, Northern and Southern European markets with quotas up to 90%, e.g. in Italy, Finland and Sweden, and in the CEE region only Poland and Austria have a visible share of smart meters amounting to a few percent – however, smart meters are also generally not present in German households.

Energy expenditure as a proportion of total consumption expenditure increased for the poorest households in the majority of member states over the last decade, indicating that energy affordability is increasingly becoming a key issue. Besides Austria, the energy expenditure for all CEE member states is at an unacceptable high level and should decrease. Therefore, the levelized costs of energy will play a more important role in the near future, which favours zero-emissions non-fuel RES, such as wind and solar power – against nuclear power. However, due to weather dependency these

TABLE 5 | **ENERGY EXPENDITURE SHARE**
Source: EC, 2nd report on the State of the Energy Union, 1 February 2017

	ENERGY EXPENDITURE SHARE IN FINAL CONSUMPTION EXPENDITURE FOR THE POOREST 20% OF CONSUMERS	
	[%]	Absolute change 2005 - 2014 [pp]
Austria	7.5	1.7%
Bulgaria	14.2	2.9%
Czech Republic	12.4	0.1%
Hungary	16.9	3.0%
Poland	12.5	1.0%
Romania	15.0	1.6%
Slovakia	21.7	-2.5%
Germany	8.4	1.0%

technologies cannot deliver full energy security, and therefore for the time being it will be the individual decision of each member country as to which technology is chosen to complete RES. Generally, in merit order based wholesale markets hard coal power plants may replace lignite power plants at an GHG emission price level amounting to less than EUR 10/ton, and gas power plants may replace hard coal power plants at an GHG emission price level amounting to less than EUR 20/ton. The European Utilities Association (EURELECTRIC) recently promoted a GHG emission price at the level of EUR 30/ton. Therefore, the future impact of the revised ETS scheme is most crucial for the question which fossil fuel technology dominates the merit order – however, supplementing RES and nuclear.

ENERGY EFFICIENCY AND DEMAND

Whereas in 2014 primary energy consumption was only 1.6% above its absolute energy consumption target for 2020, final energy consumption was 2.2% below its absolute final energy consumption target for 2020. This motivated the EC to further increase its 2030 target in the Energy Union's Fourth Energy package. Notable increases were observed in most CEE member states, e.g. Romania, Bulgaria, the Czech Republic, Poland and Slovakia. However, energy intensity in industry, mainly in the transport sector, increased in some of those member states, e.g. Poland and Romania. Increases in passenger transport, e.g. in the Czech Republic and Austria, were counterbalanced by decreases in Poland, Bulgaria, Slovakia and Romania.

ALTHOUGH ENERGY EFFICIENCY MEASURES WILL CONTINUE TO BE IMPLEMENTED, ESPECIALLY TO REDUCE THE USE OF HEATING AND ELIMINATE ENERGY POVERTY, ENERGY EFFICIENCY MEASURES RELATING TO ELECTRICITY CONSUMPTION ARE LIMITED.

Although energy efficiency measures will continue to be implemented, especially to reduce the use of heating and eliminate energy poverty, energy efficiency measures relating to electricity consumption are limited. Part of the demand-side-response management potential in the industrial sector is already used, so future potential is limited. To a larger extent demand-side-response management may provide visible effects at the consumer level, mainly through the roll-out of smart meters, zero-emission buildings and RES microgenerators for self-consumption. However, the overall potential of DSR seems to be limited to approx. 5%. Conversely, the increasing role of e-mobility, heat pumps for residential, thermal energy storage facilities for distance heating purposes and e-storage (including technical losses), may lead to a significant increase of electricity consumption. Actually, leading energy consultants forecast a long-term increase of electricity consumption in Europe between 1.0 and 1.5%; however this prediction may be proved wrong.

DECARBONISATION AND RES SHARE

According to the 2015 inventory, GHG emissions in the EU were 22% below the 1990 level. Projections show that in 2020 GHG emissions will be 24% below the 1990 level. At the EU level, the sector responsible for the highest proportion of GHG emissions (around 30%) is the energy industry – notably power production, district heating and refineries. This is followed by the transport sector and manufacturing industry with around 20% each.

TABLE 6 | **SHARE OF GHG BY ECONOMIC SECTOR**
Source: EC, 2nd report on the State of the Energy Union, 1 February 2017

	PERCENTAGE SHARE OF GHG BY ECONOMIC SECTOR IN 2014 (EXCL. LULUCF, INTERNATIONAL AVIATION AND SHIPPING)					
	Energy industries	Industry	Transport	Agriculture	Residential and commercial	Waste
Austria	13.3	34.9	29.1	10.4	10.0	2.3
Bulgaria	52.6	13.1	14.9	9.8	2.2	7.4
Czech Republic	45.4	20.1	13.6	7.6	7.2	4.0
Hungary	24.6	18.1	19.5	14.0	16.3	7.5
Poland	47.0	15.8	11.7	10.9	11.9	2.8
Romania	33.0	22.7	14.0	16.6	8.2	5.2
Slovakia	21.2	39.9	16.1	7.9	10.9	3.9
Germany	39.6	20.1	17.9	8.0	13.1	1.2

In Bulgaria, the Czech Republic and Poland, the share of GHG emissions in the Energy sector is relatively high, whereas in Austria and Romania, due to their high share in RES energy production, and Hungary and Slovakia, due to their high share in nuclear power production, the level of GHG emissions in the energy sector is relatively lower. The relatively high share of GHG in the waste sector in Hungary and Bulgaria is mainly caused by waste incineration plants, whereas countries with a lower share have either implemented an effective recycling system – Czech Republic, Slovakia and Romania, or invested in modern incineration plants – Austria – or landfill waste - Poland.

TABLE 7 | **RES SHARE**
Source: EC, 2nd report on the State of the Energy Union, 1 February 2017

	RES SHARE IN GROSS FINAL ENERGY CONSUMPTION	
	[%] in 2014	Gap to 2020 target [pp]
Austria	33.1%	0.9% (241 ktoe or 2.49 TWh)
Bulgaria	18.0%	-2.0%
Czech Republic	13.4%	-3.4%
Hungary	9.5%	3.5% (522 ktoe or 6.06 TWh)
Poland	11.4%	3.6% (2217 ktoe or 25.72 TWh)
Romania	24.9%	-0.9%
Slovakia	11.6%	2.4% (241 ktoe or 2,80 TWh)
Germany	13.8%	4.2% (8772 ktoe or 101.76 TWh)

In 2014, the share of RES reached 16% of the gross final energy consumption of the EU, however, still well below the 20% target by 2020, and the 27% target by 2030. In the region, Bulgaria, the Czech Republic and Romania have already exceeded their national 2020 RES target. All member states

IN 2014, THE SHARE OF RES REACHED 16% OF THE GROSS FINAL ENERGY CONSUMPTION OF THE EU, HOWEVER, STILL WELL BELOW THE 20% TARGET BY 2020, AND THE 27% TARGET BY 2030.

in CEE are still on track for their indicative trajectory, however, from 2017 Poland will most likely be below its trajectory target – the same as France, the Netherlands and Luxembourg in Western Europe, and also Germany, which is substantially below its trajectory target for 2020. For transport, in almost all member states the current progress will not be sufficient to achieve the binding 10% target for 2020. Therefore, it is uncertain what the consequences for non-fulfilment of the 2020 target may be – according to current legislation, a costly statistical transfer or joint fulfilment with another overperforming member state is required, as both of the most powerful EU member states, i.e. France and Germany - due to decommissioning of nuclear power plants - will most likely not meet their 2020 targets. In CEE, Poland and Hungary have a substantial gap to their 2020 target; however in 2030 the general target switches to a GHG emission target, which, e.g., favours the Hungarian strategy to further increase capacity of zero-emission nuclear power plants.

STATUS OF CHP MARKET

The CHP market in the CEE region is well-developed in the Czech Republic and Poland, as well as in Romania. Bulgaria and Hungary are less developed. Hungarian's small combined heat-power plants were not included in the generous FiT support scheme in July 2011. Generally, a well-developed CHP market is an indicator for a large district heating network. In Hungary, the government has announced that it is planning to take over the 16 largest district heating companies and their networks that are mainly local government owned (except certain smaller networks in mid-sized towns). District heating, if indeed taken over by the government, would most likely be part of the recently formed sate-owned central public utility company, ENKSZ Zrt. or MVM Zrt, the incumbent wholesaler. For Slovakia, no official Eurostat data is available. In 2013, approximately 1.9 million citizens, 35% of the total population of Slovakia, were served by district heating, 78% of which came from direct renewables and recycled heat. However, the last five years are characterised by an acceleration of disconnections of multi-apartment buildings from the district heating networks, as governmental politics failed.

TABLE 8 | **DEVELOPMENT OF CHP MARKETS (2014)**
Source: Eurostat

	CHP electricity generation, TWh	Share of CHP in total electricity generation	CHP Electrical capacity, GW	CHP Heat production, PJ	CHP Heat capacity, GW
Austria	8,49	13,0%	3,99	102,45	8,90
Bulgaria	2,96	6,2%	0,92	33,38	3,40
Czech Republic	11,80	13,7%	4,63	105,63	21,01
Hungary	3,82	13,0%	2,31	25,94	4,82
Poland	24,09	15,1%	8,55	237,65	25,24
Romania	6,10	9,3%	1,82	55,36	9,96

The main fuel for district heating is still coal. However, derogation obligations and decarbonisation will stipulate a switch to renewable CHP and thermal storage.

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TABLE 9 | **CHP MARKET FUEL MIX (2014)**
Source: Eurostat

	Fuel used for CHP PJ	Solid fossil fuels and peat	Oil and oil products	Natural gas	Renewables	Other fuels
Austria	159,26	6,4%	7,5%	37,4%	38,9%	9,8%
Bulgaria	55,09	59,9%	12,9%	27,1%	0,0%	0,1%
Czech Republic	241,83	70,8%	0,1%	8,7%	12,7%	7,8%
Hungary	51,15	3,8%	0,3%	71,2%	12,4%	12,3%
Poland	390,89	71,2%	7,8%	7,0%	11,3%	2,7%
Romania	97,67	36,0%	0,5%	54,4%	5,4%	3,7%

AIR QUALITY AND GHG EMISSIONS CAUSED BY COAL POWER PLANTS

By signing the Paris Agreement, the European Union has joined the international community in officially committing to the goal of limiting global warming to "well below 2°C and to pursue efforts to limit temperature increases to 1.5°C above pre-industrial levels". With just a few exceptions, at the beginning of April 2017, Europe's utilities pledged that they would stop investing in new coal plants after 2020. This is mainly caused by the high impact on emissions by the current coal power plant fleet. The EU has over 300 power plants with 738 separate generating units. These are not evenly distributed across the individual member states, and those most reliant on coal are Poland, Germany, Bulgaria, the Czech Republic and Romania. Germany and Poland alone are jointly responsible for 51% of the EU's installed coal capacity and 54% of emissions from coal.

Recently, the European Court of Justices sentenced Bulgaria over its poor air quality, and Poland will follow. It is also expected that Germany, after its autumn 2017 elections, as a major GHG emitter in the EU, will announce its phase out plan to exit coal firing, which will have a significant impact on EU legislation and other EU member states. This will trigger further phase-out of coal power plants to be replaced by zero-emissions generators, whether RES or – less likely - nuclear. The two biggest coal polluters saw the smallest reductions: German coal power plant emissions fell only 4%, and Poland emissions fell by only 1%. Even since 2010, movements have been small: -5% for Germany and -7% for Poland.

European coal power plants emissions fell by 11% in 2016. Almost half the fall was from the UK, with a massive 58% year-on-year fall in coal emissions. Big falls were also recorded in Spain (-27%), Greece (-21%) and Italy (-17%). The table below presents the amount of emissions caused by the current coal power plant fleet (2013/2014 data).

TABLE 10 | **AIR QUALITY**
Source: EC Climate Action, yearly emission reports

	Fine dust	SOx-NOx	mercury	CO_2 (GHG)	% of national GHG emissions
Austria	0.08 kt	2 kt	/	2 mt	3%
Bulgaria	2.50 kt	162 kt	/	26 mt	44%
Czech Republic	2.75 kt	138 kt	1.38 t	42 mt	33%
Hungary	/	18 kt	/	7 mt	13%
Poland	8.60 kt	472 kt	2.60 t	129 mt	33%
Romania	8.62 kt	194 kt	0.13 t	19 mt	18%
Slovakia	/	40 kt	0.02 t	3 mt	7%
Germany	3.27 kt	339 kt	4.87 t	256 mt	28%

WASTE DISPOSAL

In 2016, the European Commission adopted the Circular Economy Package, which includes revised legislative proposals on waste disposal to stimulate Europe's transition towards a circular economy. The revised legislative proposal on waste sets clear targets for reduction of waste and establishes an ambitious and credible long-term path for waste management and recycling. To ensure effective implementation, the waste reduction targets in the new proposal are accompanied by concrete measures to address obstacles on the ground and the different situations across EU member states.

Key elements of the revised waste proposal include:

(I) a common EU target for recycling 65% of municipal waste by 2030 (for 2020 the recycling/preparation for reuse target amounts to 50%),

(II) a common EU target for recycling 75% of packaging waste by 2030, and

(III) a binding landfill target to reduce landfill to a maximum of 10% of municipal waste by 2030.

However, according to the final report 'Support to the waste target review' published by the European Commission, in many CEE countries even the 2020 targets are far from being fulfilled, which generally questions investments in new incineration plants. We expect to see a swift response from member state policies promoting biogenic waste gasification, as in Western European countries.

TABLE 11 | **MUNICIPAL WASTE AND RECYCLING QUOTA**
Source: Eurostat

	MUNICIPAL WASTE AND RECYCLING QUOTA	
	Amount of municipal waste in thousand tons (2012)	**Recycling quota in [pp] 2012**
Austria	4,883	**34.65%**
Bulgaria	3,364	**40.75%**
Czech Republic	3,233	**58.21%**
Hungary	3,988	**27.76%**
Poland	12,084	**22.18%**
Romania	5,441	**51.29%**
Slovakia	1,657	**56.99%**
Germany	35,001	**49.53%**

RESEARCH, INNOVATION AND COMPETITIVENESS

The Energy Union's core research & innovation priorities are:

- Renewable energy,
- Smart EU energy systems,
- Efficient energy systems, and
- Sustainable transport.

Furthermore, two additional priorities are carbon capture utilisation and storage ('CCUS'), and nuclear safety. The core priorities received Europe-wide EUR 4.2 billion spending on R&I in 2014 – compared to EUR 5.6 billion in the US, and EUR 2.6 billion in Japan. Public support for the smart EU energy system increased steadily to just over a quarter of total investments, whereas public support on renewable energy and efficient energy systems slightly decreased. Nuclear energy continues to receive high levels of public support, amounting to one quarter of EU-28 R&I spending, whereas in the CEE region, in particular the Czech Republic dedicates a higher share for nuclear safety.

NUCLEAR ENERGY CONTINUES TO RECEIVE HIGH LEVELS OF PUBLIC SUPPORT, AMOUNTING TO ONE QUARTER OF EU-28 R&I SPENDING, WHEREAS IN THE CEE REGION, IN PARTICULAR THE CZECH REPUBLIC DEDICATES A HIGHER SHARE FOR NUCLEAR SAFETY.

Compared to other trade blocks, the US spends relatively 80% more on smart energy systems due to an internationally strong IT sector, and 40% more on sustainable transport due to the importance of e-mobility. Spending on nuclear safety, renewable energy and efficient energy

systems is lower as in the EU-28. Japan spends almost half of its public support for R&I on nuclear safety, and a comparable share for efficient energy systems and renewable energy. So, the US has a clear advantage in public spending for smart energy systems and e-mobility.

THE US HAS A CLEAR ADVANTAGE IN PUBLIC SPENDING FOR SMART ENERGY SYSTEMS AND E-MOBILITY.

The amount of patents related to Energy Union R&I priorities increased in recent years, however, between Austria (and) Germany and all other CEE countries there is a large gap of patents. Czech Republic and Poland performed relatively well, whereas Hungary and Slovakia show comparable underperformance. This may relate to the strong dependence on Russian nuclear power technology. The relative share of patents in EU energy priorities is comparably higher as in the US for sustainable transport, but comparably lower for smart energy systems. However, Japan and Korea are both leading as to relative amount of patents in EU energy priorities, with a clear focus on sustainable transport and efficient energy systems. Furthermore, the relative share of patents in renewable energy increased in all large economic blocks worldwide. Patenting activity on CCUS and nuclear remain very low.

TABLE 12 | **PATENTS**
Source: EC, 2nd report on the State of the Energy Union, 1 February 2017

	PATENTS RELATED TO ENERGY UNION R&I PRIORITIES	
	[patents per million inhabitants]	Average over the period [patents per million inhabitants]
Austria	2.40	**1.22**
Bulgaria	0.11	**0.04**
Czech Republic	0.38	**0.20**
Hungary	0.09	**0.06**
Poland	0.44	**0.19**
Romania	0.15	**0.10**
Slovakia	0.09	**0.06**
Germany	4.43	**2.91**

COHESION POLICY AND REGIONAL DEVELOPMENT FUND

The EU Cohesion Policy is a key tool for delivering Energy Union objectives, including significant financial allocations from the European Regional Development Fund ('ERDF') and the Cohesion Fund ('CF'), totalling EUR 68.8 billion.

EUR 29.1 billion of those allocations are foreseen for energy and low carbon R&I:

- EUR 13.4 billion for energy efficiency in public and residential buildings,
- EUR 4.8 billion on renewable energy,
- EUR 3.4 billion for smart energy infrastructure, including EUR 1.1 billion for smart distribution grids, and EUR 2.3 billion for smart electricity and gas distribution, storage and transmission systems,
- EUR 3.3 billion for energy efficiency in enterprises, with a focus on SMEs,
- EUR 2.6 billion for R&I and adoption of low carbon technologies,
- EUR 1.7 billion for high-efficiency cogeneration and district heating.

The ERDF and the CF allocate the following amounts to energy and low-carbon R&I, whereas Poland receives 78% of the joint amount received by Bulgaria, Czech Republic, Hungary, Romania and Slovakia:

TABLE 13 | **FINANCIAL ALLOCATIONS FOR R&I**
Source: EC, 2nd report on the State of the Energy Union, 1 February 2017

	Financial allocations by ERDF and CF for energy and low-carbon R&I
Austria	**EUR 0.10 billion**
Bulgaria	**EUR 0.57 billion**
Czech Republic	**EUR 2.50 billion**
Hungary	**EUR 2.12 billion**
Poland	**EUR 6.08 billion**
Romania	**EUR 1.53 billion**
Slovakia	**EUR 1.06 billion**
Germany	**EUR 1.91 billion**

The remaining EUR 39.7 billion is allocated for directly supporting the move towards an energy-efficient, decarbonised transportation sector:

- EUR 16.0 billion for sustainable urban mobility, including clean urban transport infrastructure, intelligent transport systems, cycle tracks and footpaths,
- EUR 23.7 billion for other low-carbon transport, including rail, seaports and inland waterways.

The ERDF and the CF allocate the following amounts to an energy-efficient, decarbonised transportation sector, whereas Poland receives 108% of the joint amount received by Bulgaria, Czech Republic, Hungary, Romania and Slovakia:

TABLE 14 | **FINANCIAL ALLOCATIONS FOR TRANSPORTATION**
Source: EC, 2nd report on the State of the Energy Union, 1 February 2017

	Financial allocations by ERDF and CF for efficient and low-carbon transportation sector
Austria	**EUR 0.00 billion**
Bulgaria	**EUR 1.17 billion**
Czech Republic	**EUR 3.04 billion**
Hungary	**EUR 2.44 billion**
Poland	**EUR 12.96 billion**
Romania	**EUR 3.74 billion**
Slovakia	**EUR 1.60 billion**
Germany	**EUR 0.56 billion**

2.
LEGISLATIVE FRAMEWORK SET BY THE ENERGY UNION'S FOURTH ENERGY PACKAGE

The set of documents published by the European Commission as the 'winter package' further reshapes EU Energy Union towards consumer driven low-emission energy markets, and includes legislative proposals and a range of explanatory and background policy documents.

The legislative proposals are:

- new Regulation on the Governance of the Energy Union (the 'Governance Regulation'),
- revised Renewable Energy Directive (the 'Revised RED' or 'RED2'),
- revised Electricity Market Regulation (the 'Revised Market Regulation'),
- revised Directive on the Internal Market for Electricity (the 'Revised IMED'),
- new Regulation on Electricity Sector Risk-Preparedness (the 'Risk Regulation'), however based on already existing secondary regulations,
- recast Regulation on the Agency for the Cooperation of Energy Regulators (the 'ACER Regulation'),
- Directive amending the existing Energy Efficiency Directive (the 'Revised EED' or 'EED2') and a Directive amending the existing Energy Performance of Buildings Directive, as well as
- Communication on Accelerating Clean Energy Innovation (the 'Innovation Communication').

THE 'WINTER PACKAGE' WILL GENERALLY ENTER INTO FORCE BY 2021, WHEREAS REGULATIONS DIRECTLY APPLY FROM 1 JANUARY 2021, AND DIRECTIVES HAVE TO BE TRANSFERRED TO NATIONAL LAW BY THE END OF JUNE 2021.

The 'winter package' will generally enter into force by 2021, whereas regulations directly apply from 1 January 2021, and directives have to be transferred to national law by the end of June 2021.

GOVERNANCE REGULATION

The Governance Regulation is a new framework legislation aiming to give credible underpinning to the commitments on climate change that the EU as a whole has made under the 2015 Paris Agreement and its 2014 effort sharing decision to bridge the gap left by having an EU level 2030 renewables target but no corresponding member states targets.

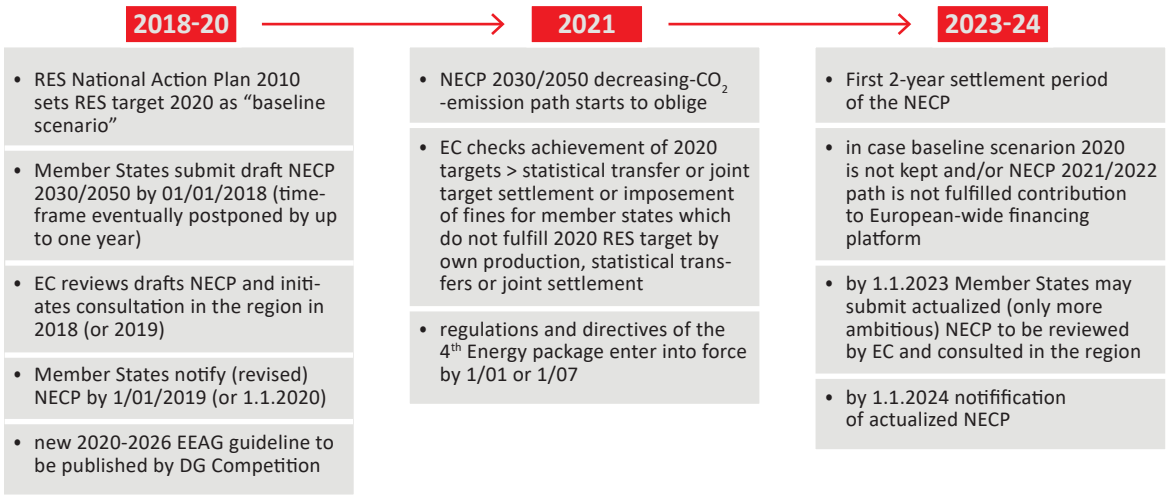
It is planned to enforce the EU's energy and climate targets 2030, which are binding targets of:

(I) at least 40% domestic reduction in economy-wide greenhouse gas (the 'GHG') emissions as compared with 1990,
(II) at least 27% for the share of renewable energy consumed in the EU,
(III) at least 27% (increased to 30% by the 'winter package') for improving energy efficiency in 2030, and
(IV) 15% electricity interconnection target for 2030.

Every 10 years, starting at the beginning of 2019, each member state is to notify an integrated national energy and climate plan (the 'NECP'), starting from the 2021-2030 period. The plan is to set out in detail the information which is required by each member state, i.e. national objectives and targets, additional policies and measures adopted, and their linear projections of GHG emissions going forward to the next 10-year period. The achievements have to be reported to the European Commission every two years, and every five years an update is possible, however only an improvement of the original targets is permitted. The NECPs are first to be submitted to the European Commission and other member states in the region for comment one year in advance, in draft, i.e. by 1 January 2018. In practice, such plan will be the basis for successful notification of any support mechanism in the electricity sector, e.g. capacity mechanism support or renewable energy support. So, the influence of EU state aid policy cannot be overestimated for re-shaping energy markets. According to the European Commission, continuing renewable energy support systems and additionally implementing capacity market support systems will lead to further market distortion, so generally the EU is aiming to reduce such report mechanism to stipulate further investments by market signals.

Most important, in case a member state does not achieve and keep the 2020 target for renewables, or does not comply with its individual NECP target to be reported and checked every two years by the European Commission, it is obliged to financially contribute to a 'European-wide financing platform' to stipulate RES investments throughout the EU – which following the logic of the EU should be subject to European-wide tenders. The calculation for the financial contribution and the organisation of the financing platform will be subject to the implementation regulation of the European Commission. So, after the first two-year reporting period in 2024 member states may find themselves in a position to contribute financing RES investments in other member states. We expect governments to be motivated to keep investments in their country by fulfilling targets as notified NECP 2030.

FIGURE 2 | **PROCEDURE OF IMPLEMENTING NATIONAL ENERGY AND CLIMATE PLANS**
Source: own



REVISED RED

With the Revised RED, priority dispatch for new renewable generators (and for combined power and heat, i.e. 'CHP') is to be brought to an end – this does not apply to operating generators. However, where redispatch (changing generator output levels) or curtailment is imposed by the system operator other than on market-based criteria, the draft Revised Market Regulation imposes restrictions on when RES, high-efficiency CHP and self-generated power can be redispatched or curtailed. The priority dispatch still includes innovative technologies and sub-500kW installations (from 2026, sub-250kW installations). Where under certain exceptions non-market based downward redispatching or curtailment of RES is used by DSOs or TSOs, it will be subject to final compensation by the system operator amounting to 90% of the net revenues from the sale of electricity on the day-ahead market, including operational support if granted as a market premium. So, in practice redispatching and curtailment of RES should be an option of last resort for system operators and still produce fair revenues for RES generators.

Important measures of reassurance for investors are implemented. The Revised RED provides a requirement to consult on and publish a mid-term schedule in relation to expected allocation for RES support looking at least three years ahead. Also, member states are to remove administrative barriers to facilitate long-term power purchase agreements to finance renewables and their uptake. Additionally, the procedure for applying for permits to build and commission new RES projects is to be streamlined to provide to a ready-to build status from starting a development in a maximum of three years – for new investments and re-powering.

The Revised RED also provides certain limitations for the energetic use of biomass. From 2024, it prohibits public support for installations converting biomass into electricity unless they apply high efficiency CHP (according to the definition provided by EU law, i.e. 10 percent more efficient combined heat-power production as in an alternative scenario with two separate installations for only heat/only power production), if they have a joint fuel capacity of 20 MW or more. A corresponding obligation applies to biogas plants with a fuel capacity of 0.5 MW or more. However, this would not require termination of the support that has already been granted to specific projects.

THE REVISED RED ALSO PROVIDES CERTAIN LIMITATIONS FOR THE ENERGETIC USE OF BIOMASS. FROM 2024, IT PROHIBITS PUBLIC SUPPORT FOR INSTALLATIONS CONVERTING BIOMASS INTO ELECTRICITY UNLESS THEY APPLY HIGH EFFICIENCY CHP (ACCORDING TO THE DEFINITION PROVIDED BY EU LAW

Additionally, prosumers, or 'renewable self-consumers', will be entitled to sell their surplus electricity without being subject to disproportionate procedures and charges that are not cost reflective, to receive a market price for electricity fed into the grid, and not to be regulated as electricity suppliers if they do not feed in more than 10MWh (as a household, e.g. 10 kWp PV installation) or 500MWh (as a business, e.g. 499 kWp PV installation) annually. Member states may set higher limits. According to currently binding EEAG aid guidelines for 500 kW installed capacity only a feed-in premium can be granted as support.

Finally, in relation to heat, member states are to identify obligated parties amongst wholesale or retail energy and energy fuel suppliers, and require them to increase the share of RES in their heating and cooling sales by at least one percent a year. The obligation should be capable of being discharged either directly or indirectly (including by installing or funding the installation of highly efficient RES heating and cooling systems in buildings) by tradable certificates. It is also relevant in this context that the Revised RED envisages that renewable guarantees of origin will be available in future for the production and injection of biomethane into the grid. Member states are to ensure that authorities at local, national and regional level include provisions for the integration and deployment of renewable energy and the utilisation of unavoidable waste heat or cold when planning, designing, building and renovating urban infrastructure, industrial or residential areas and energy infrastructure, including electricity, district heating, and cooling, natural gas and alternative fuel networks.

REVISED MARKET REGULATION

Under the Revised Market Regulation, regional cooperation will be further strengthened. TSOs decide within 'Regional Operational Centres' on those issues where fragmented and uncoordinated national actions could negatively affect the market and consumers, e.g. in the fields of system operation, capacity calculation for interconnectors, security of supply and risk preparedness. Functions to be carried out at a regional level include the dimensioning of reserve capacity and the procurement of balancing capacity, so-called capacity markets.

FIGURE 3 | **BALANCING MARKETS**
Source: own

So, national capacity markets if introduced will have to be regionalised for reserve capacity and balancing capacity services at frequency level (but not on non-frequency level at distribution grid level), which will have a major impact on the implementation of planned capacity markets. There seems no way to avoid regional tenders for those services, under the reservation that physical flows comply with the contracted services. This makes capacity markets less attractive to protect the market position of domestic utilities. However, ancillary services at non-frequency level in distribution grids might also be tendered by capacity mechanisms on domestic markets. The minimum bid size for those services is as low as 1 MW, and imbalance settlement periods being set to 15 minutes by 1 January 2025, which promotes most elastic power generators, i.e. gas power plants and storage systems, and limits needs-based load-following operations. Therefore, investments in storage systems are inevitable for owners of less-flexible conventional power plants to take part at reduced imbalance settlement periods.

FIGURE 4 **FLEXIBILITY FOR LOAD-FOLLOWING OPERATION OF EXISTING CONVENTIONAL POWER PLANTS**
Source: IEA

Furthermore, if implemented, current floors (and caps) at national balancing markets should be eliminated, which should have an impact on the increasing risk of negative prices on the domestic wholesale market. Subsequently, technology profile costs for off-peak generators, especially for onshore wind farms, will increase, and technology profile profits for peak-generators such as photovoltaic farms will decrease. This long-term outlook is of importance with the new generation of feed-in premium support systems, i.e. so-called contracts for difference in case they are settled against average wholesale prices instead of being settled against specific technology wholesale prices, which already include technology risk/profit.

The Revised Market Regulation regulates in detail the procedure for implementing national (or regional) capacity markets, which require a European-level annual assessment by the European Transmission Operator Association (ENTSO-E) of the overall adequacy of the electricity system to supply current and projected demands for electricity 10 years ahead. This assessment will

judge the adequacy to introduce a capacity mechanism, and according to this logic it is unlikely that the capacity market mechanism can grant support for more than 10 years. This timeframe should not stipulate new investments in conventional power plants, as long as the investment decision is not purely politically driven (which inevitably will conflict with state aid rules), but may drive modernisation of conventional power plants, e.g. to fulfil 2020-2030 emission levels, and mainly investments in storage. However, even if this first hurdle is taken, all interconnected member states shall be consulted, and other approaches, such as capacity provided by interconnection and storage, should be considered first.

CAPACITY MECHANISMS MUST BE OPEN TO PROVIDERS IN INTERCONNECTED MEMBER STATES - UNLESS THEY TAKE THE FORM OF STRATEGIC RESERVES

Capacity mechanisms must be open to providers in interconnected member states - unless they take the form of strategic reserves, e.g. so-called rotating (hot) reserves, however, a strategic reserve mechanism cannot stipulate any new investments and is therefore a short-term support mechanism. According to the Revised Market Regulation, national authorities must not prevent capacity located in their territory from participating in other countries' capacity mechanisms. Those generators participating simultaneously in more than one capacity mechanism shall be subject to two or more penalties if there is concurrent scarcity in two or more bidding zones that the capacity provider is contracted in.

Finally, the Revised Market Regulation sets an emission limit of 550 gCO2/kWh for a combustion plant on which a final investment decision, i.e., finalising tender for construction works, is made after the Revised Market Regulation enters into force to be eligible for capacity mechanism support. For already existing power plants, this limit applies from 1 January 2026 – and this timeframe is one of the hottest topics in the 'winter package'. It generally excludes even best-available-technology coal power plants emitting 750 gCO2/kWh from capacity markets after 2025, however, new gas power plants emitting 400-450 gCO2/kWh are below this threshold. Therefore, Poland claims that this approach is not technology neutral and favours gas power plants, whereas increasing gas imports lead to decreasing energy security. It is still unclear whether this measure will be subject to further changes. An alternative might be the implementation of a derogation mechanism with a combined power production/CO2-emission threshold for individual power plants, technically similar to the phase-out mechanism of German nuclear power plants before Fukushima.

REVISED IMED

The Revised IMED mainly aims to strengthen the market for consumers and prosumers against obliging tariffs and predominant distribution system operators (the 'DSOs'). The rights of consumers and prosumers are enhanced by various ways, e.g. (i) all consumers are entitled to request a dynamic price contract, where prices depend on fluctuating wholesale prices, for both power sale and distribution – this will end obliging tariff structure set by national Energy Regulatory Offices for consumers and should further stimulate the roll-out of smart meters , (ii) consumers will have the right to switch energy providers in case of price increase within three weeks, whereas termination fees generally cannot be charged if the contract was not concluded for a fixed period of time, (iii) all consumers are to be entitled to contract with aggregators, e.g. prosumers (the 'winter package' calls them "active consumers") with providers of virtual power plants, without the consent of their supplier, and to end such contracts within three weeks, (iv) 'local energy communities' will be strengthened, i.e. organisations 'effectively controlled by local shareholders or members, generally non-profit driven or generally value rather than profit-driven (…) engaged in local energy generation, distribution, aggregation storage, supply or energy efficiency services, including across borders'.

GENERALLY, DISTRIBUTION SYSTEM OPERATORS WILL FACE FURTHER LIMITATION ON THEIR RIGHTS UNDER THE REVISED IMED.

Generally, DSOs will face further limitation on their rights under the Revised IMED. ACER, the European Agency for the Cooperation of Energy Regulators, shall perform a major role on 'the progressive convergence of transmission and distribution tariff methodologies'. Member states are to facilitate electric cars charging infrastructure, however DSOs may only 'own, develop, manage or operate' charging points if the regulator allows them to - after an open tender process in which nobody else expresses its interest. And even in this case, the service taken on by the DSO must be re-tendered every five years. Charging points may be developed jointly with energy efficiency undertakings, e.g. street lightening, or development of hybrid installations, e.g. PV installations, small wind turbines and storage systems at super-charging points.

Furthermore, similar open tender rules would apply to the development, operation and management of storage facilities by either DSOs or Transmission System Operators (the 'TSOs'). For TSOs, there would be an additional requirement that the storage services or facilities concerned are 'necessary' to ensure efficient and secure operation of the transmission system, and are not used to sell electricity to the power market.

RISK REGULATION AND ACER REGULATION

The Risk Regulation provides a common framework of rules on how to prevent, prepare for and manage electricity crisis situations, bringing more transparency to the preparation phase and ensuring that electricity is delivered where it is needed most. ENTSO-E shall develop a common risk assessment methodology, on the basis of which it is to draw up and update regional crisis scenarios, such as extreme weather conditions, natural disasters, fuel shortages or malicious attacks. Provision is made for emergency planning at both national and regional levels, with the Regional Operational Centres playing a significant role.

The European Association of National Regulatory Offices (ACER) will take over more power. For example, the methodologies and calculations underlying the European resource adequacy assessment will require the approval of and may be amended by ACER. The European Commission notes that fragmented national state interventions in energy markets constitute an increasing risk to the proper functioning of cross-border electricity markets. However, the ACER Regulation is still far from representing a major transformation of ACER into an EU energy regulatory office.

ENERGY EFFICIENCY

Under the revised Energy Efficiency Directive, member states will be obliged to deliver the equivalent of 1.5% of annual energy sales (by volume) to final consumers over the period 2021-2030. As regards the Energy Performance of Buildings Directives, there is an emphasis on encouraging the use of smart technologies, emphasising e-mobility. When building or carrying out major renovations of buildings with more than 10 car parking spaces, an alternative fuel re-charging point for every 10 spaces in a non-residential context are required. Even more, a pre-cabling for re-charging points for EVs in all spaces in a residential context are required. In the non-residential context at least, the re-charging point must be capable of starting and spotting charging in relation to price signals.

INNOVATION

The Innovation Communication picks up on a number of topics emphasised in the various legislative proposals building on existing EU initiatives. More leverage of private sector investment in innovative energy-related technologies shall be provided. Particular priorities are singled out as technology focus areas for EU innovation funding: (i) energy storage solutions, including the objective of re-launching the production of battery cells in Europe, (ii) e-mobility and a more integrated urban transport system, (iii) decarbonising the EU building stock by 2050 by going beyond nearly zero-energy designs to include, e.g., the application of circular economy principles, and (iv) integration of renewables by cost-reduction, promoting new technologies such as building-integrated photovoltaics, and intensifying efforts to integrate renewables mainly through storage systems.

BAT CONCLUSIONS

Although the so-called BAT conclusions, i.e. technical parameters of combustion plants regarding emissions of e.g. sulphur dioxide (SOx), nitrogen oxides (NOx) and mercury is technically not part of the winter package, it implements emission thresholds according to the Industrial Emissions Directive (IED) and Medium Combustion Plants Directive (MCP) which are of major importance of the future energy mix. Especially, coal-fired large power plants, CHP plants and heat plants are affected. However, the new thresholds which will apply in the next decades are still lax compared to current US regulations, so a further increase of the thresholds end of the next decade is likely. To wash out sulphur dioxides, mercury and other emissions either a dry/semi-dry spray desulphurisation ('FGD') for smaller combustion plants or a wet FGD for larger combustion plants is typically used. Additionally, to eliminate mercury bromine is used, and to subsequently clean up fly-ash from mercury – fly-ash is used by the concrete industry - activated carbon treatment is required. This provides to significant increase of CAPEX and OPEX of coal power plants. Furthermore, the worse the quality hard coal, the higher the share of SOx and mercury – lignite has generally a high share of SOx and mercury. Lignite cannot be transported, so lignite power plants cannot replace its fuel. But also existing hard coal reserves in Europe, e.g. in Poland have a high share of SOx and mercury, so to economically run a power plant an import of higher quality coal from outside the EU (Russia is most competitive) is generally recommended, but this further affects energy security and national import balances. Finally, the high share of especially mercury in hard coal provides to serious health disease, e.g. cancer in case individual households still heat their homes with (often low quality) coal – both, Bulgaria and Poland did not yet implement quality requirements for coal firing installations below 1 MW capacity. Therefore, European Commission submitted claims against both countries, and recently the European Court punished Bulgaria. In case individual households in both countries have to switch to alternative sources for heat supply, we expect heat pumps to become extremely popular like e.g. in Scandinavia, which provides to an increase of power consumption.

3.
PRIMES EU REFERENCE SCENARIOS FOR CEE

The EU Reference Scenario is one of the European Commission's key analytical tools in the areas of energy, transport and climate action. It is updated by PRIMES, an external consultancy, and predicts the impact of current EU policies on energy and transport trends, as well as changes in the expected amount of greenhouse gas emissions. The last update was published in 2016. The Reference Scenario provides projections for indicators, such as the share of RES or levels of energy efficiency, on a five-year period up until 2050 for the EU as a whole and for each EU member state. PRIMES does not have an official mandate of the EU Commission or any member state, however it bases its projections on political assumptions which have been published by national governments in their energy policies. The Reference Scenario is a projection of where the current EU set of policies coupled with market trends are likely to lead.

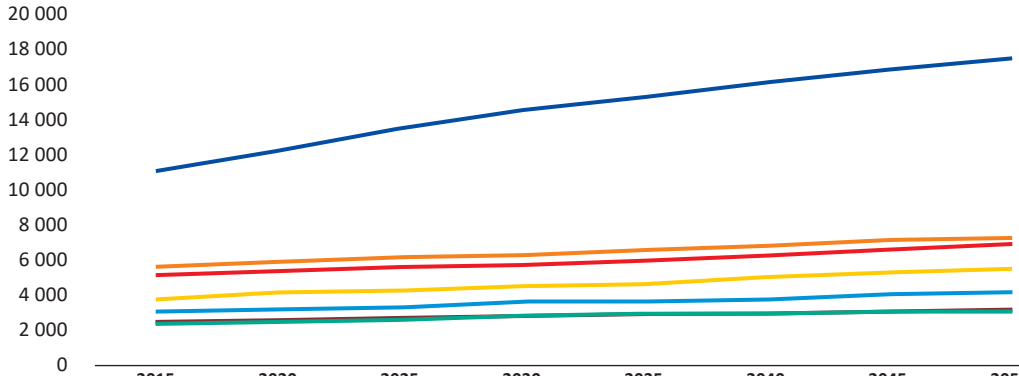
Although the Reference Scenario is not designed as a forecast of what is likely to happen in the future, it provides a benchmark against which new policy proposals can be assessed. Most important, the 2016 Reference Scenario is the benchmark for the NECPs to be submitted by each member state by the end of 2017/2018 to the European Commission. The level of GHG emissions per produced MWh of electricity is the outcome of the European Council policy as implemented in 2014.

BELOW, WE PRESENT THE KEY FINDINGS OF THE PRIMES 2016 REFERENCE SCENARIO AS RELEASED BY THE EUROPEAN COMMISSION ON 20 JULY 2016, AND ALSO COMMENT ON COUNTRY SCENARIOS AND A POSSIBLE FURTHER DEVELOPMENT OF THE ENERGY MIX.

Below, we present the key findings of the PRIMES 2016 Reference Scenario as released by the European Commission on 20 July 2016, and also comment on country scenarios and a possible further development of the energy mix. Generally, , the PRIMES scenarios Reference Scenario favours a mix of nuclear power and gas (combined-cycle) plants in case no clear political will to move towards RES is visible – so, CEE countries especially might be motivated to change their mix to decrease future import dependency. Only in cases where national governments have documented their intention being clearly in favour of RES, such as Austria or Romania, is a more progressive RES path noticeable. The general lack of bankability of nuclear power plants, especially compared to high-competitive offshore wind farms and electricity and heat storage, may however change this picture in the near future.

Furthermore, the implementation of the auction system in many countries leads to a rapid price decrease for both developers and producer of RES generators, and therefore lower CAPEX and OPEX costs resulting in lower power prices. With conventional technologies the likely increase of prices for GHG-certificates under the EU-ETS-scheme, the general lack of project finance (if not 'politically' motivated) and the further increasing standards for safety, especially for nuclear power plants, will result in increasing CAPEX and OPEX costs. Finally, high consciousness about energy security also motivates policy makers to opt for more RES.

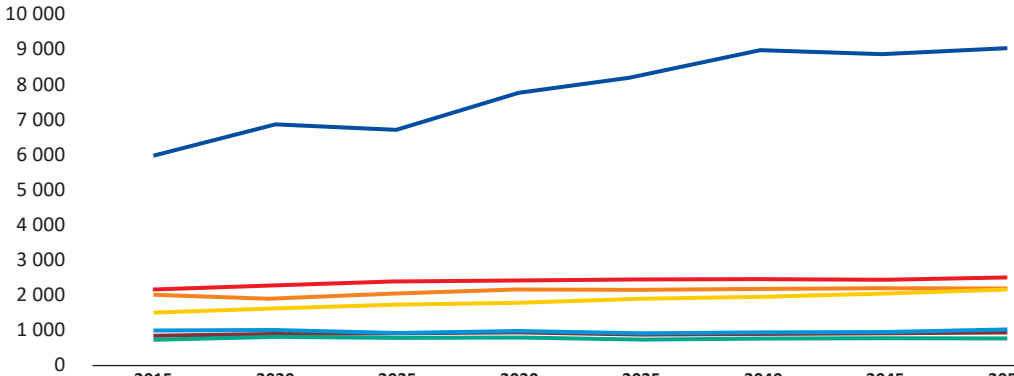
FIGURE 5 | **FINAL NET ENERGY DEMAND ELECTRICITY (IN KTOE)**
Source: PRIMES



	2015	2020	2025	2030	2035	2040	2045	2050
Austria	5436	5775	5992	6234	6419	6678	6967	7123
Bulgaria	2382	2506	2598	2672	2727	2817	2921	3062
Czech Rep.	5012	5249	5513	5687	5922	6177	6507	6801
Hungary	2977	3086	3284	3359	3489	3686	3918	4058
Poland	11011	12206	13416	14472	15226	15988	16720	17395
Romania	3683	4058	4233	4392	4584	4840	5107	5355
Slovakia	2219	2333	2532	2675	2771	2839	2897	2942

Our comments:
Final demand for electricity continues to increase for all CEE countries, i.e. energy efficiency measures for power (and heat) consumption in the long-term will not develop in line with further economic growth and a new demand for power, such as e-mobility, power-to-heat and storage losses – even in countries with a long-term established economy such as Austria. However, the relative increase for Poland is remarkably high – it is unclear whether PRIMES based its projections on assumptions by the Polish government, which might be motivated politically to stipulate new investments in coal power plants. In our opinion, this increase is questionable, as Poland will most likely continue to develop with comparable economic speed as other Visegrad countries. So, final demand for electricity should be subject to correction in the case of Poland providing an annual net demand of approx. 15,000 ktoe – or 175 TWh-e in 2050, corresponding to slightly less than 80% of gross demand for electricity, i.e. 220 TWh-e in 2050. However, this assumption may change in case Poland develops a power-to-heat scenario to replace derogated CHP and heat plants after 2023.

FIGURE 6 **FINAL ENERGY DEMAND FOR HEAT AND COOLING FROM CHP AND DISTRICT HEATING (IN KTOE)**
Source: PRIMES

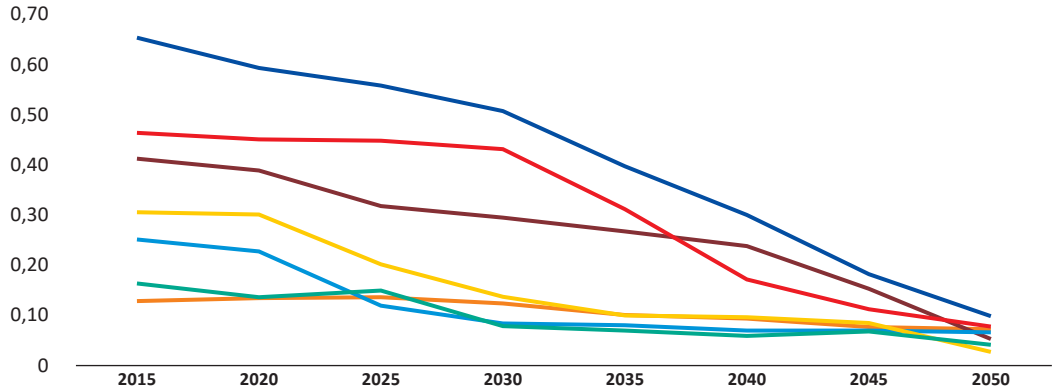


	2015	2020	2025	2030	2035	2040	2045	2050
Austria	2008	1909	2044	2137	2169	2212	2207	2153
Bulgaria	841	869	932	963	919	920	914	914
Czech Rep.	2102	2288	2417	2446	2478	2482	2458	2494
Hungary	985	1008	927	1016	949	963	1017	1034
Poland	6063	6945	6820	7850	8366	9106	8990	9112
Romania	1493	1628	1712	1801	1873	1954	2046	2122
Slovakia	726	816	827	807	791	778	758	747

Our comments:
Final demand for heat and cooling has been stable for all CEE countries in recent years, i.e. in case of heat demand energy efficiency measures compensate further economic growth. The increase for heat demand in Poland is therefore not realistic and should be subject to correction in the submitted NECP. Even in case Poland's district heating system will be extended, e.g. due to severe problems with low emissions, energy efficiency measures, e.g. to reduce energy poverty, will further limit the amount of district heat used per household.

FINAL DEMAND FOR HEAT AND COOLING HAS BEEN STABLE FOR ALL CEE COUNTRIES IN RECENT YEARS, I.E. IN CASE OF HEAT DEMAND ENERGY EFFICIENCY MEASURES COMPENSATE FURTHER ECONOMIC GROWTH.

FIGURE 7 **CARBON INTENSITY INDICATOR FOR ELECTRICITY PRODUCTION [GRAM OF CO_2/KWH]**
Source: PRIMES

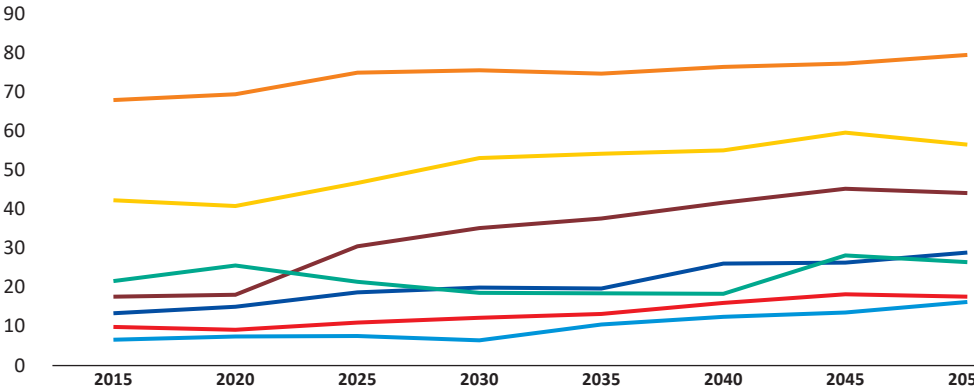


	2015	2020	2025	2030	2035	2040	2045	2050
Austria	0,13	0,14	0,14	0,13	0,11	0,10	0,09	0,08
Bulgaria	0,41	0,39	0,32	0,29	0,27	0,24	0,16	0,06
Czech Rep.	0,46	0,45	0,45	0,43	0,31	0,17	0,12	0,08
Hungary	0,26	0,23	0,12	0,09	0,09	0,08	0,07	0,07
Poland	0,65	0,59	0,56	0,50	0,40	0,30	0,19	0,10
Romania	0,30	0,30	0,20	0,14	0,11	0,10	0,09	0,04
Slovakia	0,17	0,14	0,15	0,09	0,07	0,06	0,07	0,05

Our comments:

The carbon intensity benchmark figures until 2030 are based on the EU effort sharing decision from the European Council of October 2014. In particular, Poland and Czech Republic are currently at a high emission level. Therefore, the decision of the Czech government to close domestic coal mines by 2023 is understandable. The decrease of CO2 per produced kWh is an indicator for required investments in zero-emission technologies, such as RES or nuclear. Some CEE countries are still constructing or planning nuclear power plants, such as Hungary, Slovakia and Czech Republic. The significant drop of electricity production costs of RES, especially of offshore wind and PV, as well as the further increase of security requirements for nuclear power plants means that in the next few years policymakers may switch to RES investments to avoid a sharp increase of power prices as energy poverty in all CEE countries is already relatively high. Furthermore, the presented figures for Poland are questionable, as the Polish research institute KOBIZE assumes a carbon intensity indicator for electricity production of 770 g CO2/kWh, derived from the very high average carbon intensity indicator for electricity production from coal power plants amounting to 920 g CO2/kWh.

FIGURE 8 | **SHARE OF RENEWABLE ENERGY FOR GROSS ELECTRICITY PRODUCTION (IN %)**
Source: PRIMES

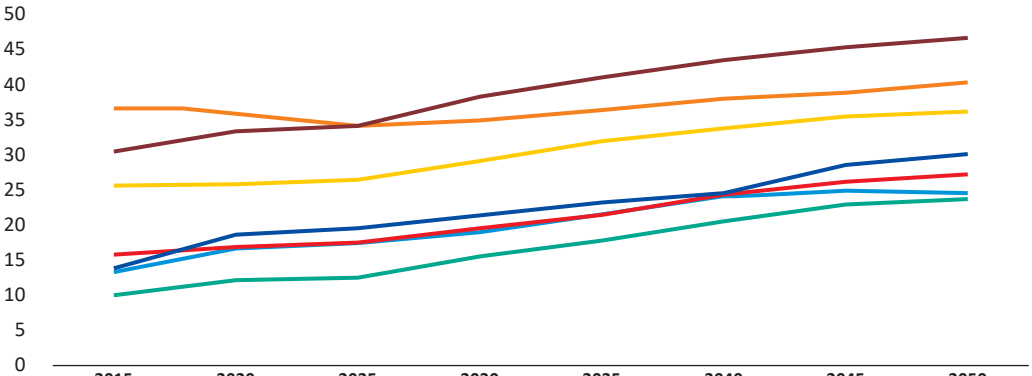


	2015	2020	2025	2030	2035	2040	2045	2050
Austria	68,0	69,0	74,7	75,4	74,5	76,0	77,0	79,7
Bulgaria	17,4	18,1	30,5	35,2	37,6	41,6	45,2	44,3
Czech Rep.	10,3	9,0	10,9	12,0	13,0	15,7	18,4	17,5
Hungary	6,7	7,9	7,7	6,6	10,7	12,1	13,7	16,3
Poland	13,4	14,3	18,8	19,8	19,8	25,9	26,6	28,6
Romania	42,3	40,8	46,8	52,8	54,1	55,0	59,3	56,2
Slovakia	21,7	25,4	21,3	18,5	18,5	18,4	27,7	26,7

Our comments:

In all CEE countries a relative increase of electricity produced by RES in the power mix is visible, however, in countries with planned investments in nuclear power planned to be commissioned in the next 15 years, such as Hungary, Slovakia, Czech Republic and Slovakia, the percentage of RES in total electricity production may even decrease, although new investments in RES generators will continue. In case the planned investments in nuclear power will not go ahead, or those countries will even exit nuclear power, e.g. as Sweden will do by 2040, increased investments in RES are inevitable. However, we do not expect that such decisions will be taken soon, but rather that decisions to construct nuclear power plants will be postponed to further observe the development of power prices from RES - and storage technology, which might be a game changer in the coming years.

FIGURE 9 | **SHARE OF RENEWABLE ENERGY FOR HEAT AND COOLING PRODUCTION (IN %)**
Source: PRIMES

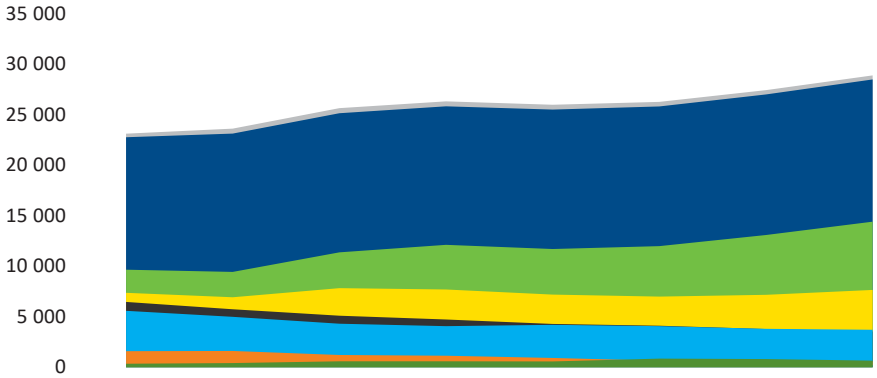


	2015	2020	2025	2030	2035	2040	2045	2050
Austria	37,0	36,2	34,5	34,9	36,6	38,2	39,1	40,5
Bulgaria	30,8	33,6	34,9	38,6	41,2	43,9	45,6	47,0
Czech Rep.	15,5	17,0	17,8	19,6	21,7	24,7	26,3	27,7
Hungary	13,4	16,7	18,2	19,0	21,7	24,0	24,9	24,5
Poland	13,8	19,0	19,7	21,7	23,4	25,0	28,7	30,3
Romania	25,9	26,0	26,8	29,5	32,2	34,0	35,7	36,4
Slovakia	10,3	12,7	12,8	15,8	18,0	20,8	23,1	24,1

Our comments:
In all CEE countries, with the exception of Austria, the increase of heat and cooling energy produced by RES is substantial. In many countries the energetic potential for straw is not yet explored, which might be an attractive alternative to wood biomass. However, according to the PRIMES scenario, the increase will slow down after 2030, which means that the LULUCF and ILUC regulations against harvesting wood and land use change for energetic use will have an impact especially on the availability of solid biomass. Therefore, for new generators which burn or gasify solid biomass an in-depth analysis of long-term available fuel supply under the LULUCF and ILUC regulations must be carried out to procure investments – for project finance a feed stock co-efficient of 1.6 within 100 km is a standard requirement. Consequently, power-to-heat technologies will become a major topic after biomass potential has been explored. The electrification of heat production, in our opinion, is one of the major investment drivers in the next decade.

AUSTRIA – PRIMES REF SCENARIO 2016

FIGURE 10 | **REFERENCE SCENARIO AT - NET GENERATION CAPACITY**
Source: PRIMES

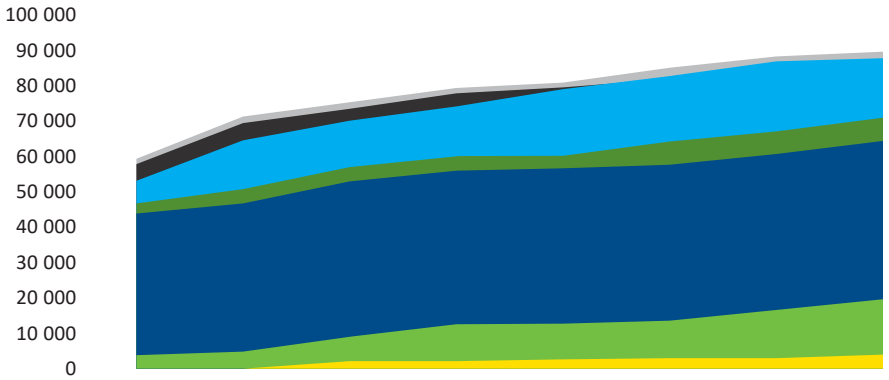


	2015	2020	2025	2030	2035	2040	2045	2050
Nuclear energy	0	0	0	0	0	0	0	0
Hydro (pumping excluded)	13149	13751	13751	13756	13849	13881	13881	14042
Wind	2412	2583	3664	4545	4545	5026	5986	6803
Solar	876	1090	2692	2821	2888	2930	3197	4009
Other renewables	0	0	0	0	0	0	0	0
Solids fired	873	804	778	778	81	72	36	36
Gas fired	4074	3527	3195	2902	3115	3046	3063	2850
Oil fired	971	815	483	423	385	8	3	0
Biomass-waste fired	633	778	764	813	806	1033	991	846

Our comments:

Generally, according to the PRIMES scenario, Austria will phase out solids and oil after 2030. Although the installed capacity of gas power (and heat) plants will decrease by one quarter by 2025, the amount of produced power by gas more than doubles by 2025, and even triples by 2035. However, the amount of wind power almost doubles, and the amount of solar power more than triples by 2025 with a planned systematic further increase. In case storage becomes competitive, wind and solar may replace the high full load hours of gas. Even the already high share of hydropower increases, and the increasing share of biomass will replace solids and oil CHP. So, for all types of renewable energy, including storage and aggregators, Austria seems to be an interesting market for the foreseeable future. And there is one thing to add: Austria's energy supply is based on hydro power, i.e. glacier water. It is likely that within this century almost all glaciers in the Alpes will disappear. So, climate change forces Austria to look for a new source of energy.

FIGURE 11 | **REFERENCE SCENARIO AT - GROSS ELECTRICITY GENERATION BY SOURCE**
Source: PRIMES

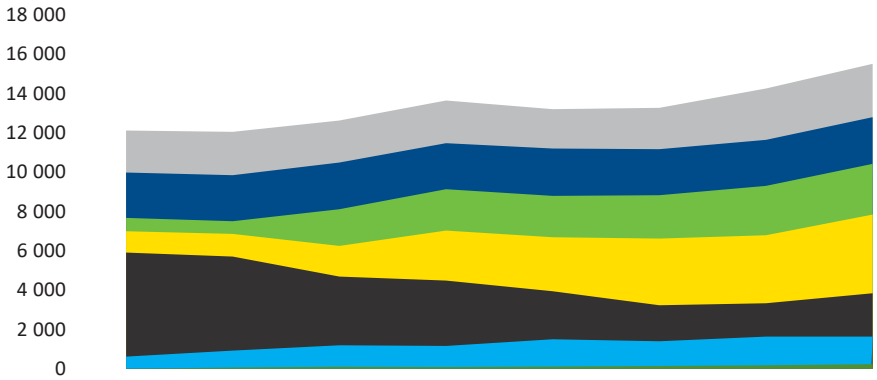


	2015	2020	2025	2030	2035	2040	2045	2050
Nuclear energy	0	0	0	0	0	0	0	0
Solids	4194	4940	3319	3290	90	82	30	30
Oil (including refinery gas)	208	215	77	67	64	0	0	0
Gas (including derived gases)	6774	14078	13565	14589	19403	19937	19783	17464
Biomass-waste	2592	3544	3983	4060	3581	6205	6646	6824
Hydro (pumping excluded)	41009	43216	44533	44553	44951	45095	45105	45776
Wind	3958	4443	7231	10050	10161	10915	13598	15410
Solar	871	1174	3125	3312	3414	3502	3890	5060
Geothermal and other RES	11	11	11	11	11	11	11	11
	0	0	0	0	0	0	0	0

Due to its influence in the region, neighbouring countries, i.e. the Czech Republic, Slovakia and Hungary, and also Romania we expect those governments to compare their NECP with Austria during regional consultation in 2018, which may lead to further changes to their energy policy. Austria consequently blocks nuclear power, and has already exploited its potential of hydro power and biomass, so a low-emission energy mix automatically has to envisage a large amount of wind and solar power plants.

BULGARIA – PRIMES REF SCENARIO 2016

FIGURE 12 | **REFERENCE SCENARIO BG - NET GENERATION CAPACITY**
Source: PRIMES

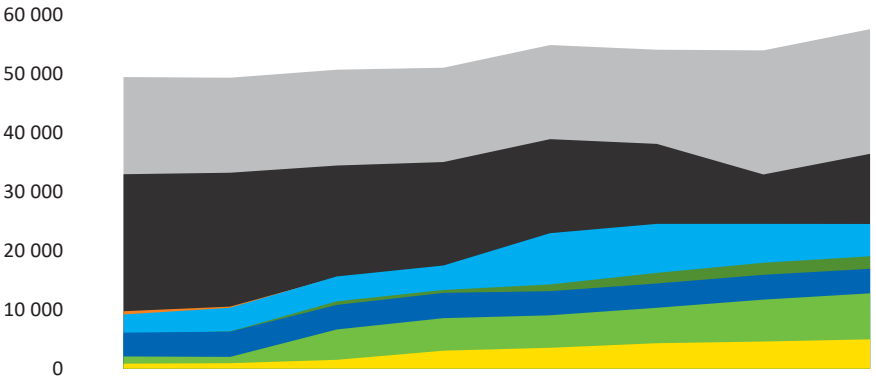


	2015	2020	2025	2030	2035	2040	2045	2050
Nuclear energy	1920	1920	1920	1920	1920	1920	2400	2400
Hydro (pumping excluded)	2338	2338	2338	2338	2338	2338	2338	2338
Wind	691	703	1954	2122	2146	2197	2535	2599
Solar	1052	1069	1541	2572	2787	3388	3473	4082
Other renewables	0	0	0	0	0	0	0	0
Solids fired	5313	4819	3501	3391	2379	1799	1590	2179
Gas fired	626	910	1129	1043	1433	1271	1517	1478
Oil fired	13	2	2	2	0	0	0	0
Biomass-waste fired	15	51	94	101	112	197	216	217

Our comments:

According to the PRIMES scenario, Bulgaria's power generation will remain based to a large extent on solids and nuclear energy. The installed capacity of solid fired power plants is slowly but steadily being reduced, however, the amount of full load hours per installed MW increases. Bulgaria has severe problems with air quality due to low emissions, which might speed up the faster shutdown of solid power plants. It is worth noting that an extension of nuclear energy is not planned before 2045, which is a reasonable timeline to reflect at a later point whether nuclear power will further lose its competitiveness with wind and solar combined with storage. Between 2020 and 2025, a large number of onshore wind farms with 4 GW capacity are planned to be connected, however, according to PRIMES offshore wind in the Black Sea will not play a role in the foreseeable future – in our opinion, most likely this will be proved wrong.

FIGURE 13 | **REFERENCE SCENARIO BG - GROSS ELECTRICITY GENERATION BY SOURCE**
Source: PRIMES

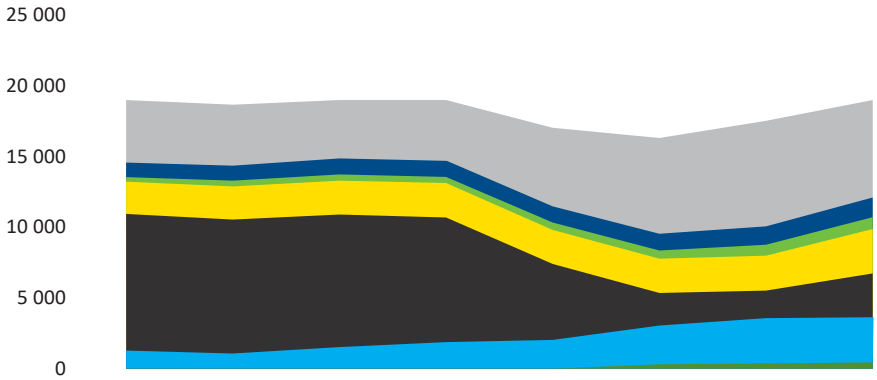


	2015	2020	2025	2030	2035	2040	2045	2050
Nuclear energy	15662	15326	15326	15326	15326	15326	20148	20148
Solids	23317	22690	18563	17456	15856	13555	8180	11972
Oil (including refinery gas)	440	70	63	0	62	0	0	0
Gas (including derived gases)	3035	3873	4408	4120	8521	8243	6758	5230
Biomass-waste	54	164	463	455	1063	1787	1985	2085
Hydro (pumping excluded)	4061	4331	4235	4218	4220	4223	4223	4227
Wind	1144	1183	5050	5589	5667	5921	7307	7518
Solar	1129	1152	1829	3323	3636	4548	4674	5570
Geothermal and other RES	0	0	0	0	0	0	0	0

Currently, in the Black Sea large oil and gas offshore developments are planned by Bulgaria, as well as Romania. However, in our opinion, in case of further offshore development in the Baltic Sea with the development of offshore wind turbines for lower wind speed, the Black Sea offshore areas at the Bulgarian and Romanian coast, with 0.5 to 1.0 m/s lower wind speed than in the Baltic Sea and comparable water depth than, e.g., at Kriegers Flak or Slupsk Bank, should also become an attractive investment area for offshore. The very conservative approach of further PV development after 2020 is astonishing and visible further decreasing system prices should change this approach soon – based on historical mal-functioning investment schemes, so that PV (and electricity storage) may replace the further development of gas power plants to a certain extent, whereas combined wind and PV further reduce the full load hours of solid fired power plants. Also astonishing is the passive approach to develop biomass (CHP) plants based on wood and straw, as Bulgaria is a country with a high share of both forest and agricultural sectors. Investments in hydro power plants are not planned in any visible scale; however, at least smaller hydro power plants should have further potential due to Bulgaria's geography.

CZECH REPUBLIC – PRIMES REF SCENARIO 2016

FIGURE 14 | **REFERENCE SCENARIO CZ - NET GENERATION CAPACITY**
Source: PRIMES

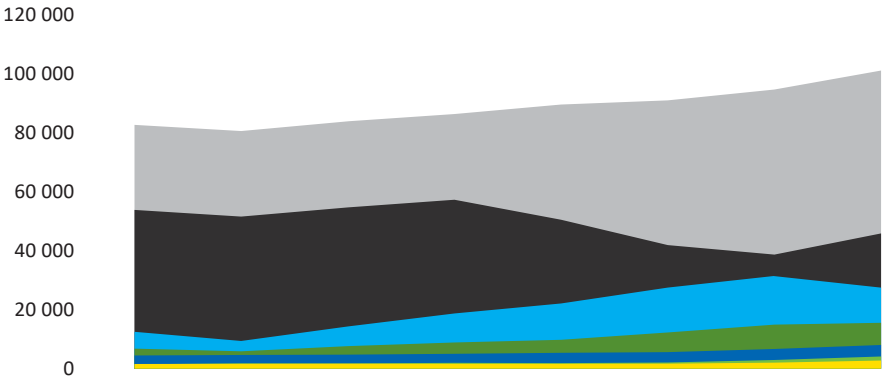


	2015	2020	2025	2030	2035	2040	2045	2050
Nuclear energy	4006	4006	4006	4006	5206	6406	7116	6848
Hydro (pumping excluded)	1080	1080	1090	1109	1142	1190	1300	1393
Wind	282	408	452	488	514	547	789	838
Solar	2266	2328	2365	2391	2412	2440	2469	3089
Other renewables	0	0	0	0	0	0	0	0
Solids fired	9656	9487	9414	8797	5364	2303	1881	3098
Gas fired	1220	933	1419	1783	1961	2749	3167	3153
Oil fired	134	72	64	64	28	24	24	24
Biomass-waste fired	171	258	263	274	279	503	638	641

Our comments:

According to PRIMES, between 2030 and 2040, the Czech Republic will generally phase out solids – due to the closure of domestic coal mines in 2023 we expect this to happen by 2030 at the latest, and replace this generation by extending nuclear power and gas. This is remarkable, as this investment most likely will increase the energy dependency of the Czech Republic – mostly from Russia. However, energy independency has so far been a certain 'leitmotiv' of Czech energy policy. An increase of nuclear power capacity is planned after 2030 – and Czech policy makers are not in a comfortable position. According to PRIMES, onshore wind and solar - based on historical mal-functioning investments - do not play any role in the future of the Czech energy system, however, this could be subject to a fast change in case wind, solar and storage become more competitive than nuclear, and a reasonable approach for grouping wind turbines within a reasonable distance to residential and landscape areas will be implemented.

FIGURE 15 | **REFERENCE SCENARIO CZ - GROSS ELECTRICITY GENERATION BY SOURCE**
Source: PRIMES

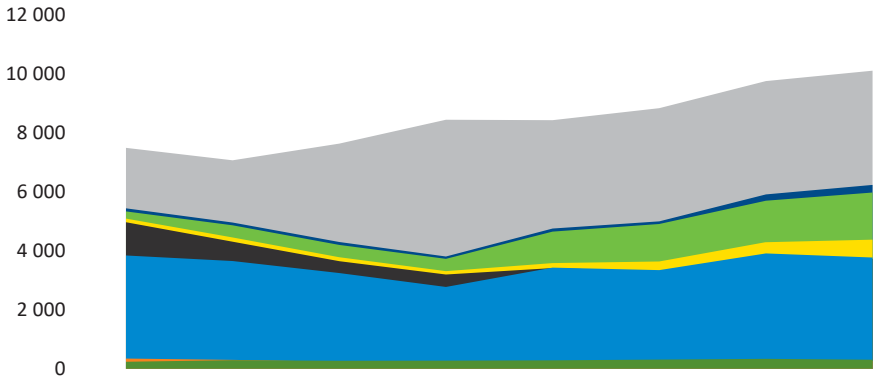


	2015	2020	2025	2030	2035	2040	2045	2050
Nuclear energy	27596	27596	27596	27594	37668	47742	54556	54467
Solids	41095	41990	40672	38739	28716	14514	6972	17948
Oil (including refinery gas)	231	0	0	0	0	0	0	0
Gas (including derived gases)	5853	3591	6677	10047	12143	15189	16583	11840
Biomass-waste	2214	1097	2781	3669	4533	6602	8251	7608
Hydro (pumping excluded)	2421	2541	2471	2561	2716	2941	3453	3877
Wind	508	759	824	878	912	991	1664	1782
Solar	2149	2214	2254	2276	2352	2395	2422	2967
Geothermal and other RES	0	2	2	2	2	2	2	2

It is worth noting that large investments in biomass waste are planned for after 2020, and for the time being we expect that policy makers will exploit this potential to postpone the inevitable decision whether the future low emission mix will be based on nuclear or wind/solar/storage. Although the Czech Republic has already fulfilled its 2020 recycling target, further efforts must be undertaken to fulfil 2030 recycling targets, so we expect investments in flexible biomass wood/straw/biogenic waste gasification plants - and not in waste incineration plants.

HUNGARY – PRIMES REF SCENARIO 2016

FIGURE 16 | **REFERENCE SCENARIO HU - NET GENERATION CAPACITY**
Source: PRIMES



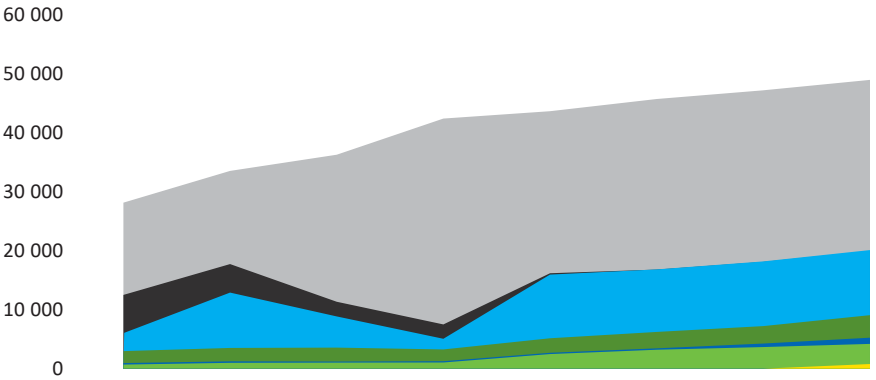
	2015	2020	2025	2030	2035	2040	2045	2050
Nuclear energy	1960	1960	3221	4482	3522	3692	3692	3692
Hydro (pumping excluded)	57	57	57	57	57	58	183	267
Wind	329	477	477	477	1128	1317	1457	1616
Solar	45	106	106	106	106	249	360	592
Other renewables	0	0	0	0	0	0	0	0
Solids fired	1137	674	407	396	3	3	3	3
Gas fired	3496	3384	2978	2531	3208	3093	3607	3483
Oil fired	91	11	11	5	5	4	0	0
Biomass-waste fired	349	356	357	357	359	386	417	388

Our comments:

As PRIMES predicts, Hungary will phase out solid fired power plants soon, and its power production will be based mainly on nuclear – the EC recently approved an increase of capacity in the Paks Nuclear Power Plant – and natural gas. However, this will lead to an even higher dependency on Russian technology and fuels – and relatively high wholesale prices compared to neighbouring countries. Whether Hungary will indeed develop another 1.2 GW nuclear power plant extension to be connected by 2030 will depend on internal politics and external political pressure from both Russia and the EU. After partly decommissioning nuclear power plants by 2035 gas and potentially solar will take over – we have seen a large number (close to 2 GW) of PV applications submitted to the regulator for licensing by 31 December 2016, trying to utilise the closing window for the mandatory off-take system to be taken over by a premium based regime.

Allocation of PV and other RES subsidies, however, is capped annually at approx. HUF 45 billion (EUR 150 million). The very conservative (almost banning-like) approach of further wind developments is astonishing and can hardly be explained with system balancing reasons. PV, however, (and stor-

FIGURE 17 | **REFERENCE SCENARIO HU - GROSS ELECTRICITY GENERATION BY SOURCE**
Source: PRIMES

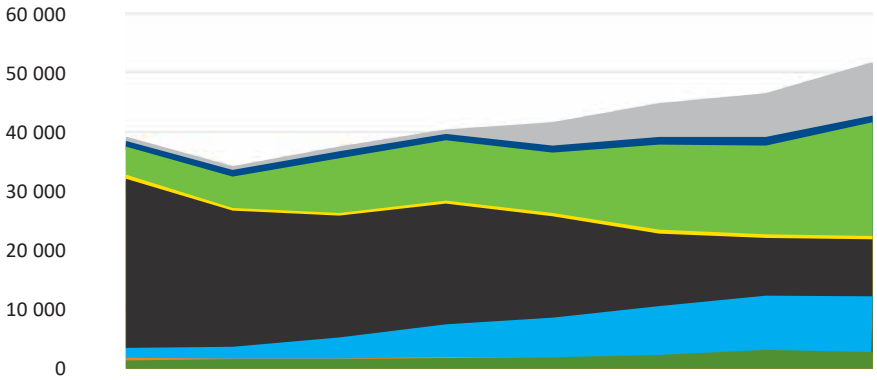


	2015	2020	2025	2030	2035	2040	2045	2050
Nuclear energy	27596	27596	27596	27594	37668	47742	54556	54467
Solids	41095	41990	40672	38739	28716	14514	6972	17948
Oil (including refinery gas)	231	0	0	0	0	0	0	0
Gas (including derived gases)	5853	3591	6677	10047	12143	15189	16583	11840
Biomass-waste	2214	1097	2781	3669	4533	6602	8251	7608
Hydro (pumping excluded)	2421	2541	2471	2561	2716	2941	3453	3877
Wind	508	759	824	878	912	991	1664	1782
Solar	2149	2214	2254	2276	2352	2395	2422	2967
Geothermal and other RES	0	2	2	2	2	2	2	2

age) may replace the further development of gas power plants after 2030 to a certain extent. Hungary's only major coal fired power plant, Matrai Power Plant, has also announced clean coal technology based development plans, together with its long dormant plans for a system balancing, pumped hydro-electric storage plant. Other than that, no investments in large biomass CHP and hydropower plants are visible, which is also astonishing, and Hungary also has a great potential in geothermal sources. It is also to be understood that Hungary's current almost on target status re. RES-share (14.5% vs 14.65%) is largely due to a change in statistical approaches now allowing Hungary to factor in its household wood and biomass consumption against RES-targets, which may change in 2021 as set out above. So, although Hungary further develops to a low-emission country, it generally does not plan to further develop renewables. However, in our opinion, in the next decade existing relatively high wholesale prices may force Hungary to change its current approach.

POLAND – PRIMES REF SCENARIO 2016

FIGURE 18 | **REFERENCE SCENARIO PL - NET GENERATION CAPACITY**
Source: PRIMES

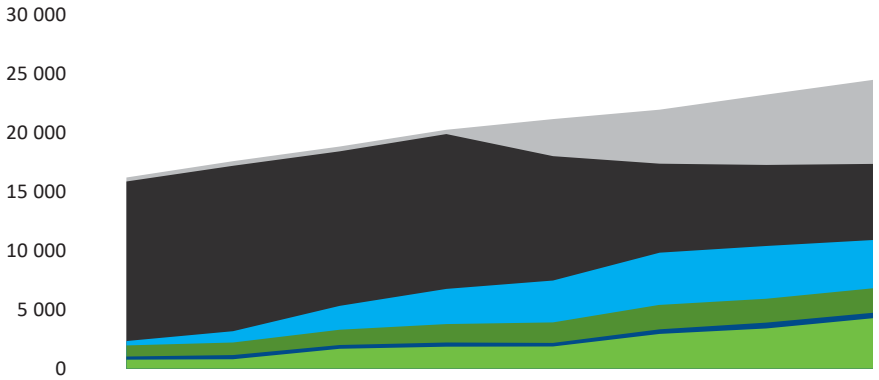


	2015	2020	2025	2030	2035	2040	2045	2050
Nuclear energy	0	0	0	0	3300	4950	6600	8250
Hydro (pumping excluded)	949	949	988	1039	1039	1155	1342	1427
Wind	5100	5728	9669	10339	10339	14664	15276	18877
Solar	35	79	79	99	155	220	278	350
Other renewables	0	0	0	0	0	0	0	0
Solids fired	28543	22967	20695	20704	17464	12708	9952	9983
Gas fired	1659	1712	3290	5403	6518	8036	9237	9143
Oil fired	398	171	162	155	148	96	68	63
Biomass-waste fired	1574	1978	2055	2105	2115	2494	3151	3016

Our comments:
Poland has by far the highest GHG emissions per MWh in the EU with a share of coal amounting to 80% of power production, and severe problems with air quality by low emissions. But the mining sector, mainly of hard coal is still an important job machine and a very strong political factor. This should change soon due to the non-competitive cost structure of Polish over-employed mining industry and pending state aid monitoring proceedings by European Commission.

Furthermore, new EU BREF/BAT emission standards require decommissioning of a large share of the coal power/CHP/heat plant fleet between 2020 and 2030. So, to decrease GHG emissions by replacing capacity and to decrease air pollution Poland has to change its energy mix rapidly. By further postponing energy transition Poland risks a severe macroeconomic damage in the coming decade. Additionally, Poland has the largest district heating system in Europe, and also heat fed-in in heating systems bases to three quarters on coal – due to BAT/BREF guideline Poland has to switch of more than 25 GW of its 56 GW installed heat generation capacity until 2022/2023. This will motivate Polish government to invest in flexible biomass wood/straw/biogenic waste gasification plants and even more in heat storage, as geothermal energy has a limited potential in Poland.

FIGURE 19 | **REFERENCE SCENARIO PL - GROSS ELECTRICITY GENERATION BY SOURCE**
Source: PRIMES

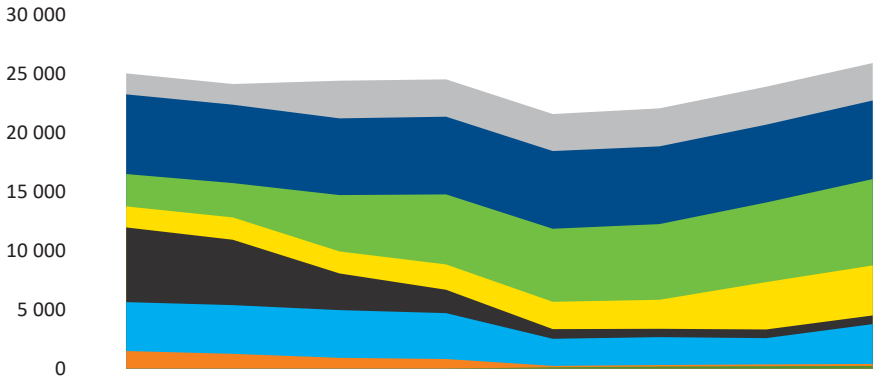


	2015	2020	2025	2030	2035	2040	2045	2050
Nuclear energy	0	0	0	0	27703	41555	55407	69258
Solids	137628	141228	131372	132075	105487	76601	69230	63563
Oil (including refinery gas)	9	0	471	471	447	283	279	292
Gas (including derived gases)	2968	9649	20733	30214	35886	43646	45154	41710
Biomass-waste	9667	11436	13082	15892	17444	21299	20772	20850
Hydro (pumping excluded)	2397	2427	2553	2765	2766	3243	4019	4403
Wind	9669	11437	20135	21665	21687	32411	37073	44968
Solar	29	67	67	84	132	190	241	303
Geothermal and other RES	0	0	0	0	0	0	0	0

Generally, Poland's energy policy is dominated by large (partly) state-owned utilities with a combined market share of almost 80%, and lack of investment transparency due to hidden market protection by both, Ministry of Energy and Regulatory Office. Additionally, energy security plays a large role for decision makers. So the PRIMES scenario, which predicts a large capacity of newly installed gas power plants, is not realistic. Rather we expect Polish utilities to either refurbish for the time being smaller coal power plant units with 200 MW to become more flexible, and to invest in electricity storage to become competitive at intraday markets, but also in heat storage due to the phase out of coal-fired heat and CHP plants. Nuclear power does not seem to be a realistic option due to its very high, generally non-bankable investment costs – astonishingly, the PRIMES scenario predicts huge investments in nuclear power connected from 2035 totalling to 8.2 GW in 2050 - , but also due to the fact that nuclear power plants increase energy dependency. Therefore, we expect that for many RES technologies an investment opportunity will soon arrive, on the short-term for PV to balance the energy system during the summer months, on the midterm for biomass CHP (all type of technologies) to replace derogated coal-fired CHP plants – we also expect a large increase of heat pumps -, and in the long-term from 2025 offshore as a RES technology favoured by large utilities to replace lignite power plants with low-emission technology.

ROMANIA – PRIMES REF SCENARIO 2016

FIGURE 20 | **REFERENCE SCENARIO RO - NET GENERATION CAPACITY**
Source: PRIMES

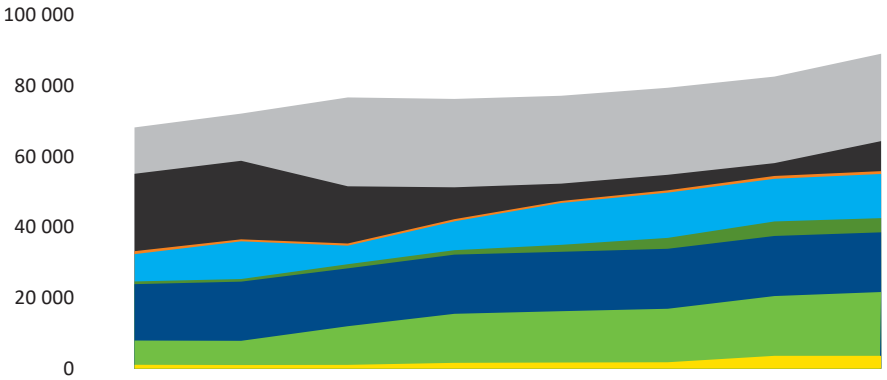


	2015	2020	2025	2030	2035	2040	2045	2050
Nuclear energy	1414	1414	2828	2828	2828	2828	2828	2828
Hydro (pumping excluded)	6645	6645	6645	6645	6645	6686	6686	6686
Wind	2976	2989	4832	6017	6264	6498	6803	7450
Solar	1792	1824	1824	2223	2305	2375	4075	4143
Other renewables	0	0	0	0	0	0	0	0
Solids fired	6441	5626	3094	1909	861	770	666	885
Gas fired	4173	4221	4170	3959	2248	2338	2205	3257
Oil fired	1360	1132	771	676	119	119	119	115
Biomass-waste fired	96	139	150	157	169	252	313	306

Our comments:

Romania has undertaken many efforts to balance its energy mix, which has resulted in a visible increase of energy independency. According to the PRIMES scenario, Romania will most likely follow this energy policy, and might even replace a planned increase of gas power plant capacity by PV and storage in case the technology switch will not increase power prices – energy poverty in Romania is an issue. The approach of further PV development seems to be too conservative – as in other CEE countries, due to historical malfunctions of support systems - and visible further decreasing system prices should lead to a significant increase of PV capacity. Also, onshore wind is consequently further developed, and offshore wind might

FIGURE 21 | **REFERENCE SCENARIO RO - GROSS ELECTRICITY GENERATION BY SOURCE**
Source: PRIMES



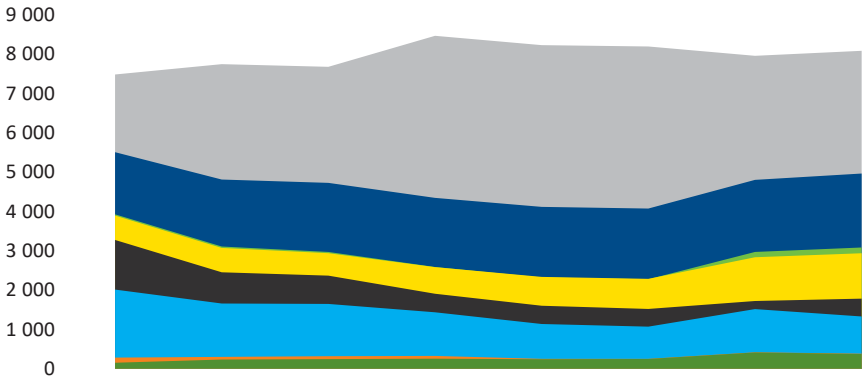
	2015	2020	2025	2030	2035	2040	2045	2050
Nuclear energy	11890	11922	23792	23606	23606	23419	23419	23419
Solids	21982	22415	16311	9020	4869	4414	3730	8511
Oil (including refinery gas)	625	405	238	226	216	231	231	217
Gas (including derived gases)	8032	10726	5443	8622	12186	13135	12402	13025
Biomass-waste	522	763	854	1155	1960	3001	3961	3841
Hydro (pumping excluded)	16112	16724	16778	16778	16796	16972	16962	17015
Wind	6473	6512	10579	13287	13859	14478	15532	16428
Solar	1891	1950	1950	2770	2895	3048	5562	5657
Geothermal and other RES	0	0	0	0	0	0	0	0

be a huge opportunity, which is not part of the PRIMES scenario (see comments for Bulgaria). In case the phase-out of solids speeds up, the development of new biomass CHP projects should also speed up – as in all other CEE member states. Romania has a large potential of straw and grass in its southern regions, but also forest biomass in Transylvania, so biomass should be able to partly replace solids for CHP at an earlier moment than predicted by PRIMES – and further decrease Romania's energy dependency.

ROMANIA HAS A LARGE POTENTIAL OF STRAW AND GRASS IN ITS SOUTHERN REGIONS, BUT ALSO FOREST BIOMASS IN TRANSYLVANIA, SO BIOMASS SHOULD BE ABLE TO PARTLY REPLACE SOLIDS FOR CHP AT AN EARLIER MOMENT THAN PREDICTED BY PRIMES – AND FURTHER DECREASE ROMANIA'S ENERGY DEPENDENCY.

SLOVAKIA – PRIMES REF SCENARIO 2016

FIGURE 22 | **REFERENCE SCENARIO SK - NET GENERATION CAPACITY**
Source: PRIMES

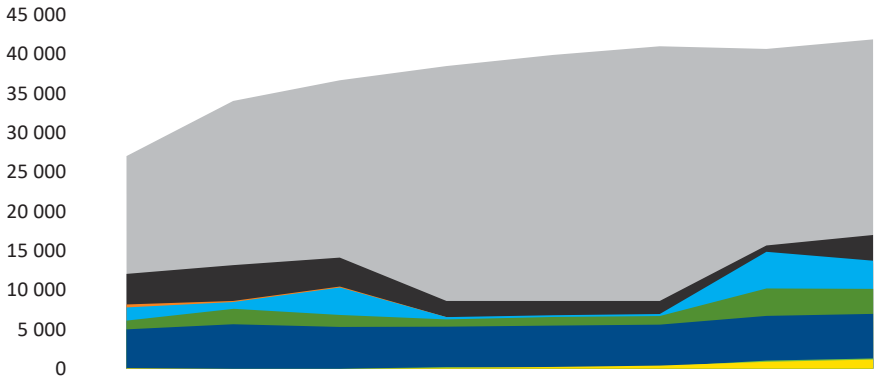


	2015	2020	2025	2030	2035	2040	2045	2050
Nuclear energy	1940	2820	2820	4020	4020	4020	3020	3020
Hydro (pumping excluded)	1607	1725	1725	1725	1725	1725	1859	1888
Wind	5	19	19	19	19	24	124	164
Solar	608	620	620	680	740	800	1100	1119
Other renewables	0	0	0	0	0	0	0	0
Solids fired	1274	792	711	483	477	456	212	449
Gas fired	1738	1323	1322	1097	863	782	1061	958
Oil fired	84	84	84	84	30	30	30	3
Biomass-waste fired	241	327	331	332	332	335	511	462

Our comments:

Slovakia has an overwhelming share of power production by nuclear, and according to PRIMES scenario, it is planned to even further increase this share by 1.2 GW by 2030 – comparable to Hungary. However, gas power plants play a less important role than in Hungary, so the Slovakian energy mix with nuclear as a must-run technology seems to be very imbalanced and non-flexible. Renewable energy investments seem not to play a role at all, which is highly astonishing due to the cost competitiveness of onshore wind and solar power, and the development of those technologies in neighbouring countries. However, Slovakia has a very high interconnection capacity, and it seems that the required flexibility for the energy system shall (further)

FIGURE 23 | **REFERENCE SCENARIO SK - GROSS ELECTRICITY GENERATION BY SOURCE**
Source: PRIMES



	2015	2020	2025	2030	2035	2040	2045	2050
Nuclear energy	14662	20320	22049	29384	30757	31945	24479	24479
Solids	4119	4615	3539	1877	1639	1592	648	3170
Oil (including refinery gas)	163	8	91	92	0	0	3	0
Gas (including derived gases)	1730	984	3617	346	395	335	4852	3676
Biomass-waste	1131	1972	1581	908	1094	1123	3324	3097
Hydro (pumping excluded)	4738	5475	5049	5045	5040	5036	5615	5751
Wind	6	26	26	26	27	33	273	373
Solar	520	532	532	619	707	812	1252	1268
Geothermal and other RES	0	0	0	0	0	0	0	0

be based on power imports. Due to this strategy Slovakia may rather not develop any new RES job potential, and its research and innovation share in those future technologies will be very low, but its investment policy to be the workbench for foreign investors from Europe and Asia, mainly from the automotive sector in the Eurozone, has so far been successful. However, those investors may soon force Slovakia to switch to renewable energy – in this case its approach to nuclear power may change rapidly.

4.
LEGAL AND PRACTICAL HURDLES FOR RES PROJECT DEVELOPMENT IN CEE

THE DEVELOPMENT OF RES PROJECTS FACES MANY LEGAL AND PRACTICAL HURDLES. DUE TO COMPLICATED ADMINISTRATIVE PROCEDURES, AS WELL AS PRACTICAL HURDLES TO PROTECT DOMESTIC PLAYERS, PROJECT DEVELOPMENT IS CHALLENGING.

The development of RES projects faces many legal and practical hurdles. Due to complicated administrative procedures, as well as practical hurdles to protect domestic markets, project development is challenging. However, as a result of relatively high potential profits project developers are still attentive to new opportunities. However, even if a project achieves fully-permitted status, due to implementation of Auction operative support systems at the EU level, further development risk has to be taken. Following a successful auction, project finance is the next hurdle, especially in non-Euro countries. Finally, the market for end investors is also a challenge, as in recent years the experience with investment in renewables in many EU member states has been mixed, which generally discourages long-term financial investors from investing so that the investment markets are dominated by utilities.

SPATIAL AND PLANNING LAW

TABLE 15 | **SPATIAL AND PLANNING LAW**
Source: own

	SPATIAL AND PLANNING LAW	
	Procedure	**Time schedule**
Austria	Due to Austrian federalism, nine federal provinces are competent for the legislative as well as the executive jurisdiction, therefore spatial and planning law is not consistent in Austria. • Federal Level: Expertise in planning regarding, e.g., the overall transport scheme. • Austrian spatial development perspective 2011 consists of 4 pillars (Regional and National Competitiveness, Social Diversity and Solidarity, Climate Change, Adaption and Resource Efficiency, and Cooperative and efficient handling structures.): Pillar 3 (Climate Change, Adaption and Resource Efficiency) contains measures regarding resource efficiency, energy self-sufficient regions, priority areas to provide protection against natural events, sustainable settlement and spatial development, sustainable mobility and development of renewable energy. • Regional Level: Law on Regional Planning; foundation for all further steps concerning spatial planning. Implementation of special provisions concerning design and orientation of buildings, as well as their relation to each other, e.g. to facilitate the usage of solar energy. • Communal Level: Planning scheme. Has to comply with the Law on Spatial Planning. • Land-use plan: Focuses preliminary on urban development. Special requirements concerning RES are implemented only in Vorarlberg, Upper Austria and Burgenland. • Wind farms and hydroelectric power stations have to be planned in accordance with Natura 2000, Habitat Directive or Water Framework Directive.	• N/A

	SPATIAL AND PLANNING LAW	
	Procedure	**Time schedule**
Bulgaria	The procedure for approval of a so-called specified development plan (master plan) for the site where the investment is planned includes: • Specified development plan (preceded by environmental impact assessment) prepared by the investor • Investor's application for approval of the plan by the competent municipality • Additional authorisation for the application is provided by the real estate owner, and possibly concessionaires or owners of other property rights over the real estate and other persons explicitly defined by the law • The competent municipal council enacts or refuses the plan • Announcement of the plan to the public to inform all interested parties, which have 14 days to submit appeals • If required by law, the relevant authority also coordinates the plan with the relevant central and local administrations and other specialised authorities • Within 2 months after the deadline to challenge the plan expires, it shall be approved with a decision of the Municipal Council based on a decision by the Mayor.	• The procedure usually takes about 3 months from application. • In case the development plan is rejected by the municipality council or appealed, the procedure might be prolonged for up to 2 years.

	SPATIAL AND PLANNING LAW	
	Procedure	**Time schedule**
Czech Republic	• Generally, (i) the relevant spatial plan has to allow for the construction of a RES plant and (ii) a planning permit needs to be issued by the relevant building authority for a specific site. • Areas defined in the spatial plan as available for construction of new RES plants are usually referred to as an area for production and storage or, less often, specifically as a RES construction area. • In addition, a regulation plan may be issued (not very common practice) providing for further constraints on the development in certain areas; the regulation plan (if existing) may substitute a planning permit unless an EIA is required for the RES plant. • Special state authorisation to develop plants with installed capacity equal to or in excess of 1 MW needs to be obtained from the Ministry of Industry and Trade prior to submitting the application for planning permit.	• It takes from 2 to 3 months to obtain the planning permit depending on the complexity of the relevant project and quality of the provided documentation. • If a change to the relevant spatial plan is required, the process may even take years.

	SPATIAL AND PLANNING LAW	
	Procedure	**Time schedule**
Hungary	• Generally, (i) the relevant spatial plan has to allow for the construction of a RES plant and (ii) a planning permit needs to be issued by the relevant building authority for a specific site. • Obtaining the relevant spatial plan (zoning plan) is a multilevel process, where the local, regional and national zoning plans needs to be harmonised as a result of which the designated area will be suitable for RES-development. • If the designated area is an agricultural area, reclassification is more complex and an additional fee is due for changing the applicable zoning class. • Amendment of the local zoning plans are under the competence of the local government and normally subject to the opinion and consent of special authorities to be involved by the local government before the decision making process. • Areas defined in the spatial plan as available for construction of new RES plants are usually referred to as an 'exempted area not to be built-in' (Hungarian: kivett beépítetlen terület), or less often, specifically as a Power Plant construction area. • In addition, a separate zoning agreement may need to be concluded (not very common practice) providing for further obligations to be undertaken by the developer.	• It takes from 2 to 6 months to obtain the planning permit depending on the complexity of the relevant project and quality of the provided documentation. • If a change to the relevant spatial plans is required, the process may even take years.

	SPATIAL AND PLANNING LAW	
	Procedure	**Time schedule**
Poland	• Two step-procedure of establishing a spatial plan (Polish: 'studium') and master plan ('MPZP'). • Master plans established from 2010 must dedicate zones for RES investments; however, older (still valid) master plans do not face such requirement. • A planning permit ('WZ') grants a planning right in case no master plan has been obtained or has been established for the respective real estate. • Minimum distance for wind farms to next residential or promoted forest – 10 times tip height (this act is subject to claims before the EC and Polish Constitutional Court).	• 2-3 years in case, both the spatial plan and the master plan must be changed, parallel procedure of spatial plan and master plan possible only to a limited extent. • In case a planning permit applies (regarding all RES technologies beside wind) the procedure takes 3 months, however, prior to this procedure an environmental permit for the undertaking has to be obtained.
Romania	• One step-procedure of establishing a zonal urbanism plan ("PUZ"). • Public consultation mandatory (protests during public consultation are very rare). • No distance restrictions, unless the project is realised in an environmental protected area (or adjacent area to such area). • Construction of RES generators is also permitted on permanent pastures or grasslands in case the exploitation of the pasture/grassland is not obstructed.	• Procedure takes approx. 1 year.

	SPATIAL AND PLANNING LAW	
	Procedure	**Time schedule**
Slovakia	• Spatial plan must dedicate zones for placement of the manufacturing operations. • In certain cases, spatial plans dedicate special zones for RES generators. • An additional planning permit based on a spatial plan is generally required, except for very small PV roof-top generators. • A construction certificate issued by the Ministry of Economy is a mandatory annex to the application for obtaining the planning permit, except for very small PV roof-top generators. • In case a hydropower plant is subject to the procedure, the administrator of a watercourse must issue an additional approval and must enter into an agreement allowing the construction of the plant. • The fee for issuance of the Construction Certificate for each commenced 10 MW installed capacity amounts to EUR 1,000. • In 2017, the Ministry has not issued such certificate in relation to construction of a new RES plant for more than 1 year, whereas in the previous year several biomass projects were approved.	• Approx. 6 – 12 months.

ENVIRONMENTAL DECISIONS

TABLE 16 | **ENVIRONMENTAL DECISION**
Source: own

	ENVIRONMENTAL DECISION	
	Procedure	**Time schedule**
Austria	• The requirement to conduct an environmental impact assessment ("UVP-Prüfung") depends on the scope of the project. • The requirement is considered during a determination process which may be applied by project applicants, competent authority, environmental ombudsman, ex officio by the regional government. • If an environmental impact assessment is needed, either a simplified or ordinary procedure is conducted. • Simplified procedure: e.g., wind power stations with a total electric output with at least 20 MW or 20 converters with a nominal capacity of at least 0.5 MW each. • Ordinary procedure: water power plant (dams, drainage etc.) with a bottleneck capacity of at least 15 MW.	• Form filing all necessary documents until the decision of the competent authority. • The duration depends on the scope of the project and its impact. The average duration of proceedings takes about 9 months.

	Procedure	Time schedule
Bulgaria	• The requirement of an environmental impact assessment is considered according to the specifics of the project and the construction works. • An application, together with a preliminary environmental report, must be submitted to the Ministry for Environment or to the Regional Environmental Inspectorate. • In case the above authorities confirm its necessity, an environmental impact assessment is required. • Prior to the environmental decision a public consultation is required. • After closing the public consultation the competent authority (Ministry or Inspectorate) issues the decision for approval of the implementation of the project.	• Within 45 days after public consultation the competent authority issues a decision for approval of the implementation of the project. • All interested parties may challenge the environmental decision within 14 days after the decision has been announced. • If a procedure for revocation of the issued decision is initiated the procedure may continue up to 2 years before the environmental decision becomes valid. • As the environmental decision is an administrative act the competent authority may pass a resolution for anticipatory enforcement of the decision if this is required in order to: (i) ensure the life or health of individuals, (ii) protect particularly important state or public interests, (iii) prevent a risk of the frustration or material impediment of the enforcement of the act, or (iv) where delay in enforcement may lead to significant or irreparable damage. However, such resolution can be appealed. The appeal shall not suspend the anticipatory enforcement, unless the court decides otherwise. If the anticipatory enforcement is revoked, the administrative authority shall restore the status quo ante the enforcement.

	Procedure	Time schedule
Czech Republic	• Environmental impact assessment (EIA) always required for combustion plants with a heat capacity over 200 MW. • For plants with a heat capacity from 50 to 200 MW, an EIA is required if the obligatory screening procedure concludes that an EIA is required ('positive screening'). • For (i) wind power plants with total installed capacity over 500 kW or a tower higher than 35 m, or (ii) hydro power plants with total installed capacity equal to or in excess of 10 MW, an EIA is required in case of a positive screening. • CHP plants, biomass, biogas and wind power plants below the above thresholds are subject to notification obligation; following that notification, the regional authority may (but does not have to) initiate screening proceedings. • For plants that may have a significant impact (in the opinion of a regional authority (Czech: 'krajsky urad') on the territory of sites of European importance or bird protection areas, an EIA is required following the positive screening.	• 2 months if only the screening procedure is required. • 7 to 10 months to complete the EIA if the process goes smoothly.

	Procedure	Time schedule
Hungary	• Environmental impact assessment (EIA) always required for combustion plants with a power capacity over 20 MW or heat capacity over 300 MW. • For (i) wind power plants with total installed capacity over 500 kW (ii) for all hydro power plants an EIA is required if the plant is located on a Natura 2000 area or the area is otherwise environmentally protected. • In other cases, the requirement for an environmental impact assessment is considered according to the specifics of the project and the construction works. • An application, together with preliminary environmental report, must be submitted to the relevant governmental office's (Hungarian: Kormányhivatal) environmental protection department. • In case the above authorities confirm its necessity, an environmental impact assessment is required. • Prior to the environmental decision a public consultation is required. • After closing public consultation the competent authority (Kormányhivatal as mentioned above) enacts the decision for approval of the implementation of the project.	• 2-4 months if only the screening procedure is required. • 7 to 10 months to complete the EIA if the process goes smoothly.

	Procedure	Time schedule
Poland	• Environmental decision generally required, first an information card ("KIP") has to be submitted and consulted, and based on this screening procedure the relevant municipality, after consultation with the Regional (Voivodship) Environmental Office ('RDOS'), decides whether an EIA is required. • Submission of the EIA to the municipality, which consults with the Regional Environmental Office ('RDOS'), additional questions common. • Impact assessment (incl. public consultation) not required for undertakings with cover less than one hectare of ground, i.e. ground-mounted PV up to 1 MWp, but also for biogas installations up to 500 kW. • Public appeals against wind farms and biogas installations quite usual.	• 6-9 months, however in case of appeals and initiation of two-instances administrative court proceedings the issuance of valid decision might be prolonged for up to three years
Romania	• Environmental decision required incl. public consultation. • EIA usually required only for hydro power plants and wind farms. • Application to the Regional (County) Environmental Office ('APM'). • Public appeals are unusual.	• Procedure takes 2-9 months, however in case the decision is appealed court proceedings may last up to 2 years.
Slovakia	• Environmental impact assessment consists of (i) a screening procedure and (ii) a compulsory assessment. • A screening procedure is required for hydropower plants up to 0.1 MW, PV up to 5 MW, biogas/biomass plants over 5 MW; the competent authority decides whether the proposed activity must be subject to an EIA. • A compulsory EIA is required for wind farms, hydropower plants over 0.1 MW, PV over 50 MW, biomass plants over 50 MW.	• From 6 to 9 months, however, the procedure may last up to 48 months in case the environmental decision is appealed.

GRID CONNECTION

TABLE 17 | **GRID CONNECTION**
Source: own

	GRID CONNECTION	
	Procedure	**Time schedule**
Austria	• RES generators are entitled to the conclusion of a contract on the connection of a power generation plant to the grid with the grid operator. • The actual conditions are laid down in the implementing legislation of the national framework energy law act for the given federal province. • Renewable energy plants are not given priority for the connection to the grid, however, priority dispatch applies.	• N/A

	Procedure	Time schedule
Bulgaria	• It is obligatory to apply for grid connection at the respective electricity grid operator; upon submission of the application an investor should present a guarantee amount of BGN 5,000 (approx. EUR 2,500) per MW; in case of approval the operator issues grid connection terms, whereas in case of refusal the deposited guarantee is returned to the investor within 7 days, and in case of approval, the deposited guarantee is kept by the operator and considered as part of the advanced payment. • The following must be provided for the application: (i) title deed or established in rem rights, (ii) approved Development plan, (iii) Deposited guarantee; in case of production of energy from biomass additional documents certifying the registration of livestock and registered animals and birds must be provided. • Within 6 months after receiving grid connection terms, an investor should request to conclude a preliminary grid connection agreement, otherwise the grid connection terms are considered as invalid. • Upon signing the preliminary grid connection agreement, the investor should pay an advance payment of BGN 50,000 (approx. EUR 25,000) per MW for generators with capacity above 5 MW, and BGN 25,000 (approx. EUR 12,700) per MW for generators up to 5 MW. • The preliminary grid connection agreement is signed for a 1-year period and before its expiration the investors should apply for a final grid connection agreement incl. connection date. • The term of the final grid connection agreement cannot exceed 3 years, so within this period the generator has to be connected to the grid.	• 14 days to obtain terms and conditions for connection to the grid. • The grid connection should take place within the term of the final grid connection agreement, i.e. maximum 4 years considering the 1-year period of validity of the preliminary agreement and the 3-year term of the final agreement.

	Procedure	Time schedule
Czech Republic	• Grid connection is subject to (1) application for connection (including (i) information on location and technical characteristics of the plant, (ii) landlord's consent, (iii) a development time schedule, including a list of permits that need to be obtained, if a plant of more than 500 kW is concerned), possibly; (2) submission of a grid connection feasibility study (Czech: studie pripojitelnosti) (if required by TSO/DSO) and (3) payment of an upfront fee (the amount is regulated by law and capped at CZK 50 million (approx. EUR 1.85 million)) if adjustments to the grid for connection are required (which is often the case if a new plant is concerned). • Grid connection agreement (setting out the terms of connection) is concluded directly (without previous application for connection) in case of smaller RES generators (micro-installations) where no grid adjustments are required, or following positive assessment of the application for connection (i.e. conclusion there is no statutory reason to reject the connection). • Grid connection agreement has to provide for a certain grid connection deadline (an obligatory part of the agreement) by which the plant must be completed by the investor and connected by the grid operator.	• Grid connection has to take place or, alternatively, a grid connection agreement has to be signed by the grid operator within 30 days, or 60 days if a connection to high voltage is concerned, of the positive assessment of the application for connection by the grid operator (including the absence of any statutory reasons for rejection of connection). • If a grid connection feasibility study is required, it will take approx. 130 days to obtain the assessment and to subsequently conclude a grid connection contract. • Disputes over the grid connection are resolved by the local regulator ('ERU') and subsequently by courts which may substantially prolong the process.

	Procedure	Time schedule
Hungary	• Grid connection is subject to (1) application for connection (including (i) information on location and technical characteristics of the plant, (ii) landlord's consent, (iii) a development time schedule, including a list of permits that need to obtained, if a plant of more than 500 kW is concerned), eventually; (2) submission of a grid connection feasibility study/plan (Hungarian: 'hálózatcsatlakozási terv') (if required by TSO/DSO) and (3) payment of an upfront application fee (HUF 138,000, approx. EUR 400), and, if adjustments to the grid for connection are required (which is often the case if a new plant is concerned), reasonable costs of such connection must be paid. • The grid connection agreement (setting out the terms of connection) is concluded directly (without previous application for connection) in case of smaller RES generators (micro-installations) where no grid adjustments are required, or following positive assessment of the application for connection (i.e. provided there is no statutory reason to reject the connection). • The grid connection agreement has to provide for a certain grid connection deadline (this is an obligatory part of the agreement) by which the plant must be completed by the investor and connected by the grid operator.	• N/A

	Procedure	Time schedule
Poland	• Application requires advance payment of PLN 30,000/MW to obtain grid connection conditions, for installations with at least 2 MW installed capacity a grid feasibility study is required. • Based on issued grid connection conditions the investor has to conclude a grid connection agreement within 2 years. • Grid connection agreement provides a connection time schedule with a connection end date of a maximum of 48 months after conclusion which cannot be prolonged.	• 150 days to obtain grid connection conditions (incl. a grid feasibility study ordered by the DSO/TSO), however in case of an administrative procedure before the regulatory office ('URE') and possible further court proceedings ('SOKiK') the grid connection procedure can take up to 5 years.
Romania	• To obtain grid connection conditions usually a technical assessment is necessary. • Application costs amount to approx. LEI 1,000 – 1,500/MW (EUR 225-335/MW), depending on size of generator and the grid operator. • The investor has to conclude the grid connection agreement no later than 12 months after obtaining connection conditions (before the agreement is signed, for units >1MW, a performance guarantee has to be deposited with the grid operator). • Based on the grid connection agreement, the investor may opt to perform the grid connection works via a private construction company (but regulatory office ANRE authorised).	• 3 months, in case of connection to LV/MV lines. • 6-9 months, in case of connection to HV lines or involvement of transmission system operator in the procedure. • In case of administrative proceedings before the regulatory authority ('ANRE') and possible further two-instances of court proceedings, it may take more than 3 years to obtain a grid connection agreement.

	Procedure	Time schedule
Slovakia	• Construction Certificate (required to obtain the planning permit), i.e. certificate of compliance with the long-term energy policy of the Slovak Republic) from the Ministry of Economy has to be obtained. • One of the mandatory annexes of the application is a positive assessment by the distribution grid operator. • After obtaining the Construction Certificate, the investor has to submit an application for obtaining connection conditions to the distribution/transmission grid at the operator. • The distribution/transmission grid operator is entitled to refuse the connection conditions in specific areas due to lack of technical grid capacity. • Currently, all three distribution grid operators have suspended receiving applications for connection to the distribution grids, and no RES generators are connected to the transmission grid.	• Approx. 3 – 72 months from application.

BUILDING PERMIT AND LICENSE AFTER COMMISSIONING

TABLE 18 | **BUILDING PERMIT**
Source: own

	BUILDING PERMIT	
	Procedure	**Time schedule**
Austria	• Building permit generally required for all RES projects. • Granted when in compliance with building regulations, regional planning law and regulations on electricity. • Parties with legal interest may appeal the issued building permit (e.g. affected neighbours). • Generally, licence for generators with more than 100 kW required (federal provinces have specific regulations).	• Depending on project and its scope.
Bulgaria	• A building permit is generally required for all RES generators. • The building permit is issued by the competent authority – the Head Architect of the respective Municipality. • All interested parties, i.e. the investor, the land owner, the owners of the neighbouring plots and authorities, may appeal the issued building permit. • Building permit to be supplemented with a generator license issued by the regulatory authority for units >5MW after grid connection.	• The permit is issued within 14 days from the date of the application. • Appeal within 14 days from its issue is permitted, after expiration of this term the permit enters into force. • In case of an appeal against the issued permit court proceedings may take up to 2 years - the building permit becomes enforceable at the moment when all possibilities for appeal at different court stages have been exhausted – the final court instance is the Supreme Administrative Court acting as the second court instance.

	Procedure	Time schedule
Czech Republic	• Building permit required for all RES plants, except for micro-installations of up to 20 kW. • Objections may be filed by owners of adjacent plots. • Building permit is valid for 2 years, construction works extend its validity. • Following the issuance of the building permit, a permit to use the plant and a generation license needs to be obtained for all RES plants (other than micro-installations).	• The building permit is issued within 2 to 3 months as of the date of submission of the application. • A protester (party to the building proceedings) may appeal the permit at the relevant superior building authority within 15 days of receipt. • After expiration of the period for appeal, or once the second instance decision of the relevant superior building authority is delivered to the involved parties (the appeal procedure takes approx. 2 months), the building permit becomes enforceable. • Afterwards, the protesting party may file an action in the administrative court which may overrule the second instance decision (this could prolong the process even by years).
Hungary	• Generally, required for all RES generators, except household installations (up to 50kW). • The licensing authority is the Hungarian Trade Licensing Office (Hungarian: Magyar Kereskedelmi Engedélyezési Hivatal in Hungarian). • All interested parties, i.e. the owners of the neighbouring plots and authorities, may appeal the issued building permit. • In more complicated cases it is advisable to apply for a so-called 'theoretical building permit', which would clarify all pertaining licensing obligations. • Special authorities cooperate with the licensing authority. • Following the issuance of the building permit, a generation license (Hungarian: kiserőművi összevont engedély) up to 50 MW built-in capacity and a normal generation licence in a separate, more complex procedure for installations above 50MW) needs to be obtained for all RES plants (other than micro-installations).	• 2 months from submitting the application. • A protester (party to the building proceedings) may appeal the permit at the relevant superior building authority within 15 days of receipt, • After expiration of the period for appeal, or once the second instance decision of relevant superior building authority is delivered to the involved parties (the appeal procedure takes approx. 2 months), the building permit becomes enforceable. • Afterwards, the protesting party may file an action in the administrative court which may overrule the second instance decision, but normally would not suspend the procedure.

	Procedure	Time schedule
Poland	• Generally, required for all RES generators beside micro-installations up to 40 kW. • Grid connection conditions, environmental decision and planning title conditional to obtain the building permit. • Only neighbours entitled to appeal the building permit. • Building permit to be supplemented with a generator license issued by the regulatory authority for units >200kW after grid connection.	• 65 days from application, approx. 3 weeks to become valid, in case of appeal proceedings may take another 3 months before the building permit becomes enforceable; however, court proceedings may take up to 3 years.
Romania	• Generally, required for all RES generators. • Building permit to be doubled by a "setting up permit" issued by the regulatory authority 'ANRE' for units >1MW.	• 30 days after completed application (1-3 months to obtain prior approvals from third authorities).
Slovakia	• Generally, required for all RES generators. • In case of a hydropower plant, the producer must also apply for the special permit- to use the hydro-energetic potential of water. • Building permit to be supplemented by a generator license issued by the regulatory authority for units >1MW after grid connection.	• Usually 3 months from application, however, in case of court proceedings the procedure may take up to 72 months.

DEVELOPMENT SCHEME OVERVIEWS

FIGURE 24 | **DEVELOPMENT SCHEME OVERVIEWS - AUSTRIA**
Source: own

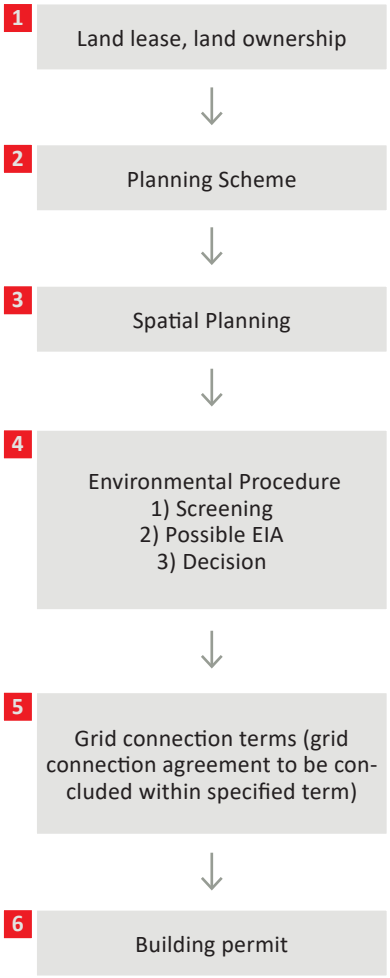


FIGURE 25 | **DEVELOPMENT SCHEME OVERVIEWS - BULGARIA**
Source: own

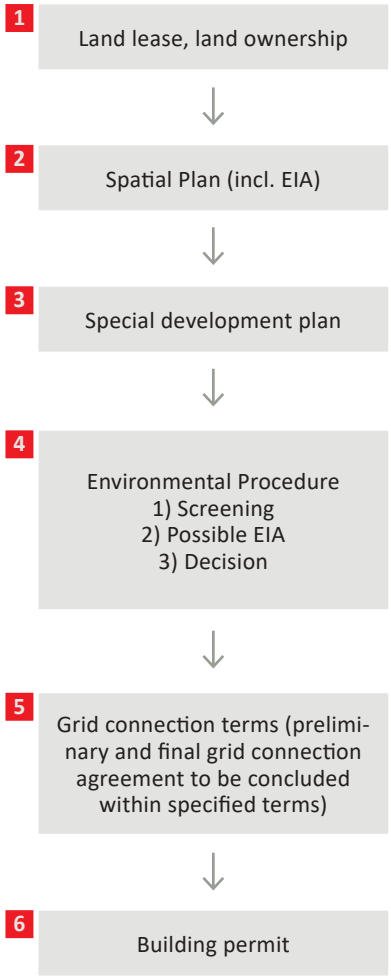


FIGURE 25 | **DEVELOPMENT SCHEME OVERVIEWS - CZECH REPUBLIC**
Source: own

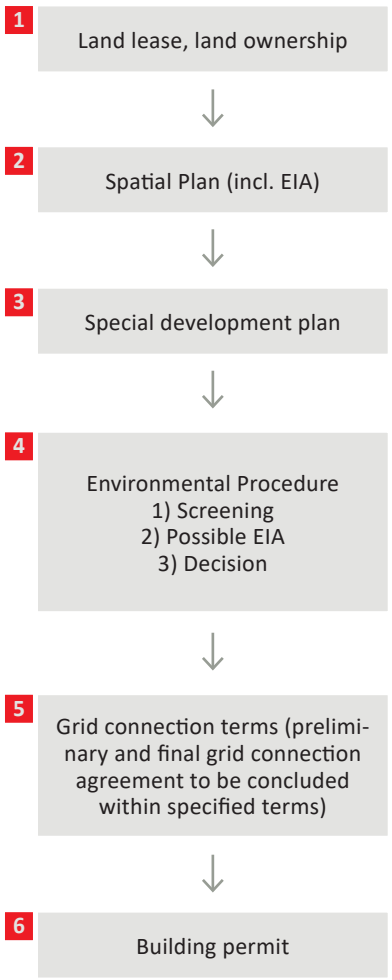


FIGURE 27 | **DEVELOPMENT SCHEME OVERVIEWS - HUNGARY**
Source: own

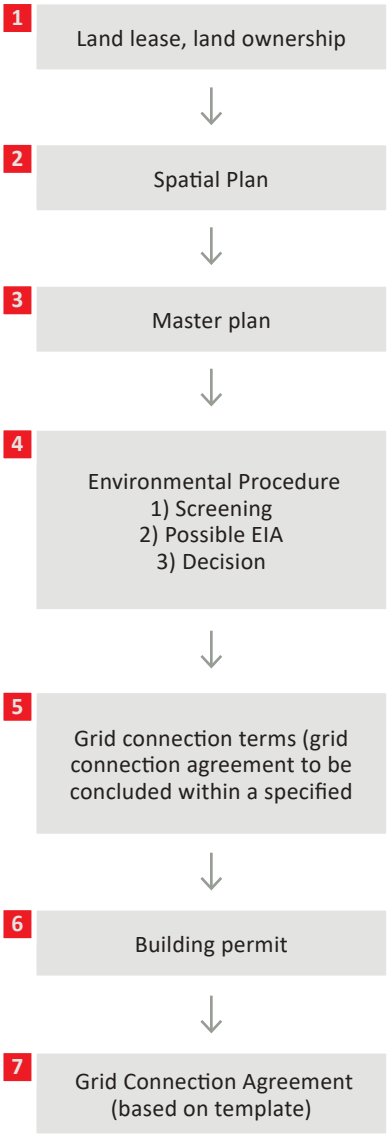


FIGURE 28 | **DEVELOPMENT SCHEME OVERVIEWS - POLAND**
Source: own

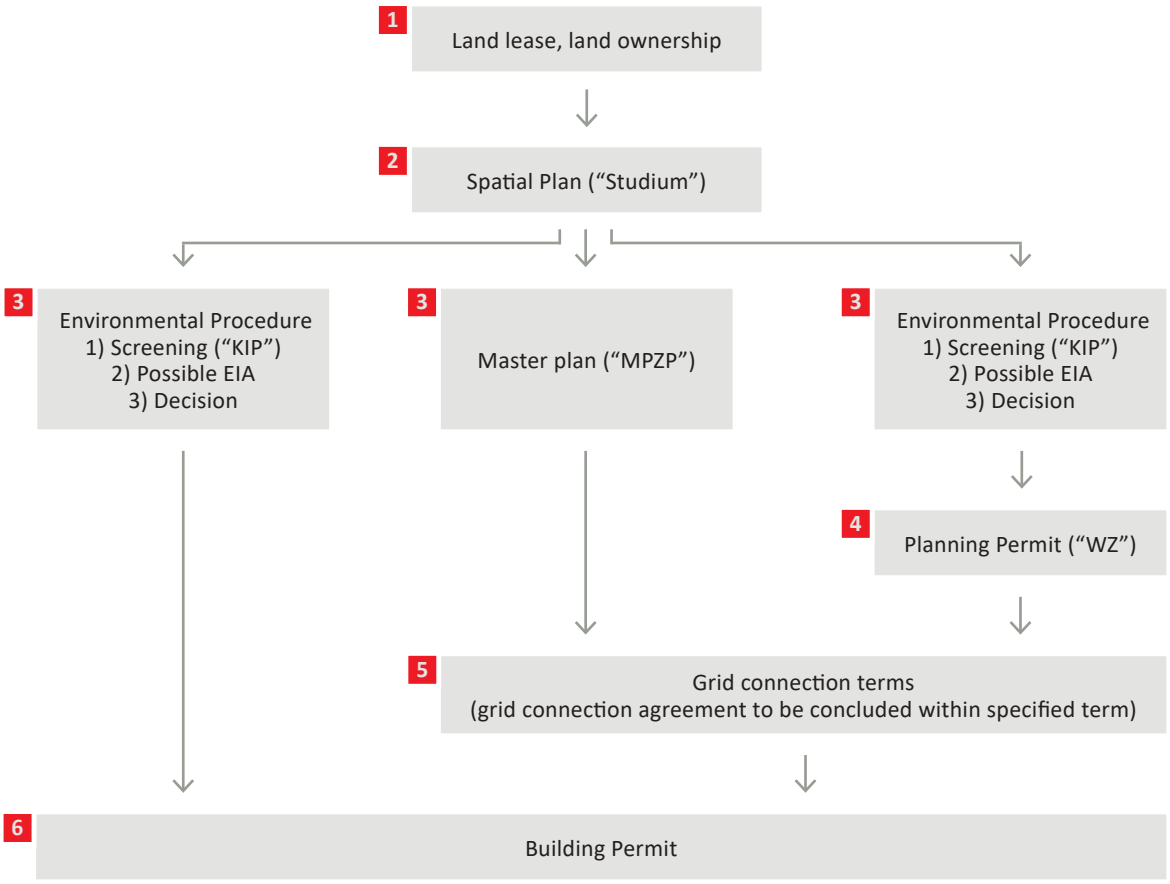


FIGURE 29 | **DEVELOPMENT SCHEME OVERVIEWS - ROMANIA**
Source: own

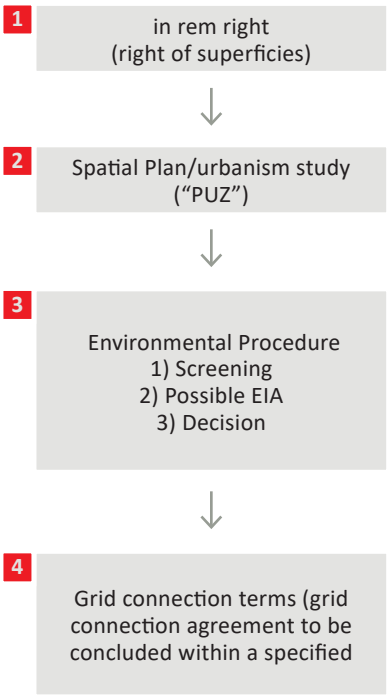
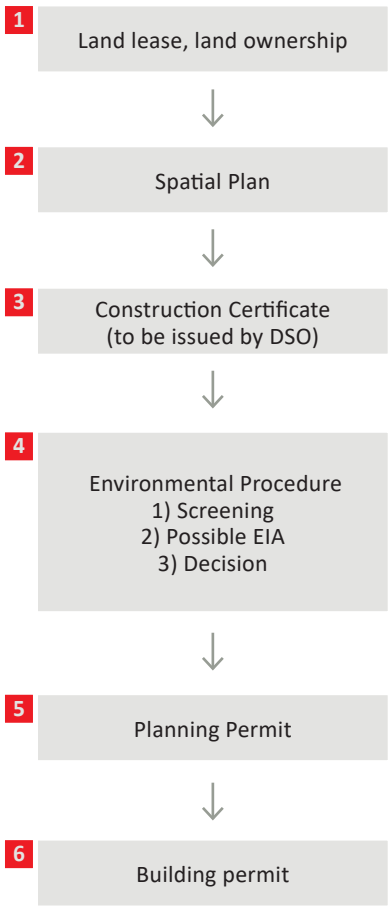


FIGURE 30 | **DEVELOPMENT SCHEME OVERVIEWS - SLOVAKIA**
Source: own



5.
RES OPERATIVE SUPPORT SYSTEMS IN CEE AND PRACTICAL COMMENTS

DEVELOPMENT SCHEME OVERVIEWS

TABLE 19 | **RES OPERATIVE SUPPORT SYSTEMS**
Source: own

	RES OPERATIVE SUPPORT SYSTEMS	
	Support system	**Prequalification for auctions**
Austria	• Generally promotion by decreasing feed-in tariffs, contract to be concluded with clearing and settlement agency ('Oekostromabwicklungsstelle'). • All technologies are supported, in 2015 wind and solar power have been most successful. • For some RES generators, i.e. hydro power up to 20 MW and micro PV up to 5 kWp investment grants are available, however, this excludes benefiting from FiT. • Direct sale of power restricted.	N/A
Bulgaria	• An auction support system has not yet been implemented. • The current FiT support scheme is applicable from April 2015 only for new PV installations up to 30 kWp constructed as roof top or in the facade of buildings in urban areas, and RES generators up to 1.5 MW for CHP production from biomass/slurry, and RES CHP generators up to 500 kW for production of electricity from biomass/biogenic waste, both constructed in urban zones, agricultural sites or industrial zones. • Generally, RES generators are supported by: - Obligatory purchase of the produced electricity on the basis of long-term contracts for the period of 12 years for wind farms, 20 years for geothermal, PV and biomass, 15 years for hydro power plants up to 10 MW and other RES generators, - Balancing responsibility for RES generators is taken over by the investors, which are part of a so-called combined balancing group unless they have chosen the balancing group of the Public Provider/Supplier (National Electricity Company JSC) or End Suppliers (Chez, EVN, Energo-pro), - Produced energy up to reaching annual specific limits is purchased at a preferential price determined by the State Energy and Water Regulatory Commission, - In July 2015, a (retroactive) tax of 5% was introduced to all power producers.	N/A

	Support system	Prequalification for auctions
Czech Republic	• Notification of existing green bonuses premium support system with the EU Commission has been successfully closed. • An auction support system has not yet been implemented. • Subject to certain exceptions, support of new RES plants ceased as of 2014. • Regarding PV plants, only roof-top and on-wall micro installations (up to 30 kW) are supported (either by green bonus or feed-in-tariff). • Feed-in-tariffs only available for hydropower plants of up to 10 MW capacity and other RES generators with installed capacity of up to 100 kW (30 kW in case of PV plants). • However, PV and biogas plants are only eligible for FIT if put into operation before 31 December 2013; and wind, hydro, geothermal or biomass plants up to 100 kW are eligible only if put into operation before 31 December 2015, and the building permit was issued before 2 October 2013. • Green bonuses (premium) support system generally available for all RES installations complying with certain conditions. • However, PV (of up to 30 kW only) and biogas plants are only eligible for green bonus if put into operation before 31 December 2013; and wind, hydro, geothermal or biomass plants are eligible only if the building permit was issued before 2 October 2013. • Balancing responsibility for RES generators taken over by mandatory purchasers or other electricity buyers of the power from the relevant plant. • Feed-in-tariff is set yearly as an amount allowing the nominal value of the production costs to be recovered within a 15-year simple payback period of the investment; energy is sold to mandatory purchasers.	N/A

	Support system	Prequalification for auctions
Hungary	• A feed-in-tariff (FiT or KÁT in Hungarian) applies for installations with a capacity of from 50 kW to 500 kW. • For installations with a capacity from 0.5 MW to 1 MW, the market based premium system (METÁR in Hungarian) applies as described in more detail below. • Plants with a capacity over 1 MW and wind power plants must participate in a tendering procedure in order to receive the market premium, but no wind capacity tenders are planned to be announced. • Tenders will be announced by the Hungarian Energy Office (www.mekh.hu). • The reference market price will be based on hourly rates of the day ahead market of HUPX, the Hungarian power exchange. • Household-sized power plants up to 50 kW can benefit from net metering (Hungarian: ad-vesz mérés or szaldó elszámolás). • The matrix of the off-take period, the quantity to be off-taken and the commissioning deadline is regulated by the Hungarian Energy Office. • Mandatory off-take period varies between 5-25 years, depending on fuel type and size of plant.	N/A

	Support system	Prequalification for auctions
Poland	• Notification of existing green certificate premium support system with the EU Commission has been successfully closed (beside newly introduced blue certificates for biogas plants, which are subject to a complaint at the EC as selective state aid). • Notification of auction system with the EC still ongoing, one 'test' auction organised for >1MWp PV/wind in December 2016, another 'test' auction to follow in June 2017. • Auction system grants a 15-year feed-in premium in the form of an indexed contract for difference settled monthly on the basis of the daily-hourly wholesale base price (index 'TGE Base'). • Non-technology dependent auctions organised once per year for new generators with up to 1 MW and higher installed capacity, and an average production of less or at least 3,504 MWh/year/MW. • Bid cannot exceed a reference (ceiling) price, parallel investment support and other public support has to be deducted. • Government generally plans to favour generators with a high capacity factor, especially CHP. • Feed-in tariff ("FiT") envisaged for RES generators under 500 kW, but currently only net-metering up to 10 kW implemented. • From 1 January 2017, wind turbine generators incl. technical elements subject to real estate tax (for other RES generators this applies only to immovables/building structure).	• Fully permitted-projects can prequalify. • Reimbursable bid fee amounting to PLN 30,000/MW has to be submitted prior to auction.

	Support system	Prequalification for auctions
Romania	• Access to quota system for RES producers (green certificates with regulated price limits) closed on 31 December 2016. • In December 2016, the EC endorsed positive changes to the GCs support scheme, the system is valid until 2031. • New National Energy Strategy 2030 is debated to favour biomass, biogas and geothermal/ heat RES generators for power and heat production: 1) new biomass law (already approved by the first chamber of Parliament) aims to support approx. 175 MW biomass and biogas projects until 2025 by auctions, 2) EU investment grants (approx. 60% of CAPEX, up to EUR 15 million /project) for biomass, biogas and geothermal projects. • Feed-in Tariff ("FiT") envisaged for RES capacities under 500 kW.	N/A
Slovakia	• Implementation of RES auction system is planned. • Currently electricity from renewable sources is supported through a fixed feed-in tariff. • The feed-in tariff consists of two parts: the price of electricity for losses and a surcharge. • The surcharge is limited for capacity up to 5 MW (wind 15 MW), for larger generators support is paid proportionally. • Regarding PV, only roof-top and on-wall micro installations (up to 30 kWp) are supported by the surcharge. • New feed-in tariffs introduced on 1 January 2017, especially feasible for smaller hydro power generators up to 5 MW.	N/A

RES BANKABILITY

TABLE 20 | **RES BANKABILITY**
Source: own

	RES BANKABILITY	
	Experience	**Usual conditions**
Austria	• Financing banks benefit from stable feed-in tariff system.	• Austrian banks are generally positive with RES financing, also in CEE region. Approach similar to German banks.
Bulgaria	• Financial stability of RES project finance was based on feed-in-tariff and long-term PPAs. • Changed investment climate and regulatory changes provided unpredictability, so currently banks do not offer project finance.	• No recent experience due to the lack of new RES projects.
Czech Republic	• Lack of new RES projects, mostly refinancing of the installations put into operation prior to the government's clampdown on RES and certain smaller biomass/biogas projects.	• No recent experience due to the lack of new RES projects.
Hungary	• Financial stability of RES project finance was based earlier feed-in-tariff system (KÁT) and long-term mandatory off take PPAs with MAVIR, the local TSO. • Recent introduction of the new green premium system (METÁR) provided unpredictability, so currently commercial banks do not offer project finance. • The Hungarian Development Bank (MFB) is planning a micro-financing program for small PV-projects.	• No recent experience due to the lack of new RES projects. • The MFB-program is a zero interest rate, subsidized program.
Poland	• New contract-for-difference support system has not yet been tested for project finance, banks are reluctant to enter the business due to recent bad experience with wind farms.	• Past experience with Green certificate system. • 3 months WIBOR interbanking rate at currently 180 bp. • 5-year hedging of 3M WIBOR at approx. 40-50 bp. • up to 300 bp margin under the green certificate system due to long term risk exposure. • End of 2016 auctioned PV projects have not yet been financed.

	Experience	Usual conditions
Romania	• Banks' appetite affected by close of GS's support scheme and its malfunctioning. • 2015 draft Biomass Law received positive feed-back from banks.	• No recent experience due to the lack of new RES projects.
Slovakia	• Lack of new RES projects.	• No recent experience due to the lack of new RES projects.

RES FINAL INVESTORS

TABLE 21 | **RES FINAL INVESTORS**
Source: own

	RES FINAL INVESTORS
Austria	• Experienced investment market for larger RES investments. • Financing of projects through public participation projects (e.g. citizens of a municipality finance the project). • Crowdfunding (platforms) financing of projects through public participation projects (e.g. citizens of a commune finance the project) get popular.
Bulgaria	• RES final investors are both domestic and foreign investors. Larger RES generators are usually developed by foreign companies.
Czech Republic	• No reliable data about ultimate owners, however, the majority of RES generators are probably owned by domestic investors including utilities. • The secondary market is relatively calm at present.
Hungary	• A large number of small PV project applications (cc 2 GW) have been submitted by 31 December 2016 to the Hungarian Energy Office, and it remains to be seen how many of these will be successfully implemented and put on the market for sale, either in a pre-developed (fully licensed) or fully developed phase. • Certain Hungarian investor groups hold large tranches of the above PV applications and we expect these to be put on the market soon (project sizes will vary between 5-20 MW with more projects sold by investor groups). • Secondary market for well performing RES projects also shows signs of life and the Hungarian incumbent wholesaler, MVM, has also publicised its large-scale RES-investment program. • Hungary has avoided the overgenerous FiT schemes (level of FiT still remains in the region of EUR 0.1-0.12 / kWh as it was around 2005) and, with construction costs constantly decreasing, this has become attractive for developers and investors.
Poland	• Due to lack of transparency end investor market recently dominated by domestic utilities (under Polish or foreign ownership). • International financial investors still not ready for market entry, although contract-for-difference support system received a positive feedback.
Romania	• Mainly foreign companies invested in RES (mostly from 2011 – 2014) due to a generous RES support scheme.
Slovakia	• Frequent changes in legislation negatively affected investments, e.g., by reducing the feed-in-tariff support. In 2014, a rule was introduced (surprisingly upheld by the Constitutional Court in March 2017) based on which the RES producers lose their right for feed-in-tariffs if they fail to fulfil certain reporting duties. In 2013, the regulatory office URSO imposed the so-called G-tariff for access to distribution system on all electricity producers connected to distribution networks. Although this tariff was declared unconstitutional in 2016, URSO reintroduced it again.

ENERGY EFFICIENCY/PPP

TABLE 22 | **RES BANKABILITY**
Source: own

	ENERGY EFFICIENCY AND PPP	
	Energy efficiency support	**Practical experience with PPP**
Austria	• Cooperation between private partners and municipalities is usual, e.g. Köflach (Styria) "Ökopark Lorder".	• PPP in public building sector often practiced.
Bulgaria	• Support is provided by the Energy Efficiency and Renewable Sources Fund (the 'Fund'). • The Fund was established pursuant to the Energy Efficiency Act, with intergovernmental agreements between the Global Environment Facility (through the World Bank), the Government of Austria and the Government of Bulgaria. • The Fund operates according to applicable legislation and agreements with donors. • The Fund is the only institution in Bulgaria for financing energy efficiency investment projects. • The Fund offers credits below market interest rates, partial credit guarantees and portfolio guarantees. • The Program BG04 "Energy Efficiency and Renewable Energy" of the Financial Mechanism of EEA 2009-2014 with Program operator the Ministry of Energy has been successfully introduced, and major focus for the second program period 2014-2021 will be put on energy efficiency and the use of geothermal and water potential in the country.	• No energy efficiency PPP projects on the way yet.
Czech Republic	• On 7 March 2017, the Commission decided not to raise objections on the notified support scheme of highly efficient CHP installations. • Green bonuses for high efficiency CHP projects meeting the efficiency test prescribed by law (in particular, 10 per cent savings of primary energy compared to separate generation of heat and power) available. • Only those installations with a certificate of the power origin qualify for the support.	• No energy efficiency PPP projects on the way yet. • Rather ad hoc quasi PPP arrangements between the municipalities and private investors closed.

	Energy efficiency support	Practical experience with PPP
Hungary	• Biomass or biogas projects may only participate in the new market premium (METÁR) support scheme if the involved power plants are highly efficient CHP installations. • Only those installations with a certificate of the power origin qualify for the support. • Earlier ESCO-based projects entered into with local governments have lost their popularity.	• No large scale PPP projects on the horizon due to the government's approach to energy and utilities and the re-privatisation phenomenon taking place since 2010.
Poland	• High-efficiency CHP support system to be closed by 2018, future of CHP support unclear. • White certificate support system for every saved ktoe with a price cap of PLN 1,500/ktoe, from 1 October 2016 the previous tender procedure does not apply anymore (support of RES-H local infrastructure). • Investors less experienced as previous tender procedure hampered the market development.	• Available EU funds to a large extent hampered PPP projects. • Due to constitutional cap on public debt and lack of possibility to co-finance EU funds government started recently to promote hybrid (off balance) PPP.
Romania	• Ongoing bonus support scheme for high efficiency cogeneration – regulated prices for EE and heat plus bonus (valid 2010-2023, without exceeding 11 consecutive years). • Support of RES-H local infrastructure by 2020 (up to 70% of the eligible costs co-financed from the state budget – annual allocation).	• New Law on PPP in force starting December 2016 (secondary legislation expected). • No energy efficiency PPP projects on the way yet, but expected for biomass.
Slovakia	• RES-H plant operators may receive investment support for renewable heat installations from the Operational Programme Quality of Environment. • No special high-effective CHP support system in place.	• No energy efficiency PPP projects on the way yet.

WASTE-TO-ENERGY

TABLE 23 | **WASTE-TO-ENERGY**
Source: own

	WASTE-TO-ENERGY	
	Incineration plants	**Other investments**
Austria	• As an example, "Fernwärme Wien" provides households in Vienna with 1.5 million MWh-th per year through an incineration plant.	• Still no investments in waste gasification.
Bulgaria	• Investments in incineration plants planned. • Biodegradable share of municipal waste not treated as RES, incentive measures are not applicable.	• Companies increasingly invest into different technologies to identify and extract energy from recycled materials, such as all kind of plastic materials, recycling solutions for metallic sludge from the automobile industry, composting, etc. • Still no investments in waste gasification.
Czech Republic	• Only the power generated from biodegradable parts of municipal waste is eligible for support. • So far only a very few incineration plants have been constructed in the Czech Republic.	• Still no investments in waste gasification.
Hungary	• Municipal waste is treated as RES and enjoys the same FiT and premium based support scheme as other RES fuel sources. • Currently low incineration capacity, except Budapest, where the Budapest Municipality is planning to implement its second large scale incineration plant. • Small biogas plants using animal waste are becoming popular. • Landfill gas based plants are allocated a shorter mandatory off-take time under the new METÁR scheme.	• Still no investments in waste gasification.

	Incineration plants	Other investments
Poland	• A few incineration plants have been constructed, more have been planned; however, the very low recycling quota is a hurdle for further investments in incineration plants. • Incineration plant must qualify as RIPOK (designated installation) and be part of the currently notified voivodship investment plans to have a guaranteed waste stream.	• Very low recycling quota requires investments in all types of recycling. • Still no investments in waste gasification.
Romania	• Low incineration capacity. • New Biomass Law (under approval) should also provide support for approx. 125-140 MW of Waste to Energy projects, by 2025, guided by the "first come, first served" principle. • Long list of new environmental taxes voted in 2016, including landfills.	• Public funding for non-recyclable waste treatment such as incinerators to be gradually phased-out, acc.to EC most recent advice (Jan. 2017) to mainly support new and emerging waste treatment and recycling technologies. • Still no investments in waste gasification.
Slovakia	• Only the power generated from biodegradable parts of municipal waste is eligible for support. • So far only a very few incineration plants have been constructed in Slovakia.	• Still no investments in waste gasification.

6. PERSPECTIVE FOR SPECIFIC RES TECHNOLOGIES IN CEE

We expect the National Energy and Climate Plans to be a key motivator to (finally) base energy mixes in CEE on a realistic scenario. Consultation of its drafts with the European Commission, but even more with neighbouring countries, should motivate policy makers to get a broader point of view – and to partly disburden domestic energy and environmental policy from lobbying. Capacity markets will keep existing coal and gas power plants for the time being in the energy systems, but regional tenders and short-term support periods will limit the appetite of utilities, e.g. regional capacity tenders in Poland for balancing services may lead to the situation where Polish energy consumers

ACCORDING TO THE WORLD ECONOMIC FORUM WHITE PAPER "GAME CHANGERS IN THE ENERGY SYSTEM", PUBLISHED IN JANUARY 2017, AS A RULE, STRATEGIES BUILT ON REAL OPTIONS WILL BECOME CRUCIAL VERSUS THE TYPICAL PRACTICE OF MAKING LARGE BETS

promote existing Czech and German gas power plants fired by natural gas delivered by Gazprom. According to the World Economic Forum White Paper "Game Changers in the Energy System", published in January 2017, as a rule, strategies built on real options will become crucial versus the typical practice of making large bets, e.g. on new generations of 'smaller' nuclear power/CHP plants – the insolvency of major US nuclear technology provider Westinghouse proves this forecast. Agility, flexibility and fast decision-making could become crucial which favours, e.g. smaller units firing natural gas, but even more biomethane and storage. Investment allocation will become more strategic, and less opportunistic, which should promote (start-up) clean tech investments to lead to further decentralisation of energy production – many utilities in CEE have already implemented their own investment vehicles.

Bankability of generators becomes crucial, as all large, at least partly state-owned utilities face severe problems to adapt to energy transition. Consequently, the EU Commission by the Energy Union's Fourth Energy package points to especially implement measures to close the financial gap for offshore wind – the favoured low emission large-scale technology for low-emission energy transition in Europe. This is good for offshore wind, but definitively not in favour for large units of low-emission conventional power plants, such as new nuclear or new CCS/CCU coal/gas power plants. As the recent offshore wind auctions in Denmark and Germany prove the amount of required support is marginal, more important is the duration of the energy production licence and the extension of transmission grids to offshore grid connection point.

We expect energy security in almost all CEE countries to be a main policy driver – generally less favourable for nuclear and gas, with Hungary as a notable exception where nuclear power development by Rosatom may for the time being successfully block development of onshore wind as competitor for base-load technologies, such as coal or nuclear. But also reduction of emissions (others than CO2) has motivated voters – and policy makers – to care about health consequences. Generally, a further move to decentralise energy production and decrease GHG emissions will naturally be in favour of renewables. However, onshore wind and PV have been over-promoted in many CEE member states in recent years, so the political support for those technologies is limited for the time being. The newly implemented/to be implemented auction support system – and the expected improving cost-effectiveness of storage systems - should change this approach in the coming years.

Currently biomass, especially biomass/biogenic waste gasification seems to be the technology to be politically most acceptable as bridge technology in many CEE countries, also due to its large job impact in rural areas. Therefore, we expect many developments for this technology in the coming years. However, as the resources are limited due to iLUC and LULUCF regulations, after 2025 the development may slow down. In parallel, larger PV installations, but also onshore wind farms should again gain more political acceptance; however, the development potential might be limited for the time being. Furthermore, after derogation of many coal-fired heat/CHP plants those installations due to limited biomass fuel capacity may only partly substitute coal. So, the installation of heat pumps (including prosumer PV installations) should pick up substantially. In the case of cost-effectiveness (easily developed) of larger storage systems, both heat (from 2020) and electricity (from 2025) further increases for Poland, but also for Romania and Bulgaria offshore wind may be 'the' technology for successful energy transition from 2025 onwards.

ONSHORE WIND

TABLE 24 | **ONSHORE WIND - PERSPECTIVE**
Source: own

	ONSHORE WIND - PERSPECTIVE		
	Until 2020	**Until 2025**	**After 2025**
Austria	Continuation of project development	Continuation of project development	Continuation of project development
Bulgaria	No progress	Continuation of project development	Further wind farm development only in western Bulgaria to keep grids in eastern Bulgaria free for offshore
Czech Republic	No progress	New project development	Continuation of project development
Hungary	No progress	No progress	No progress
Poland	Very low support, change of minimum distance, but new project development expected, transactions for distressed assets	First farms under new distance rules (e.g. 4 or 5H) connected	Further larger wind farm development only in central and southern Poland to keep grids in northern Poland free for offshore wind
Romania	Continuation of project development	New wind farms connected	Further wind farm development only in western Romania to keep grids in eastern Romania free for offshore
Slovakia	No progress	New project development	Continuation of project development

OFFSHORE WIND

TABLE 25 | **OFFSHORE WIND - PERSPECTIVE**
Source: own

OFFSHORE WIND - PERSPECTIVE			
	Until 2020	**Until 2025**	**After 2025**
Austria	N/A	N/A	N/A
Bulgaria	Start of project development	Project development	First wind farms connected
Poland	Project development	First wind farms connected	Up to 6 GW connected (according to McKinsey study)
Romania	Start of project development	Project development	First wind farms connected

PHOTOVOLTAIC FARMS

TABLE 26 | **PHOTOVOLTAIC FARMS - PERSPECTIVE**
Source: own

	PHOTOVOLTAIC FARMS - PERSPECTIVE		
	Until 2020	**Until 2025**	**After 2025**
Austria	Continuation of project development	Acceleration of project development	Acceleration of project development
Bulgaria	No progress	Moderate continuation (favourable irradiation)	Increasing capacity due to low technology costs incl. storage
Czech Republic	No progress	Moderate continuation	Increasing capacity due to low technology costs incl. storage
Hungary	Up to 2 GW PV applications have been submitted for licensing by 31 December 2016	Continuation	Increasing capacity due to low technology costs incl. storage
Poland	Up to 2-3 GW PV required to stabilise grids in summer months due to lack of cooling water for coal power plants	Moderate continuation	Increasing capacity due to low technology costs incl. storage
Romania	No progress	Moderate continuation (favourable irradiation)	Increasing capacity due to low technology costs incl. storage
Slovakia	No progress	Moderate continuation	Increasing capacity due to low technology costs incl. storage

BIOGAS PLANTS

TABLE 27 | **BIOGAS PLANTS - PERSPECTIVE**
Source: own

BIOGAS PLANTS - PERSPECTIVE			
	Until 2020	**Until 2025**	**After 2025**
Austria	Continuation of project development, gasification	Continuation of project development, gasification	Syngas from biomethane
Bulgaria	Development of CHP biogas plants, high gas imports motivate to decrease import dependency, RES CHP required to replace derogated coal CHP capacity, reduction of high emissions urgently required	Continuation of CHP biogas plants development (relatively high costs limit potential for further extension)	Syngas from biomethane
Czech Republic	No progress	Start of development of biogas plants, decrease of import dependency, peak-load technology	Syngas from biomethane
Hungary	Development of CHP biogas plants, RES 2020 target	Development of CHP biogas plants, RES 2020 target, subject to high efficiency targets being met	Syngas from biomethane
Poland	Development of CHP biogas plants, RES CHP required to replace derogated coal CHP capacity, reduction of high emissions urgently required, RES 2020 target	Continuation of CHP biogas plants development	Syngas from biomethane (decrease of import dependency)
Romania	Moderate development of CHP biogas plants, high gas imports motivate to decrease import dependency, reduction of high emissions	Development of CHP biogas plants	Syngas from biomethane (decrease of import dependency)
Slovakia	No progress	Development of CHP biogas plants	Syngas from biomethane

LARGE BIOMASS/GASIFICATION (CHP) PLANTS

TABLE 28 | **LARGE BIOMASS/GASIFICATION (CHP) PLANTS - PERSPECTIVE**
Source: own

LARGE BIOMASS/GASIFICATION (CHP) PLANTS - PERSPECTIVE			
	Until 2020	**Until 2025**	**After 2025**
Austria	Continuation of project development	Continuation of project development	LULUCF and ILUC regulations limit further extension
Bulgaria	Development of CHP biomass plants, high gas imports motivate to decrease import dependency, RES CHP required to replace derogated coal CHP capacity, reduction of high emissions urgently required	Continuation of CHP biomass plants development	LULUCF and ILUC regulations limit further extension
Czech Republic	No progress	Moderate development of biomass CHP plants	LULUCF and ILUC regulations limit further extension
Hungary	Development of CHP biogas plants, RES 2020 target, subject to high efficiency targets being met	Continuation of CHP biomass plants development	LULUCF and ILUC regulations limit further extension
Poland	Development of CHP biomass plants, RES CHP required to replace derogated coal CHP capacity, reduction of high emissions urgently required, RES 2020 target	Continuation of CHP biomass plants development	LULUCF and ILUC regulations limit further extension
Romania	Development of CHP biomass plants, high gas imports motivate to decrease import dependency, reduction of high emissions	Continuation of CHP biomass plants development	LULUCF and ILUC regulations limit further extension
Slovakia	No progress	Development of CHP biomass plants	LULUCF and ILUC regulations limit further extension

WASTE-TO-ENERGY

TABLE 29 | **WASTE-TO-ENERGY - PERSPECTIVE**
Source: own

WASTE-TO-ENERGY - PERSPECTIVE			
	Until 2020	**Until 2025**	**After 2025**
Austria	Moderate project development of syngas from biogenic waste	Moderate development of syngas from biogenic waste, 2030 targets	Syngas from biogenic waste
Bulgaria	No continuation of incineration plant development due to very low recycling quota	Development of syngas from biogenic waste, 2020 and 2030 targets	Syngas from biogenic waste
Czech Republic	Moderate project development of syngas from biogenic waste	Moderate development of syngas from biogenic waste, 2030 targets	Continuation of development
Hungary	Budapest is planning its second large incineration plant	Development of syngas from biogenic waste, 2020 and 2030 targets	Syngas from biogenic waste
Poland	No continuation of incineration plant development due to very low recycling quota	Development of syngas from biogenic waste, 2020 and 2030 targets	Syngas from biogenic waste
Romania	Moderate project development of syngas from biogenic waste	Moderate development of syngas from biogenic waste, 2030 targets	Syngas from biogenic waste
Slovakia	Moderate project development of syngas from biogenic waste	Moderate development of syngas from biogenic waste, 2030 targets	Syngas from biogenic waste

LARGE SCALE STORAGE (ELECTRICITY/THERMAL)

TABLE 30 | **LARGE SCALE STORAGE (ELECTRICITY/THERMAL) - PERSPECTIVE**
Source: own

	LARGE SCALE STORAGE (ELECTRICITY/THERMAL) - PERSPECTIVE		
	Until 2020	**Until 2025**	**After 2025**
Austria	High system costs	No requirement for thermal storage due to biogas/bio-mass heat	Electricity storage for wind and PV
Bulgaria	High system costs	Requirement for electricity storage to increase flexibility of nuclear power plants, no increase of import depen-dency from gas	Thermal storage for offshore wind power after phase out of coal CHP
Czech Republic	High system costs	Requirement for electricity storage to increase flexibility of nuclear power plants, no increase of import depen-dency from gas	Thermal storage for nuclear power after phase out of coal CHP
Hungary	High system costs	No requirement for thermal storage due to biogas/bio-mass heat	Thermal storage for nuclear power
Poland	Urgent requirement for electricity storage to increase flexibility of new large coal power plants	Urgent requirement for electricity storage to increase flexibility of new large coal power plants Thermal storage for onshore wind power	Thermal storage for offshore/ onshore wind power
Romania	High system costs	Requirement for electricity storage to increase flexibility of nuclear power plants, no increase of import depen-dency from gas	Thermal storage for offshore wind power after phase out of coal/oil CHP
Slovakia	High system costs	No requirement for thermal storage due to biogas/bio-mass heat	Thermal storage for nuclear power

YOUR PONTES TEAM FOR ENERGY & INFRASTRUCTURE INVESTMENTS IN CEE

Our team has strong experience both in M&A and project work, as well as on the financing side. Our lawyers deliver integrated solutions to complex strategic and operational challenges which are of major importance with energy and infrastructure projects. We support our clients in their investment plans in order to allow them to successfully complete their projects.

We provide legal advice for renewable and conventional energy projects, as well as infrastructure projects on issues regarding, inter alia, spatial development and environmental protection, construction and contract law, including FIDIC, joint venture agreements, PPP, as well as energy regulation and support mechanisms, public procurement, subsidy law, energy trade, transactions and project finance. We also advise on technology-related matters of both sectors, such as building information modelling, smart metering & trading, smart grids & storage, e-mobility and alternative fuels/gasification.

Andrej Majernik, Bratislava

Andrej qualified as a Slovak attorney in 2001. He is a partner at Majerník&Miháliková | PONTES since 2011. Andrej has experience in civil law, real estate, energy law, commercial contracts, labour law, administrative law and representing clients before civil courts and in arbitrations. He also represents clients at the Constitutional Court of the Slovak Republic.

Justyna Chabocka, Warsaw

Justyna is a legal counsel in Solivan | PONTES with almost 20 years of experience across a wide range of sectors including energy. The professional experience of Justyna Chabocka to date comprises many years of advice for banks (Polish and foreign), including bank consortia and borrowers in granting/ acquiring various types of financing: property finance, corporate finance, refinancing, project finance, asset finance.

Bernd Taucher, Vienna

Bernd is a partner in Graf Patsch Taucher Rechtsanwälte | PONTES. He is the key contact responsible for Austria projects. Bernd is a qualified lawyer with over ten years of experience in M&A, corporate finance and capital markets across a wide range of sectors including energy. His economics degree from a world class British university helps him to better understand his clients' business needs.

Catalina Sucaciu, Bucharest/Brasov

Catalina is a parner in Jinga & Asociatii | PONTES and has extensive expertise in banking & finance, employment, energy law, commercial & contract law and capital markets related matters. She acted as lead counsel in complex banking and financing projects, while also advising domestic and international clients in structuring, negotiating and implementing complex corporate structures and in the development of various investment projects.

Christian Schnell, Warsaw

Christian Schnell, a partner in Solivan | PONTES, is a legal counsel (Radca prawny) at the Regional Chamber of Legal Advisors in Warsaw and Rechtsanwalt (German advocate) at Landgericht Düsseldorf. Christian has been particularly active in the energy sector since 1999 and advises international utilities, developers, investment funds, family offices and multinational corporations in the energy and utilities sector (including power, heat, transport, waste, energy efficiency). He is a visiting lecturer at the Warsaw School of Economics SGH. Christian is a senior expert of the think tank Jagiellonian Institute and often advises the government and Polish employers associations in regulatory issues concerning the energy sector.

Csaba Polgar, Budapest

Csaba is one of the founding partners in Pontes Budapest and specialises in energy law. He is the key contact for Hungarian projects and for consultations in any cross-border energy deals.He leads the energy, arbitration and environmental law practices, and co-leads PPP and general project financing matters. Csaba also acts as an arbitrator at the Permanent Court of Arbitration for Energy Matters.

Roman Kramarik, Prague

Roman is a founding partner in JŠK | PONTES. He is an expert in energy law and aviation law. Roman's experience includes representing numerous clients in acquisitions and financing, restructuring the Czech oil refinery business, financial and operating aircraft leases, and representing multinational clients in litigation and competition matters. Roman has also advised the regulators on complex regulatory issues involving the distribution of both gas and electricity. As a long-standing member of the Appeals Committee of the Energy Regulatory Office he reviews challenges to the licencing, fining and other important decisions of the energy regulator.

Stefan Gugushev, Sofia

Stefan Gugushev is a founding and managing partner in Gugushev and Partners Law Office | PONTES and is the key contact responsible for Bulgarian projects. He is a qualified attorney with over ten years of professional experience. He specializes in energy law, corporate and tax law.

Wolfgang Graf, Vienna

Wolfgang is a partner in Graf Patsch Taucher Rechtsanwälte | PONTES. He focuses mainly on corporate and M&A. He has a great deal of experience in M&A and private equity transactions and has co-ordinated many cross-border transactions across a wide range of sectors, including energy. He is also admitted to practice in New York.

ABOUT PONTES

PONTES, established in 2004, is a legal network rooted in the culture of cooperation and results. Our team's distinctive competence lies in its ability to blend legal service with a level of regional insight generally not seen among international competitors. Knowledge is the key to our excellence: addressing trends within the practice and bringing the best minds together. PONTES firms also benefit from a schedule of cross-border training events, staff secondments and quarterly roundtables.

PONTES draws on in-depth knowledge acquired by leading international practices; a group of over 120 professionals delivering top-flight legal services clients can rely on, with experience in a range of practices including corporate/M&A and capital markets, banking and finance, real estate, energy and infrastructure, litigation and dispute resolution, contract, employment, as well as insurance.

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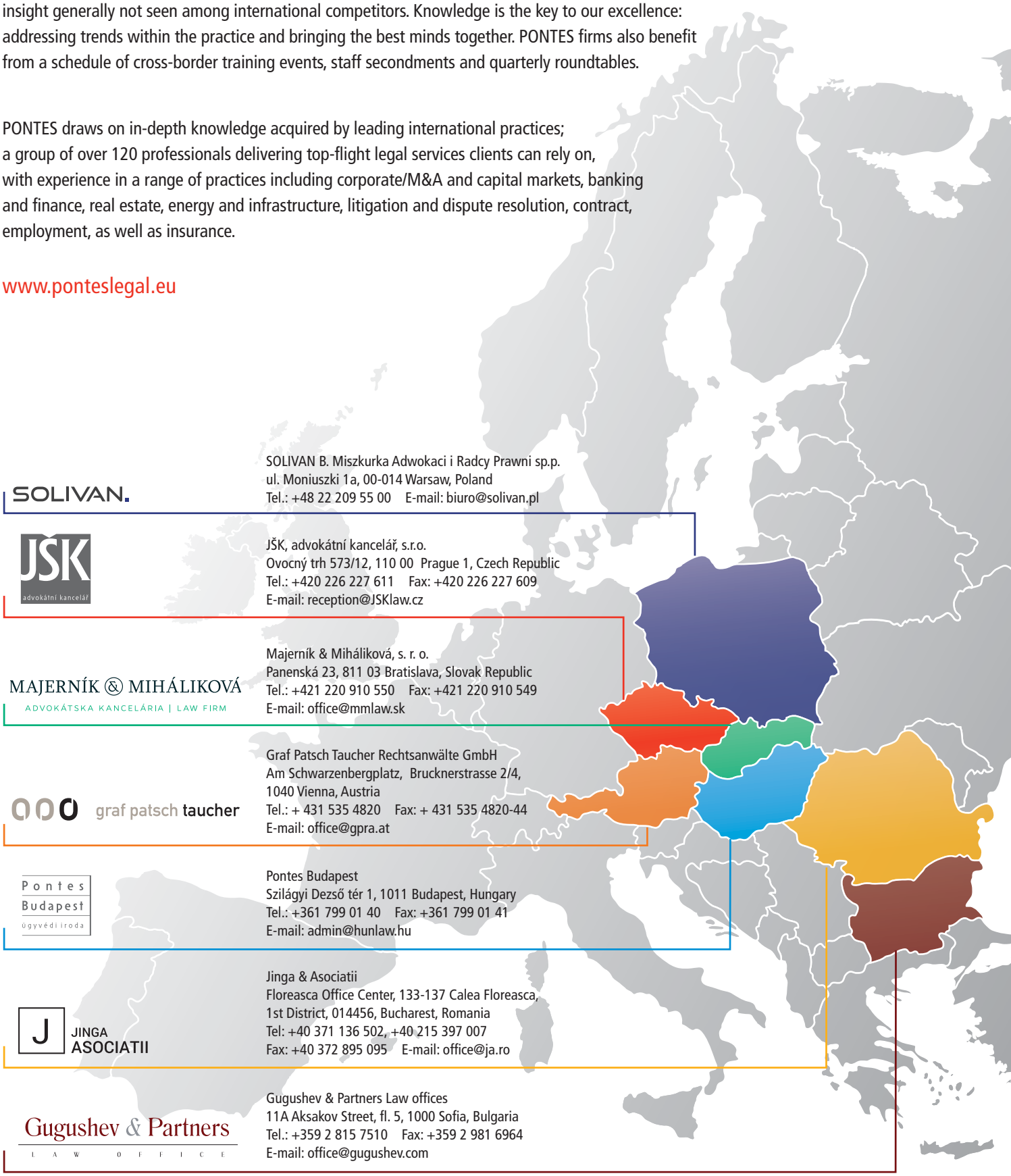

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