

Deloitte.



Newsletter

Power & Utilities in Europe

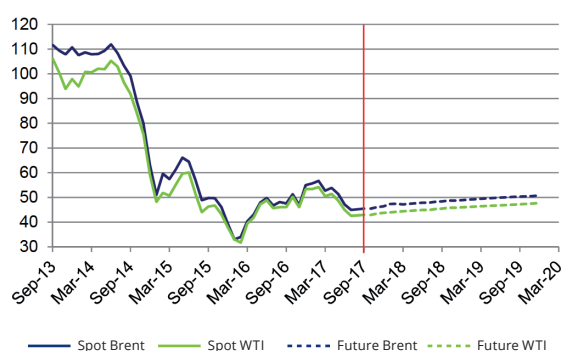
October, 2017

Newsletter Power & Utilities in Europe

Commodities



Crude oil (\$/bbl)



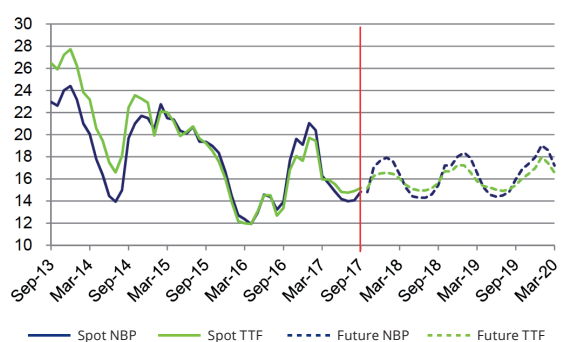
Source Capital IQ

Crude oil prices have rebounded following the decline in Q2 2017, the biggest quarterly decline since 2015. The rebound has occurred on the back of **Hurricanes Harvey and Irma in August and an ongoing commitment from OPEC and 11 non-OPEC countries to extend production cuts to 2018. In particular, production from Libya declined alongside output from Venezuela, Iraq, the UAE and Saudi Arabia.** The natural disasters and OPEC production cuts led to a reduction in global supply which supported oil prices.

On the demand side, **greater demand for diesel has contributed to a growth in total oil consumption in 2017.** The unexpectedly strong demand and depletion of supply may lead to further price increase, as inventories are usually built up in Q3 in preparation for winter. This is reflected in the forwards market for this winter and next year, with prices for the following year increasing and exceeding the \$50/bbl mark.



Gas (€/MWh)



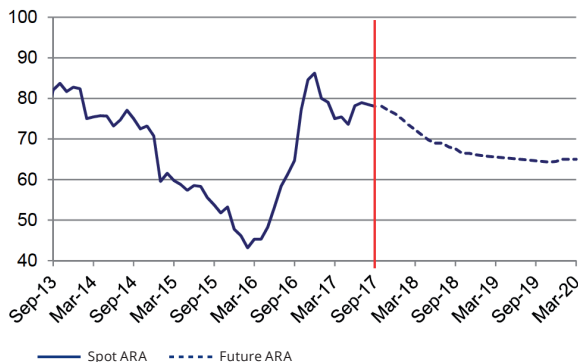
Source Capital IQ

Gas prices at the end of Q3 2017 were relatively similar to prices at the end of Q2. During Q3, supply of gas reduced due to **maintenance works at Norway's Kollsnes gas processing plant and at the UK Continental Shelf until the end of September.** The outage in Norway was a key event as the UK imports a large proportion of gas from Norway. This reduction in supply offset the seasonally weak demand and decline in prices during summer.

The higher spread between NBP and TTF prices for this winter in the forward markets may reflect **greater uncertainty following confirmation from Centrica that the Rough storage site will be closed permanently.** As a result, the UK will be more dependent on imports from the continent. Given that past winters have been relatively mild, there is concern that the UK may not cope in a cold winter if there are unexpected pipeline failures.



Coal (\$/metric ton)

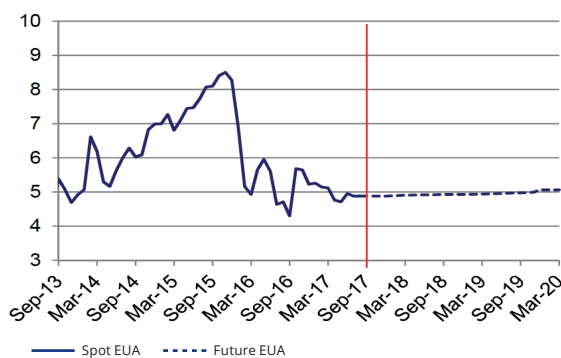


Source Capital IQ

After nearly hitting the \$80/metric tonne mark in June, coal prices fell slightly in Q3 2017. Given China's influence on the global coal market, the government's latest policy initiatives may have signaled a long-term decline in coal prices. **The Chinese government has stated its desire to increase energy efficiency and reduce pollution by closing unprofitable mines and cracking down on illegal operations and low-quality imports at small ports in the country.** However, this downward pressure on prices was partially offset by negative shocks to global supply, including a **UN ban on coal exports from North Korea and August strikes by Glencore miners in Australia.** Overall, global coal prices were fairly stable in Q3 but there appears to be downward trend in forward markets.



Carbon CO₂ (€/ton)

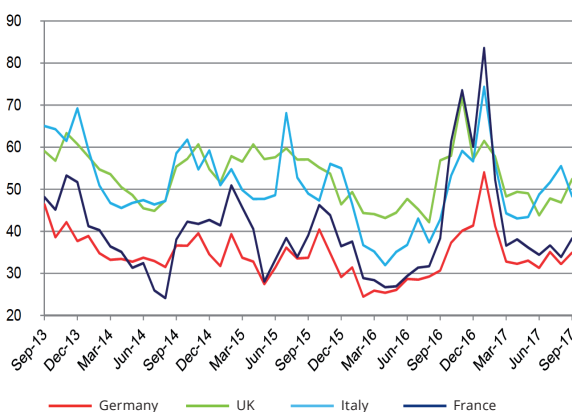


Source Capital IQ

Carbon prices were stable in Q3 2017. The low prices observed in the spot and forward markets **reflect the oversupply of EUAs and perhaps the cautious stance adopted by parties involved in relation to a few key events.** Firstly, there remains **concerns that Brexit may trigger a large sell-off of EUAs,** thus pushing carbon prices even lower. This potential outcome would make it harder for the EU to achieve carbon emission targets. To prepare for this, there has been **EU legislation in the pipeline to automatically void emission allowances issued in a country exiting the ETS.** Secondly, **the post-2020 EU ETS reform bill has still yet to be finalised.** Once these events materialise in the next few quarters, there may be volatility introduced to carbon prices.



Baseload Electricity Baseload Spot Day Ahead (€/MWh)



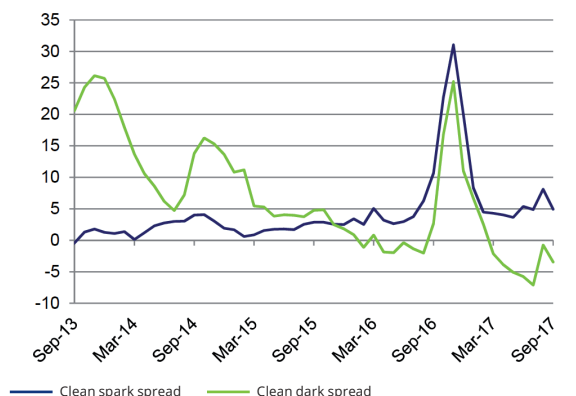
Source Bloomberg

In the UK, the increase in electricity prices may be attributed to negative supply shocks to wholesale gas flows from Norway and the UK Continental Shelf due to maintenance works. The volatility observed in Italy may be due to an extreme heat wave in August, which contributed to low hydro levels and a spike in demand for cooling.

Electricity prices in France and Germany have been relatively stable in Q3 as gas and coal prices were similarly stable. The late uptick in prices in France may be attributed to **supply shocks to France's nuclear power due to a reactor being halted for a planned outage and ongoing EDF maintenance works.**



UK Clean dark & spark spreads (£/MWh)

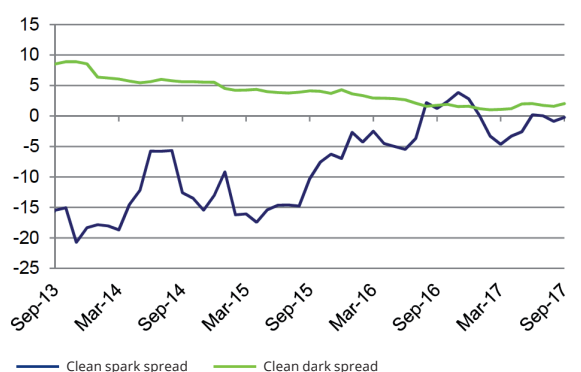


Source Bloomberg

Gas margins were relatively stable as gas plants continue to be the regular price setting plant in the UK. On the other hand, **coal margins have shown signs of recovery in August after dipping into negative margins in Q1**. This may be partly attributed to movement in the GBP:EUR exchange rate. While spot electricity prices were stable in EUR, these prices increased in GBP due to a depreciation in GBP from July to August. In addition, falling coal prices on the back of the China's commitment to reduce carbon emissions from coal usage may have contributed to the recovery of coal margins. Overall, **gas plants have been more profitable than coal plants over the past year and this is like to be the long term trend in the UK.**



German Clean dark & spark spreads (€/MWh)



Source Bloomberg

Both clean spark and dark spreads were relatively stable in Q3 2017. **As EUAs continue to be traded at low prices in Q3**, coal remains the price setting plant in the German merit order. As a result, coal margins have been stable and just above breakeven point. On the other hand, **gas generation has become unprofitable after margins improved in Q2**. This may be attributed to a slight rise in gas prices. However, the impact is minimal and on overall gas generation is still less profitable compared to coal generation.

Spotlight on Power and Utilities market

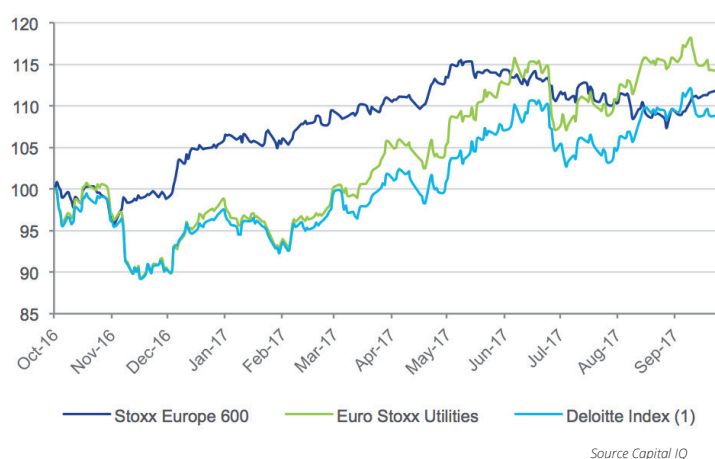
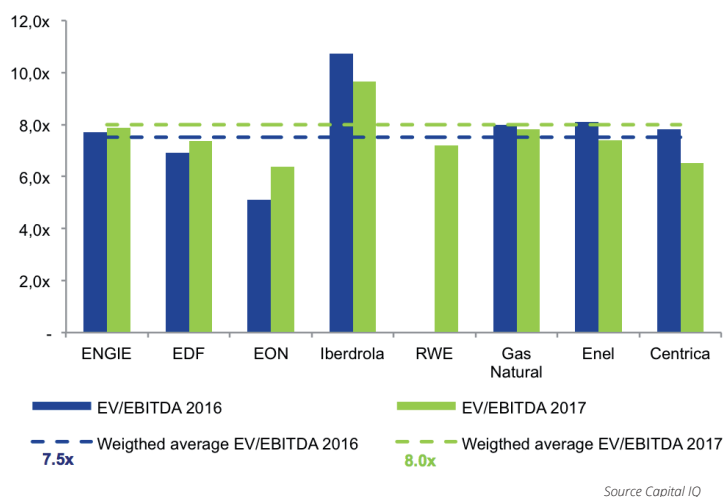
Capital market overview

| | Deloitte Index ⁽¹⁾ | Enel | Iberdrola | ENGIE | EDF | E.ON | Gas Natural | RWE | Centrica |
|-----------------------------|-------------------------------|--------|-----------|--------|--------|----------------------|-------------|--------------------|--------------------|
| Market cap. ratios | | | | | | | | | |
| Currency | | EUR | EUR | EUR | EUR | EUR | EUR | EUR | GBP |
| Market Cap as of Sept 17 | | 52 300 | 42 886 | 34 671 | 28 675 | 20 252 | 19 443 | 12 627 | 10 707 |
| 3m stock price performance | 3% | 7% | -4% | 7% | 12% | 11% | -9% | 8% | -7% |
| YoY stock price performance | 9% | 30% | 10% | 5% | -1% | 48% | 3% | 25% | -18% |
| Market multiples | | | | | | | | | |
| EV/EBITDA FY16 | 7.9x | 8.1x | 10.7x | 7.7x | 6.9x | 5.1x | 8.0x | n.m. | 7.8x |
| EV/EBITDA FY17 | 8.1x | 7.4x | 9.7x | 7.9x | 7.4x | 6.4x | 7.8x | 7.2x | 6.5x |
| P/E FY16 | 9.5x | 20.4x | 15.7x | n.m. | 10.1x | n.m. | 14.4x | n.m. | 6.4x |
| P/E FY17 | 14.6x | 14.4x | 15.7x | 14.2x | 15.0x | 15.0x | 15.0x | 10.0x | 12.5x |
| Price/book value FY16 | 1.2x | 1.5x | 1.2x | 0.9x | 0.7x | n.m. | 1.3x | 1.9x | n.m. |
| Profitability ratios | | | | | | | | | |
| ROE forward 12m | 2% | 10% | 7% | 6% | 6% | -128% ⁽³⁾ | 9% | 34% ⁽³⁾ | 32% ⁽²⁾ |
| ROCE forward 12m | 14% | 8% | 5% | 6% | 4% | 84% ⁽³⁾ | 7% | 38% ⁽³⁾ | 18% ⁽²⁾ |
| EBITDA margin FY16 | 20% | 21% | 25% | 14% | 21% | 16% | 20% | 5% | 8% |
| EBITDA margin FY17 | 20% | 21% | 26% | 15% | 21% | 13% | 21% | 12% | 9% |
| EBIT margin FY16 | 12% | 13% | 15% | 8% | 10% | 6% | 12% | 0% | 5% |
| EBIT margin FY17 | 12% | 13% | 15% | 9% | 9% | 8% | 13% | 7% | 5% |

(1) Deloitte Index is composed of Engie, EDF, EON, Iberdrola, RWE, Gas Natural, Enel, SSE and Centrica

(2) Ratio linked to the expected level of non recurring income resulting from disposals program by Centrica

(3) Not meaningful due to non-recurring items (E.ON: Nuclear tax refund and spin-off of Uniper and RWE: Nuclear tax refund and spin-off of innogy)



Key messages from brokers and analysts

"Are we closer to a carbon floor in Europe? ... France's support alone is not enough, German policy would be key"

(Morgan Stanley – September 27, 2017)

"German election ... Coal and lignite closure would remove base-load output and raise the marginal cost of generation in Germany ... Potentially positive for neighbouring generators"

(HSBC – September 25, 2017)

"CO2 and French regulatory expectation in a driving seat ... Supportive regulation to come"

(Barclays – September 21, 2017)

"European gas market ... Russia's market share in europe: A matter of national security?"

(Credit Suisse – August 14, 2017)

M&A Trends

Transactions involving Power & Utilities companies

China General Nuclear Power Group (CGN) announced its **interest to acquire a stake in Toshiba's entity**, which should built three nuclear reactors in the UK for a total investment between €12.5 and €16.7 bn (NuGen).

(Reuters - September 19, 2017)

EP UK Investments, a subsidiary of the Czech utility company EPH, is authorized to buy **2.3 GW of UK CCGT plants from Centrica for £318m**.

(Platts European Power Daily - July 26, 2017)

Japanese electric power company **Kansai and Mitsubishi UFJ** have bought a **60% stake in Irish firm Evalair** which owns a 223 MW wind portfolio from Cork-based renewable energy entrepreneur Michael Murnane and a British private equity fund for **€300m**.

(CTBR - August 1, 2017)

Total has agreed to buy a **23 percent stake** in wind, solar and hydropower energy producer **EREN Renewable Energy (EREN RE)** with a 650 MW capacity, for **€237,5m**, with an option to acquire 100% of the company after a 5 years period.

(Reuters News - September 19, 2017)

Enel Green Power North America, Inc. (EGPNA), a leading owner and operator of renewable energy plants, acquired **100% of EnerNOC, Inc.**, a US provider itself of energy services, for about **\$250m**.

(The New Dawn - August 8, 2017)

Electrica (EL), a Romanian electricity supplier and distributor, is set to buy four Romanian energy companies, including Electrica Furnizare, from investment fund **Fondul Proprietatea** for **€163.42m**.

(Esmerk Eastern European News - September 6, 2017)

Transactions involving equity funds

Fortum, a Finnish state-owned power company, is about to buy the remaining 46.65% of E.ON in **Uniper for €3.8bn**.

(Reuters - September 21, 2017)

Global Infrastructure Partners (GIP), a US-based fund manager, has agreed to buy **50% of a 450MW offshore wind farm from DONG Energy for €1.17bn**.

(IJ Global - August 7, 2017)

Gas Natural Fenosa has sold **20% of its distribution network in Spain to Allianz Capital Partners** and fund **CPPIB for €1.5bn**

(Reuters - September 18, 2017)

New Energy Investment (NEI) has decided to sell a **1.78% share** in Danish windfarm developer **DONG Energy** to institutional investors for **€324m**.

(Reuters - September 6, 2017)

SSE signed an agreement to sell **5% of Clyde Windfarm (Scotland)**, a 349.6MW operational wind farm and 172.8MW under construction, **to Greencoat UK and GLIL Infrastructure**, two infrastructure funds, for **£67.8million**. Both companies also have the **option to buy a further 14.9% for £202.2 million**.

(The Times - August 2, 2017)

Greencoat UK Wind, a listed infrastructure fund, purchased a Scottish wind farm with a capacity of 69.5MW, from US-based developer **Invenenergy for £181m**.

(Infrastructure Investor - August 23, 2017)

Saeta Yield, a Spanish energy infrastructure company, has agreed to purchase **100% of Lestenergia**, owning wind farms in Portugal with a 144 MW installed capacity, from **ProCME**, a subsidiary of construction business Grupo ACS for **€104m**.

(IJ Global - August 7, 2017)

BKW, a Swiss energy and infrastructure company, sold **Electra Italia's electricity distribution business** and its stake in CDNE, an entity acting in electricity distribution, **to both E.ON and Illumia** for an undisclosed amount.

(Tensid - September 20, 2017)

Octopus Investments, a private equity firm, acquired a **149 MW capacity portfolio of wind projects** from **Blue Energy Co.**, a renewable energy company for an undisclosed amount.

(Financial Deals Tracker - July 21, 2017)

European Power and Utilities companies wrap-up

The economic conditions are still driving wholesale electricity prices at historical low level. In addition, the **warmer H1 2017** compared to 2016 and the **lower Hydro production** negatively impacts Utilities' performance across Europe.

Consistently with past periods **Utilities performance depend on their regulated activities** providing a competitive advantage to those having a broad regulated assets footprint.

In this context, "self-help" is a key driver and leads utilities to engage large assets rotation program.

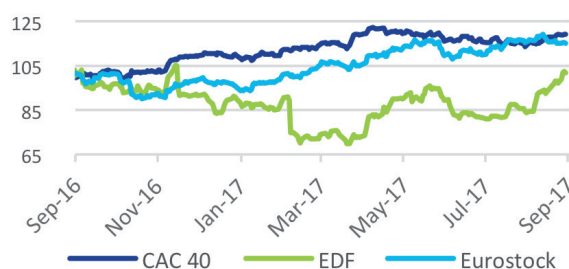
In Germany, a number of uncertainties no longer exist: those regarding Germany's **nuclear-fuel tax** and those regarding the funding and the transfer of the payment into **Germany's public fund for financing nuclear-waste disposal**.

FY17 outlooks confirmed for all below mentioned Utilities.





Share
Price Perf.
Sep. 2016
Sep. 2017



Key
Reported
Financials

| In billion of € | H1 2017 | H1 2016 | Var. |
|--------------------------------|------------|------------|-------------|
| Sales | 35.7 | 36.7 | -3% |
| EBITDA | 7.0 | 8.9 | -21% |
| Operating Income | 3.9 | 4.5 | -13% |
| Recurring net income Gr | 1.4 | 3.0 | -53% |
| Net Income Gr Share | 2.0 | 2.1 | -5% |
| Operating CF | 4.2 | 8.0 | -48% |
| Net Capex | -6.5 | -6.6 | -2% |
| Net debt | -31.3 | -37.4* | -16% |

* as of Dec. 31, 2016

| In billion of € | H1 2017 | H1 2016 | Var. |
|--------------------------------|------------|------------|------------|
| Sales | 33.1 | 32.6 | +2% |
| EBITDA | 5.0 | 5.0 | 0% |
| Operating Income | 3.0 | 3.2 | -6% |
| Recurring net income Gr | 1.4 | 1.4 | 0% |
| Net Income Gr Share | 1.3 | 1.2 | +8% |
| Operating CF | 3.5 | 4.7 | -26% |
| Net Capex | -2.3 | -2.2 | +5% |
| Net debt | -22.7 | -24.8** | -8% |

* data restated of the presentation of Engie E&P

International as discontinued operation from May 11, 2017

** as of Dec. 31, 2016

H1 2017
Highlights

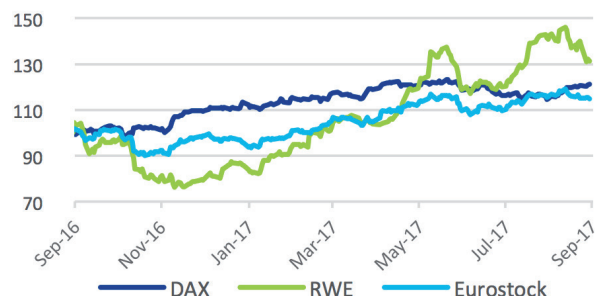
- **Ebitda amounted to €7.0bn, -21% vs H1 2017, due to:**
 - A 29% organic decline in generation and supply in France due a drop in nuclear and hydropower generation and unfavourable market conditions,
 - A 14% organic drop in French regulated activities due to unfavourable weather conditions
 - Lower sales prices in the UK partially offset by higher electricity and oil & gas prices in Italy.
- **The net income totalled €2.0bn stable compared to H1 2016, the capital gain (€1.5bn) recorded with the sale of 49.9% of RTE, the French TSO offset the decline in EBITDA.**
- **The assets disposal program generated a €4.1bn positive impact in the first half of 2017**, notably due to the sale of 49.9% of RTE, the French TSO.
- **The net debt is improving by €6.1bn in connection with the €4bn capital increase** and the habove-mentioned assets disposals.
- Approval of the French Nuclear Safety Agency on the Flamanville 3 Vessel requesting the replacement of the vessel head by the end of 2024.
- **Hinckley point C: update of project costs to £19.6b**, an increase of £ 1.5 billion, compared to previous evaluations. The estimated **projected rate of return is now 8.5%** compared to 9% initially.
- Creation of a JV in engineering services between EDF and Areva (Edvance)
- Binding agreement with Mitsubishi Heavy Industries (15%) and Assystem (5%) to sell shares in New NP based on an Equity value of €2.5bn (AREVA's activities notably related to design and equipments' manufacturing of nuclear reactors) after acquisition (to come) by EDF.
- Acquisition of Imtech in the UK specialized in Energy services

- **Ebitda reached €5.0bn, stable vs H1 2016 but +4% on an organic basis, due to:**
 - Positive impacts of (i) the Lean 2018 performance program, (ii) the sustained performance of the Group's growth engine notably customers solutions, infrastructures, and renewable and thermal contract, (iii) the commissioning of new assets in Latin America and (iv) good performance of the thermal power generation activities in Europe and Australia.
 - These positive factors are partially offset by (i) lower renewable energy generation in France, (ii) less favourable temperature effect in France, and (iii) shutdown of Tihange 1 nuclear power plant in Belgium from September 2016 to May 2017.
- **The difference between organic and reported EBITDA growth is linked to (i) the disposal of Merchant power generation assets** in the United States (June 2016 and February 2017) and Paiton power plant in Indonesia (end 2016), and (ii) **the classification in EBITDA of the nuclear contribution in Belgium.**
- **Net debt and net capex positively impacted by the portfolio rotation program** including the sale of the thermal merchant power plant in the United States and Poland, and the disposals of interests in Opus Energy (UK) and Petronet LNG (India) with a positive €3.9bn impact.
- **Regarding the assets disposal target of €18bn over 2016-18, €11bn have been announced to date and €8bn accounted for as of June 2017.**
- **Engie entered into exclusive negotiation for the sale of its 70% interest in Exploration & Production International (EPI)** leading to present this activity in financial statements within discontinued operations. Excluding internal E&P debt, the Group net debt as of June 30, 2017 would amount to €20.9bn

e-on

RWE

Share
Price Perf.
Sep. 2016
Sep. 2017



Key
Reported
Financials

| In billion of € | H1 2017 | H1 2016 | Var. |
|--------------------------------|------------|-------------|-------------|
| Sales | 19.6 | 20.3 | -3% |
| EBITDA | 2.7 | 2.9 | -7% |
| Operating Income | 1.8 | 2.0 | -10% |
| Recurring net income Gr | 0.9 | 0.6 | +50% |
| Net Income Gr Share | 3.9 | -3.0 | n.m. |
| Operating CF | 4.9 | 1.6 | +206% |
| Net Capex | -1.3 | -1.3 | - |
| Net debt | -21.5 | -26.3* | -18% |

* as of Dec. 31, 2016

| In billion of € | H1 2017 | H1 2016 | Var. |
|--------------------------------|------------|------------|--------------|
| Sales | 23.3 | 23.9 | -3% |
| EBITDA | 3.2 | 3.0 | +7% |
| Operating Income | 2.2 | 1.9 | +16% |
| Recurring net income Gr | 0.8 | 0.6 | +33% |
| Net Income Gr Share | 2.7 | 0.5 | +440% |
| Operating CF | 1.7 | -1.0 | n.m. |
| Net Capex | -0.9 | -0.8 | +13% |
| Net debt | -21.5 | -22.7* | -5% |

* as of Dec. 31, 2016

H1 2017
Highlights

- **Ebitda amounted to €2.7bn, -7% vs H1 2016.**
 - Decrease of EBITDA in Customer Solutions (-€0.2bn) and Renewables (-€0.1bn) business segments
 - Lower sales volume and higher costs in the United Kingdom; and higher power and gas procurement costs in Romania;
 - Slightly compensated by higher Energy Networks' EBITDA (+€0.2bn) namely in Germany.
- **Operating income decreased by €0.2bn owing primarily to the items mentioned above and the absence of earning streams from E&P operations in the North Sea divested in 2016.**
- **The German Federal Court ruled that the nuclear fuel tax was invalid. This decision entitled E.ON to a tax refund of €2.9bn fully recovered in June 2017. It positively impacts net income, operating cash flow and net debt.**
- **In June 2016 the net income was negatively impact by a €2.9bn impairment charge** recorded on European generation (€1.8bn) and Global commodities (€1.1bn)

- **Ebitda reached €3.2bn, +7% vs H1 2016. The main reason of the improvement are:**
 - The positive impacts of (i) the recovery in Supply & Trading after the unusually weak performance in 2016, and (ii) declining expenses for operations and maintenance in the grid business (innogy).
 - Partially offset by (i) lower wholesale prices for electricity produced by lignite-fired and nuclear power plants and (ii) non-recurring profit recorded in 2016 on European Power in connection with the release of provisions and the sale of properties in the United Kingdom.
- **The German Federal Court ruled that the nuclear fuel tax was invalid. This decision entitled E.ON to a tax refund of €1.7bn fully recovered in June 2017. It positively impacts net income, operating cash flow and net debt.**
- **At the end of February 2017, RWE successfully completed the legal transfer of the debt from senior bonds to Innogy (€11bn).**
- **Retrofit of the hard coal-fired power plants Eemshaven and Amer 9 for biomass cofiring.** The background for these decisions is that the Dutch state approved subsidies of up to €2.6bn for the two plants.
- Rating agencies confirm RWE's investment-grade rating: Baa3 / BBB-

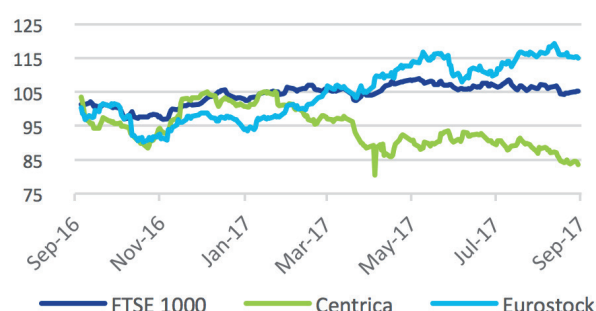
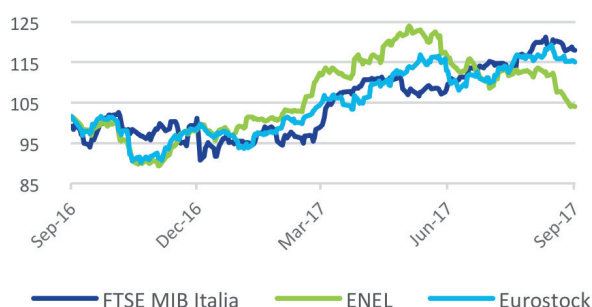
FY 2017
Outlook

2017 guidance confirmed

2017 guidance confirmed



Share
Price Perf.
Sep. 2016
Sep. 2017



Key
Reported
Financials

| In billion of € | H1 2017 | H1 2016 | Var. |
|--------------------------------|------------|------------|------------|
| Sales | 36.3 | 34.2 | +6% |
| EBITDA | 7.7 | 8.1 | -5% |
| Operating Income | 4.9 | 5.2 | -7% |
| Recurring net income Gr | 1.8 | 1.7 | +6% |
| Net Income Gr Share | 1.8 | 1.8 | +1% |
| Operating CF | 4.0 | 4.2 | -4% |
| Net Capex | -3.5 | -3.7 | -5% |
| Net debt | -38.8 | -37.6* | +3% |

* as of Dec. 31, 2016

| In billion of € ** | H1 2017 | H1 2016 | Var. |
|--------------------------------|------------|------------|--------------|
| Sales | 16.6 | 15.6 | +6% |
| EBITDA | 1.5 | 1.5 | - |
| Operating Income | 0.3 | 2.1 | -86% |
| Recurring net income Gr | 0.5 | 0.6 | -17% |
| Net Income Gr Share | 0.0 | 1.3 | -100% |
| Operating CF | 1.4 | 1.6 | -14% |
| Net Capex | -0.2 | -0.5 | -60% |
| Net debt | -3.4 | -4.1 | -16% |

* as of Dec. 31, 2016

**assuming a fixed exchange rate of 1.163 into euros

H1 2017
Highlights

- The 6% increase in revenue is attributable to positive impact of exchange rate and an increase in sales of electricity to end users, partially offset by a decrease in sales on the wholesale market.
- Ebitda decreased to €7.7bn, -5% vs H1 2016. The change is mainly attributable to the decline in the margin in Iberia, mainly reflecting the effects of the drought on the margin from generation and the cost of provisioning raw materials, which more than offset the improvement in performance in Italy, especially in the retail market.
- Operating income amounted to €4.85bn, a decrease of €0.36bn (-7%) compared with the same period of 2016.
- Enel Green Power North America acquired a 100% stake in Demand Energy Networks, a US-based company specialized in intelligent software and energy storage systems.
- Finalization of the acquisition of (i) 95% of CELG Distribuição, a power distribution company operating in the Brazilian state of Goiás, for R\$2.2bn and (ii) E-Distributie Muntenia and Enel Energie Muntenia, two Romanian utility companies, for €0.4bn.

- Group revenue increased BY 6% to €16.6bn namely due to the positive perimeter impact of Neas Energy acquisition in H2 2016.
- EBITDA amounts to €1.5bn, stable compared to 2016:
 - EBITDA is negatively impacted by (i) the warmer weather, (ii) lower energy and services accounts and (iii) an extended outage at Morecambe E&P asset,
 - Being offset by a strong performance in energy Marketing, namely Connected Home and Distributed Energy and Power, and Trading.
- The decrease in operating income is linked to impairment on Canadian E&P and gas storage assets recorded in 2017 (€0.4bn). In addition, the non-recurring result on forward energy trades remeasurement moved from a £0.7bn profit in 2016 to a £0.2bn loss in 2017.
- In July 2017, the Group announced an agreement with Stadtwerke Munchen GmbH to combine their E&P business with Nayerngas Norge that would grant 69% of the company to Centrica. The transaction should be closed in Q4 2017.
- Over €0.9bn of Central Power Generation and E&P disposals completed or announced in H1 2017, in line with strategy, taking total disposals to over €1.0bn since 2016, at the upper end of the €€580m-€1.2bn targeted range.

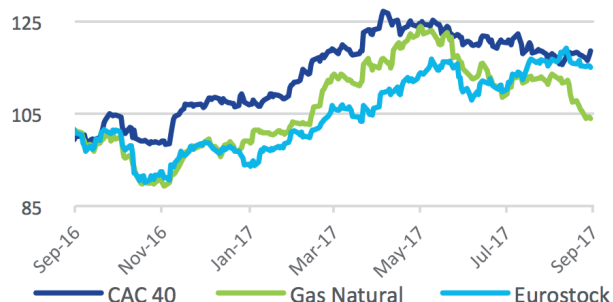
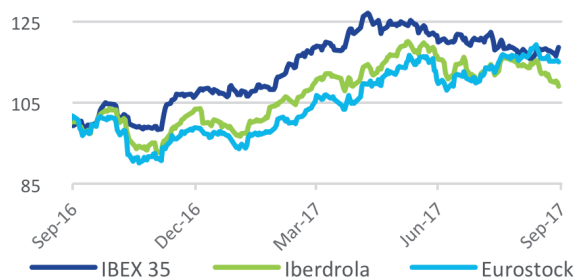
FY 2017
Outlook

2017 guidance confirmed

2017 guidance confirmed



Share
Price Perf.
Sep. 2016
Sep. 2017



Key
Reported
Financials

| In billion of € | H1 2017 | H1 2016 | Var. |
|--------------------------------|------------|------------|------------|
| Sales | 15.2 | 14.9 | 2% |
| EBITDA | 3.8 | 3.9 | -4% |
| Operating Income | 2.1 | 2.3 | -9% |
| Recurring net income Gr | 1.2 | 1.4 | - |
| Net Income Gr Share | 1.5 | 1.5 | - |
| Operating CF | 3.3 | 3.2 | 2% |
| Net Capex | -2.5 | -1.9 | 35% |
| Net debt | -29.5 | -29.2* | 1% |

* as of Dec. 31, 2016

| In billion of € | H1 2017 | H1 2016 | Var. |
|--------------------------------|-------------|-------------|-------------|
| Sales | 12.3 | 11.4 | 8% |
| EBITDA | 2.2 | 2.5 | -11% |
| Operating Income | 1.3 | 1.4 | -7% |
| Recurring net income Gr | n.a. | n.a. | |
| Net Income Gr Share | 0.5 | 0.6 | -14% |
| Operating CF | 1.8 | 1.8 | - |
| Net Capex | -0.7 | -0.6 | +15% |
| Net debt | -15.8 | -15.4* | +2% |

* as of Dec. 31, 2016

H1 2017
Highlights

- Ebitda decreases to **€3.8bn**, **-2% vs H1 2016**, due to:
 - Adverse impact of weather in the UK and Spain, lower Hydro production in Spain and lower demand in the UK
 - It has been partially offset by a robust performance in Networks business and a profit increase (€0.2bn) of the US subsidiary Avangrid.
- In Spain, the period has been characterised by a significant drop in hydroelectric production (-52%) as a result of the weather conditions.
- In the United Kingdom, electricity demand dropped by 2.2% compared to 2016. Customers' gas demand also dropped by 4.7%.
- Net investment for the January to June 2017 period came to **€2.5bn**, exceeding by 35.2% the net investment made in the same period of 2016. Of this investment, 80.1% focused on the Networks and Renewables businesses.
- The shareholders of Neoenergia, the first private Energy company in Brazil, have reached an agreement to incorporate the activity of Elektro, Iberdrola subsidiary, creating a leading utility company in Brazil and Latin America with a focus on networks and renewables. Iberdrola should own 52% of the new company.

- EBITDA amounted to **€2,176 million**, an **11.4% decrease on the first half of 2016 (6.6% in like-for-like terms, excluding Electricaribe not consolidated since December 2016)** due to:
 - Electricity business in Spain, whose performance was shaped by weather, as hydroelectric output declined by 77.3%
 - this has been partially offset by robust performance on networks and international contracted generation and a stabilization in gas supply
- New loan of **€0.5bn** with the European Investment Bank (EIB) with a term of 20 years to finance part of the electricity distribution business and the development of renewable energy projects in Spain.
- Gas Natural Fenosa was awarded 667 MW of wind capacity through an auction in Spain. The investment required developing those projects and the awarded capacity is a maximum of €0.7bn.
- No evolution in the arbitration process brought to the United Nations Commission on International Trade Law regarding the litigation with the Colombian State on Electricaribe.

FY 2017
Outlook

2017 guidance confirmed

2017 guidance confirmed

Talking points

1 - Investment cycles in generation assets and the impact of capacity remuneration mechanisms

Capacity Remuneration Mechanisms (CRM) to solve the underinvestment issue

In the wake of power market reforms and the introduction of competition within the generation side, the ability of electricity prices to induce optimal investment in generation assets has been challenged by economists, policy makers and utilities in Europe and in the US. In previous regulated systems, investments were made by a unique player: coordination in generation investments was then not an issue. Moreover, investment risks were passed through the tariffs to the consumers. From now on, investors perform their own development planning in reaction to complex and hardly predictable price signals, aiming to earn the highest profit. It makes coordination in investments more complex, which can lead to long-term inefficiencies.

Practical outcomes in the US and in Europe, as well as theory studies, highlight the existence of several issues in traditional power markets (called energy-only markets) where only generated electricity is remunerated. These issues, known as market failures, are likely to result in underinvestment, in particular for peak technologies. This is the famous concept of the missing money issue. This is particularly due to 1) the existence of price cap on the energy market which does not reflect the real value of shortages when installed capacity is not sufficient to supply all demand¹, or 2) the current technologic impossibility to disconnect individually consumers based on their willingness to pay during scarcity hours. Rolling black outs are performed randomly and then no market player is willing to invest in peak technology if it can be ensured that its consumers will benefit from it.

To correct this risk of underinvestment and solve the missing money issue, policy makers and economists promote the implementation of complementary mechanisms, called Capacity Remuneration Mechanisms (CRM). These

new mechanisms aim at reducing the under investments and the associated shortages by guaranteeing a sufficient level of installed capacity to deal with peak consumption. Several CRM designs have been discussed and implemented in some power markets around the world. Among these, the debates and discussions currently taking place in Europe mostly focus on two mechanisms, the capacity market, like in France or in Great-Britain, and the strategic reserve mechanism, for instance in Belgium or in Germany.

The risks of investment cycles in generation investments

However, ensuring the adequacy of power systems is not only about investing in the right amount of capacity to avoid shortages; it is also about doing it at the right timing. Indeed, the dynamic aspects of generation investments also matter regarding the adequacy issue. In particular, the risk of cyclical tendencies in generation investments, with phases of undercapacity (during which installed capacity is lower than electricity demand) following by phases of overcapacity (when installed capacity is greater than load), has been highlighted and supported by empirical data. These tendencies, known as boom-and-bust cycles, are dramatically prejudicial in two ways. First, during the undercapacity phases, more shortages than optimal are required, i.e. it would be less costly to build additional power plants than to curtail some customers' consumption. This is particularly detrimental for the economy as a whole because it prevents the production of goods and services². Second, during the overcapacity phases, more plants than optimal are available on the market, which incurs higher investment and operational costs. Thus capacity cycles should be avoided. If classic economics believes that these cycles could lessen by themselves, several specific characteristics of the power system and of investors make the cyclical tendencies likely in current markets.

Policy makers and economists promote the implementation of complementary mechanisms, called Capacity Remuneration Mechanisms (CRM) to correct the risk of underinvestment.

¹ For instance, in France, the price cap is equal to 3,000€/MWh on the day-ahead market and € 10,000/MWh on the intraday market and balancing market whereas the French TSO estimates the unserved energy (known as the value of lost load) at € 26,000/MWh (source : https://eco2mix.rte-france.com/uploads/media/pdf_zip/alaune/RTE_END_BD.pdf)

² The value of unserved energy (known as the value of lost load) is estimated at around 26,000€/MWh in France by RTE, approximately 200 times higher than the average cost of electricity in this situation.

Indeed, added to the missing money issue previously introduced and which reduces incentive to invest, undercapacity phases are explained by the tendency of investors to delay their investments. This is mostly due to uncertainties (e.g. regarding fuel prices, regulation decisions...), impossibility to predict futures prices in a perfect way and risk aversion. Investors tend to wait for clearer signals regarding the profitability of their plant projects. Long lead times, capital intensiveness and irreversibility of investments also intensify these effects.

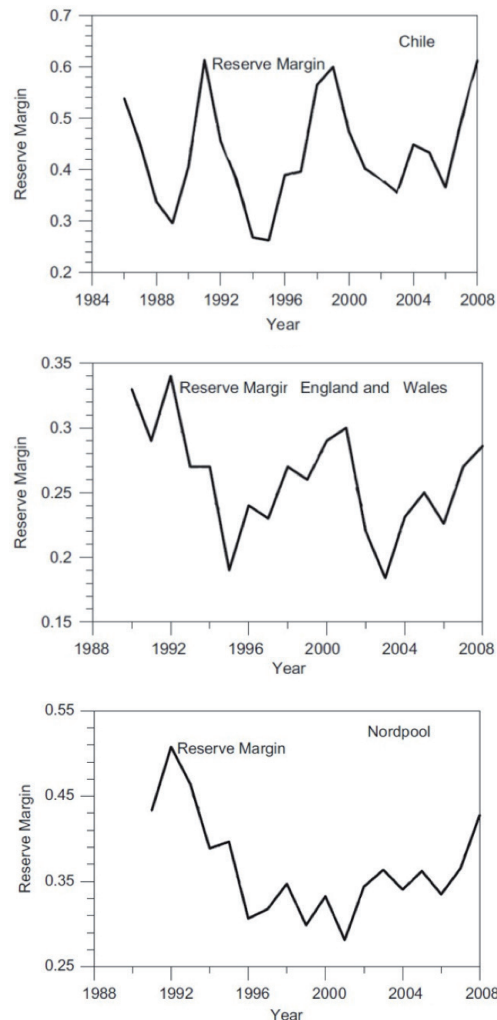
Conversely, once investments seem to be profitable enough, players are prone to overinvestment. This can be explained by a herd behavior. Without any coordination practice, investors can over-react to high prices in the energy market. In particular, they can fail to take into account the likely investment decisions of other competitors. Such underestimation can be intentional - investors being skeptical about completion of competitors announced power plants - or unintentional - investors having limited information about competitors' decisions. Moreover, even if market players are aware of the overcapacity and the associated low energy prices, they may not want to close their power plants immediately. Indeed, since the player that actually does so will incur a massive loss (due to the importance of sunk costs), it would prefer others to make this decision. However, eventually, a long overcapacity phase will sharply reduce power prices which will result in massive plants closures and possibly in bankruptcy for investors. This might lead to a spiral of massive losses for investors, which might then increase their risks aversion again, consequently emphasizing delays in investment decisions and exacerbating cycles.

Empirical support of the cyclical tendencies

These theoretical considerations are supported by empirical data in several power markets. Such empirical evidence is however limited since recent liberalization provides few data about private investor behaviors, especially as most markets tend to begin with overcapacity. Nevertheless, using data from the oldest liberalized markets (Chile, England

or Nordpool), empirical support of cyclical behavior, as illustrated in figure 1, were found³.

Figure 1: Empirical evidence of cyclical behavior in three power systems (from Arango & Larsen)



Power markets in Europe also seem to experience some cyclical investments in recent years. Indeed, large investments in CCGT plants have been observed between 2004 and 2012⁴. However, for several years, due to the massive development of renewable technologies and a stagnation of demand, some overcapacity phases are noticed in Europe, resulting in low energy prices and mothballing and closures of many recent CCGT plants⁵. Moreover, whereas a current overcapacity phase is likely to occur, some TSOs expect a lack of capacity in several years. For instance, the French TSO forecasts that up to 2.5 GW may be lacking in this country between 2018 and 2020 in the worst scenario⁶.

Ensuring the adequacy of power systems is not only about investing in the right amount of capacity to avoid shortages; it is also about doing it at the right timing.

Cyclical tendencies in generation investments, known as boom-and-bust cycles, should be avoided to increase efficiencies.

The existence of cyclical tendencies are supported by empirical data in several power markets.

3 Arango, S., Larsen, E., 2011. Cycles in deregulated electricity markets: Empirical evidence from two decades. Energy Policy, vol. 39, issue 5, 2457-2466.

4 For instance, cf. p 31 of the report accompanying the draft rules of the French capacity market published by RTE (available at http://www.rte-france.com/sites/default/files/2014_04_09_french_capacity_market.pdf)

5 For instance, cf. <http://www.powerengineeringint.com/articles/2014/03/rwe-to-mothball-500m-state-of-the-art-ccgt-plant.html>; <https://www.greentechmedia.com/articles/read/europe-mothballs-20gw-of-gas-plants-in-2013-with-more-to-come#gs.7qs7yeQ>; <http://www.energie.sia-partners.com/20160926/quel-etat-de-sante-pour-la-filiere-europeenne-des-centrales-cycle-combine-gaz>

6 http://www.rte-france.com/sites/default/files/bp2016_complet_vf.pdf

Similarly, Elia, the Belgium TSO, has identified a likely under-capacity phase after 2023⁷. A cyclical tendency in generation investments in current power markets in Europe may then not be diverted.

Impacts of CRMs on investment cycles

Given the importance of these cyclical tendencies as mentioned previously, the comparison of CRMs and of their performances has to be made from a dynamic point of view, in particular to study to what extent they can reduce the investment cycles which are detrimental, both during under and over capacity phases, and to see whether they can reach a long term equilibrium. To study the dynamic tendencies when a capacity market or a strategic reserve mechanism is implemented and to compare the benefits in both cases, Deloitte Economic Advisory has developed a simulation model, based on system dynamics modeling⁸. It simulates the investment and shutdown decisions made by market players in a liberalized market regime for three different sets of market rules: the energy-only market (as a reference case), the capacity market and the strategic reserve mechanism.

As a result of these simulations, Figure 2 describes the evolution of the expected system margin for 25 years for one scenario of load growth for the three studied market designs. The system margin is defined as the extra capacity over the peak load, i.e. the ratio $(\text{Installed capacity} - \text{Peak load}) / \text{Peak load}$. Due to maintenance operations and outages, this margin has to be strictly positive to avoid shortages. Here, a target margin of 15% is considered in the design of both CRMs, i.e. the system should have a 15% capacity margin to avoid any shortages (this margin should be positive to offset possible unavailabilities of some plants due to outages).

The dynamic performances of each market present major differences based on this simulation. In particular, the energy-only market experiences high cyclical tendencies for the reasons explained previously. Moreover, large shortages occur with this market since revenues earned from the energy market are

not high enough to attract new investments. This missing money then justifies the implementation of a CRM if policy makers want to avoid costly shortages.

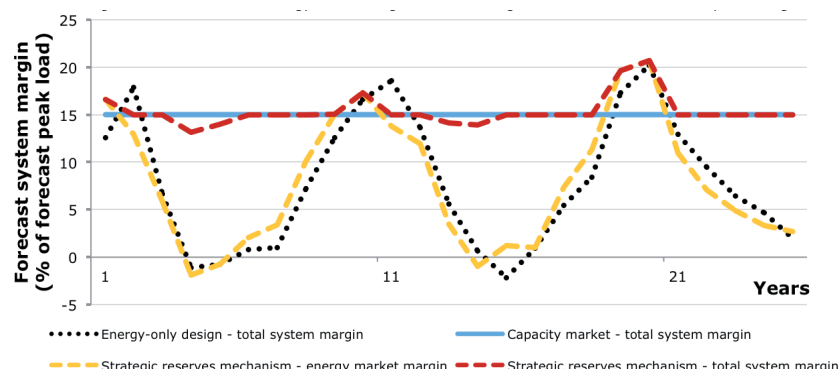


Figure 2: Evolution of the expected system margin for three market designs for one scenario of load growth (from Hary et al.)⁹

When a CRM (capacity market or a strategic reserve mechanism) is implemented, the cyclical behavior is well reduced and the system experiences very few shortages. For the capacity market (blue curve), the system margin is always equal to the 15% target margin. This result is logical since this target is explicitly defined in the design of the mechanism by the TSO. If there are not enough plants initially, the capacity market selects the required amount of capacity to reach the target by raising the capacity price so that capacity providers (new plants or existing plants) break even. Conversely, in case of overcapacity, the capacity price will decrease so that expensive plants close or investors postpone investments. This capacity market acts as a coordinator in investment and closure decisions to reach a long term equilibrium and an efficient level of installed capacity.

The total system margin for the strategic reserve mechanism (considering the red line on figure 2), if better than that for the energy-only market, highlights a lesser ability to reduce cycles compared to the capacity market. In particular, with this CRM, there is no explicit target for the system margin and no coordination through a capacity price between investments and decommissions made by different market players: the energy price is the only signal to coordinate decisions and

Comparison of CRMs and of their performances has to consider the dynamics of investments.

When a CRM (capacity market or a strategic reserve mechanism) is implemented, the cyclical behavior is well reduced and the system experiences very few shortages compared to the energy-only market.

⁷ http://www.elia.be/~media/files/Elia/publications-2/studies/160421_ELIA_AdequacyReport_2017-2027_FR.pdf

⁸ More details about the model and data used can be found in Hary, N., Rious, V., Saguan, M., 2016. The electricity generation adequacy problem: Assessing dynamic effects of capacity remuneration mechanisms. Energy Policy 91, p113–127

⁹ For the situation where a strategic reserve mechanism is implemented, two types of margin are depicted. The orange one, the energy market margin, considers only capacity available on the energy market, i.e. plants that sell electricity on this market and whose revenues are driven by the energy price only. The red curve, the total system margin, considers in addition the actions of the TSO which can contract some strategic reserves to avoid shortages. Contracted plants will then be removed from the energy market (they cannot sell energy on this market anymore) and will produce only as a last resort in case of likely shortages. As a result, these reserves help the system to have a sufficient margin to deal with peak consumption. For the energy-only market and the capacity market, since all available plants can participate to the energy market, both aforementioned margins are exactly the same.

to give incentives to invest, like in the energy-only market. Therefore, it leads to the same consequences (i.e. cyclical behavior and a mean margin well below the 15% target, which can be noticed with the orange line on figure 2). The TSO is however able to react as a last resort by contracting old generators in strategic reserves to avoid shortages (the action of reserved capacity can be noticed through the difference between the orange and red lines). Thus, phases of undercapacity are reduced compared to the energy-only market, but in a less effective way than the capacity market since the total system margin is not always equal to the 15% target margin. Moreover, when focusing on the overinvestment phases, the strategic reserve mechanism does not perform any better than the energy-only market (e.g. in year 20). Overinvestments are still likely to happen if investors expect large profits. Indeed, there is no signal to avoid this and the TSO cannot force players to postpone their investments within this mechanisms.

Based on these simulation results, both CRMs succeed in reducing the cyclical tendencies which appear in the energy-only market, in particular regarding the underinvestment issues. However, the capacity market appears to experience fewer shortages and, at the same time, to present lower total generation costs (since over investment phases are reduced) than the strategic reserve mechanism, i.e. the benefits are higher with a capacity market. These differences are explained by the key role of the capacity price to coordinate investments, reduce investments risks and lessen the herd behavior.

These results have direct implications for policy-makers when they decide which CRM to implement. Regarding the case studied above, implementing a capacity market will result in a higher profit. At the opposite, the European Commission recommended in 2013¹⁰ the implementation of a strategic reserve mechanism which it assesses as less distortionary for the energy market and easier to implement. These different conclusions about the performances of CRMs are reflected in the choice of different types of CRMs in Europe in the past few years. For instance, France, Great Britain and Italy have implemented or are implementing mechanisms that are closed to a capacity market. On the opposite, Belgium and Germany have chosen a solution based on strategic reserves. However, the recent implementation of these CRMs does not enable to draw conclusions regarding their impact on investment cycles. More generally, this recent implementation of diverse CRMs in Europe highlights the risk of increasing differences of market design between Member States in Europe, which may threaten the creation of a single power market. The question of the participation of foreign plants to CRMs is also currently debated in Europe. The regulation of such new mechanisms is then at the heart of policy discussions, as it can be noticed through the extensive work of the European Commission regarding this question and in particular the impacts of CRMs on the EU Single Market.

By coordinating investments through the capacity price, the capacity market lessens investments risk and the herd behavior and then reduces the investment cycles : this CRM then results in a higher benefit than the strategic reserve mechanism.

¹⁰ https://ec.europa.eu/energy/sites/ener/files/documents/com_2013_public_intervention_swd01_en.pdf

2 - A place for closed distribution networks in Europe ?

In 2009, the European Union's directive 2009/72/CE reorganised the common rules for the electricity internal market and reinforced the unbundling obligations between regulated activities (transmission and distribution) and competitive activities (generation, retail) in the electricity sector. At the same time, through article 28, the European Commission introduced a new function within the power value chain with the Closed Distribution System (CDS). This introduction was meant to cope with the fact that the idealistic structure Generation/Transmission/Distribution/Supply did not fully exist in practice, as many historical or de facto exemptions could not enter into that frame, and that other types of networks closed to distribution existed. The CDS, in particular, was partly designed to address the case of former sites which belonged to a single final customer but are now divided into several slots (like in a plant, a train station or an airport). Through its directive, the EC encouraged the Member States to recognize the right of these sites' electrical systems to be operated independently of the distribution system operators (DSO).

However, the current market rules are now proven inefficient themselves and need to be adjusted. Decentralized production is increasing while smart grids, storage and proactive demand more and more challenge the roles of historical market players, thus calling for a new change in paradigm. In particular, the centralized model of distribution is confronted by numerous new cases of small, semi-autonomous distribution-like systems. Here again, the existing rules prove insufficient as the existing notion of CDS could not englobe the variety of new exemptions and could not address the rise in decentralised generation, smart-grids and self-consumption. Should the rules be again adapted in order to enable energy transition?

This article intends to describe the development of these new distribution systems in Europe, by looking at their drivers, their benefits and their costs, and the attempts at framing by the Member States and the Commission. It will also try to assess whether these installations are the key to decentralisation and energy transition. To distinguish from the restricted notion of CDS, linked to the definition in EU directive 2009/72, the notion of Closed Distribution Network (CDN) will be preferred hereafter. It intends to englobe all cases of electricity system which

distribute electricity to several final customers (and potentially withdraw energy from some local producers) but lack the criteria (technical and regulatory obligations) which define official distribution systems¹¹.

What are the motivation to develop a closed distribution network (CDN)?

CDNs tend to develop (or subsist) because they bring substantial cost reduction prospects to their customers, especially in a case of decentralized electricity production. In some cases, it is indeed cheaper to connect someone indirectly through another's electrical installation than to draw a completely new line from the distribution grid. This is the case for mountains resorts or for new facilities within former single-customer sites like airports, train stations or factories. Another major benefit brought by CDNs is the convenience in terms of modularity and flexibility for the connected customers. Indeed, CDNs are often faster and more flexible to offer solution of power consumption aggregation and meter modularity, which are valued in particular by businesses in a commercial centre or a multi-occupant building. Modularity enables them to aggregate their consumption on all their floors while saving costs on metering.

By gathering within a CDN, network users can benefit from more favourable distribution tariff conditions. For example, the aggregation of their consumption and capacity enables them to pass some thresholds and to gain access to cheaper distribution tariffs (those who subscribe to a higher power can benefit from lower unit tariffs). These effects are contrary to the intention of the regulations and tariff methodologies, and they do not constitute benefits for society as a whole: indeed, what private customers gain will be considered as lost revenue for suppliers and DSOs, which will then increase their tariffs in reaction.

Can CDN favour energy transition?

CDNs have seen a surge over the last decade with the emergence of information and communication technologies (ITC) and new stakes related to the energy transition: EVs, RES, storage, smart grids ...

In the particular case of electric vehicles (EV), CDNs correspond to a bundle of EV charging points (either on a street or in a private parking

The idealistic structure Generation/Transmission/Distribution/Supply did not fully exist in practice, as other types of networks closed to distribution existed.

In particular, the centralized model of distribution is confronted by numerous new cases of small, semi-autonomous distribution-like systems.

Should the rules be again adapted in order to enable energy transition?

CDNs tend to develop (or subsist) because they bring substantial cost reduction prospects to their customers.

What private customers gain will be considered as lost revenue for suppliers and DSOs, which will then increase their tariffs in reaction.

¹¹ Direct lines between two consumers as well as microgrids, which can disconnect from the main grid and are partly autonomous, are some types of CDN. However, the definition should be as large as possible as an official delimitation of CDN or distribution perimeters does not exist.

lot) and are seen as a way for aggregators and new business ventures to provide a bundled offer of services, from car park to electricity distribution to data processing. The new system operators could also constitute market platforms to value their EV fleet for flexibility and for energy storage. However, this raises new issues waiting to be solved. For example, the development of EVs could fundamentally change the scale of electric charging and could require much more control and optimization of EV's charges and discharges at the distribution and transmission levels. What distribution and transmission system operators try to anticipate is the risk of a scenario where every car gets charged at the same time, generating significant (though short) local and global demand peaks. The solution to mitigate this risk necessarily involves a strong coordination between all stakeholders, and in particular the interaction between EV platform operators and the rest of the value chain. Another pending issue is electricity roaming: are regulators interested in a situation where each EV driver, wherever she connects her vehicle, can directly be charged through her normal supplier? Is it financially and economically interesting to ensure third party access to EV charging platforms?

The development of eco-neighbourhoods and green buildings is also strongly related to that of CDNs. These sites are indeed characterised by problematics and principles which are well aligned with a functioning in closed network. As for EVs, their business model is oriented toward a global aggregating approach, where all flows (electricity, gas, transport) and services are coordinated and optimized by a single party. Developing and managing the local electricity grids appears as a logical extension of this business model. Above all, CDNs make it easier for green buildings and neighbourhoods to optimize their self-consumption and storage features: through CDNs, locally produced or stored electricity can be shared between local customers with more flexibility and less constraints. The related benefit is called green value: it is defined as the perspective of future profits for the occupants and the tenants (higher land value, higher occupancy rate...). Self-consumption through CDN can also enable customers to benefit from more intense windfall effects: thus, the share of consumption supplied by local production might be exempted from network grid fees at the distribution and transmission levels, as well as other taxes and contributions based

on the metered consumption. Consequently, CDN could be relevant in the context of energy transition.

Are CDNs truly beneficial?

As has already been partly explained with the existence of windfall profits and the need for more coordination, the benefits of a CDN are outweighed by a series of costs and risks at all levels of the power value chain.

Firstly, the consumer connected to the CDN faces new types of costs which are due to the non-respect by the closed network of the obligations of an official distribution system. Hence, there might be issues in terms of reliability and security which might lower the life expectancy of the CDN and could justify a quick takeover of the site by the DSO. More globally, the consumers cannot rely on the DSO as a trusted third party for their issues in terms of connection, metering or supply. Meanwhile, closed distribution networks often prevent their users to choose their electricity suppliers. The loss of access to the retail market can lead to an additional cost for the CDN user, when the supply conditions within the CDN are less favourable.

Secondly, the existence of uncoordinated CDNs beside the main distribution systems might lead to higher costs of network operation and investment. This is due to the limited transparency and sharing of information between the upstream and downstream network levels as well as a local optimization which is not aligned with the general power system optimization criteria. For example, a locally optimized management of peak and off-peak periods could not coincide with nationally set schedules. Besides, the existence of several distribution networks could reduce the pool of economies of scale or scope which the distribution monopoly theoretically brings.

Thirdly, the windfall profits already identified above constitute costs for the other stakeholders of the value chain. The aggregation of consumption and capacity as well as the ability to self-consume enables the CDN users to save on grid fees and taxes, which will need to be compensated by increasing the fees and taxes for the rest of national consumers. Indeed, the tariffs and taxes normally constitute authorized budgets fixed by regulators and which should be paid unconditionally to system operators, renewable energy investors ... As

Above all, CDNs make it easier for green buildings and neighbourhoods to optimize their self-consumption and storage features.

The loss of access to the retail market can lead to an additional cost for the CDN user, when the supply conditions within the CDN are less favourable.

The existence of several distribution networks could reduce the pool of economies of scale or scope which the distribution monopoly theoretically brings.

The windfall profits might lead to a more and more unstable balance of the power system.

a result, the windfall profits might lead to a more and more unstable balance of the power system, where the use of the power system costs more and more for the remaining users. Eventually, this is likely to lead to even higher incentives to form CDNs and to unsustainable distribution and transmission networks.

The slow regulatory response throughout Europe

The new surge in CDNs over the past decade has led to a steep increase of litigations and regulatory actions to better frame and control them. The starting point of a rationalized framework for CDN was the Citiworks ruling by the European Court of Justice (ECJ) in May 2008. The case opposed the Leipzig airport in Germany to an electricity supplier. The airport was a typical case of CDN, where the former single customer was now constituted of several final ones (airport authorities, air companies, commercial...), and where the owner benefited under German law of an exemption from third party access. The exemption was attacked by another energy supplier wanting to sign contracts with a customer within the airport. The ECJ eventually ruled that the network within the airport was considered as a distribution network and that German law could not exempt it from third party obligation. The judgment drove a progressive evolution of European jurisprudence which favoured the emergence of new CDNs, which considered they now had a legal basis to exist and develop. In 2009, directive 2009/72/CE went further into the acknowledgment of these systems. It set the possibility for Member States to qualify and authorize official 'Closed Distribution Systems'. These are defined as systems which distribute electricity 'within a geographically confined industrial, commercial or shared services site and [do] not [...] supply household customers'. They must comply with the following list of criteria:

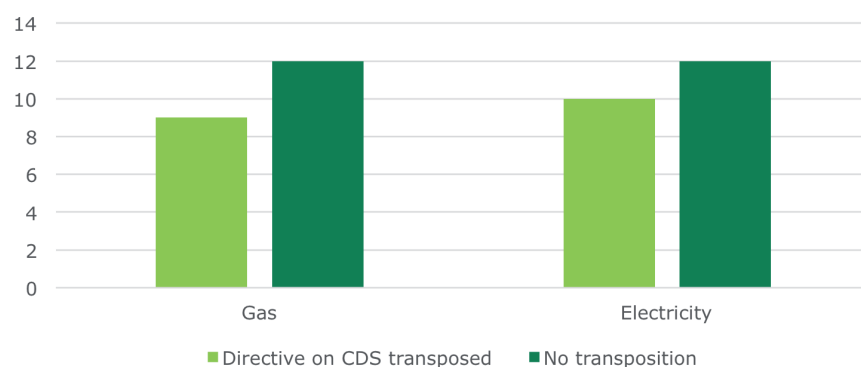
- *for specific technical or safety reasons, the operations or the production process of the users of that system are integrated; or*
- *that system distributes electricity primarily to the owner or operator of the system or their related undertakings'.*

The Closed Distribution Systems as meant in the EU directive can be exempted from several obligations, in particular the requirements regarding the procurement of the energy it uses to cover energy losses and of reserve capacity, as well as the need for their tariffs to be approved ex-ante.

Yet, the definition of CDN under directive 2009/72 is rather restricted. It does not encompass all the possible cases of private networks, and excludes in particular the development of eco-neighbourhoods or new multi-company office buildings. Furthermore, as highlighted by CEER¹² in 2013, the directive has been poorly implemented by Member States. Up to 2013, only half of the EU28 seemed to have transposed the directive (see next figure), and France, a country where several disputes and litigation procedures took place around the notion of private networks, only transposed it in 2016 in its *Loi pour la Transition Énergétique et la Croissance Verte*. Meanwhile, several countries have created status for a more global definition of CDN (e.g., in Belgium, Italy, Portugal and the UK) but the private networks are then strictly controlled. For example, the UK enforces third party access, while the Walloon region in Belgium ensures that windfall profits on network tariffs are neutralized. Interestingly, this region also creates a specific Private Network status that it immediately bans: it provides specific rules for their reintegration within the main distribution perimeters.

The surge in CDNs over the past decade has led to a steep increase of litigations and regulatory actions to better frame and control them.

Survey realised by CEER in 2013: Were articles introducing Closed Distribution Systems in gas (Article 28 Directive 2009/73/EC) and electricity (Article 28 Directive 2009/72/EC) transposed into national law in your country?



As a result, the European delimitation of what constitutes a legal closed distribution network is still floating, and the EU directive has only been partly transposed across Europe. The grey area under which CDNs can develop and operate remains thus very significant and could potentially hinder the trend toward decentralisation, self-consumption and smart grids. However, one should look closely at the impact of CDNs on the grids and their customers and at the possible alternatives before any new change in national or EU laws.

The grey area under which CDNs can develop and operate remains thus very significant.

12 Source: CEER, 2013. Status Review on the Transposition of Unbundling Requirements for DSOs and Closed Distribution System Operators

Policy and Regulation Radar

This section summarizes the key changes respectively in the EU or in the country regulation that may significantly affect the power and utilities companies.

What is changing in the EU regulation?

Informal Energy Council in Tallinn

| Key features | Insights |
|---|--|
| <p>On 20th September 2017, an informal meeting of EU energy ministers took place in Tallinn (Estonia). At this meeting, EU ministers discussed on the proposals to redesign Europe's electricity markets. The discussions focused on following key aspects:</p> <ul style="list-style-type: none"> • The role of consumers: Broad support was shown for a legal framework that enables consumers to become active participants in energy markets. This framework will enable them to reap the benefits of the energy transition and technological developments by bringing down costs, combatting energy poverty, and making it easier to switch suppliers. • Regional cooperation: Large support was exposed for enhanced cross-border cooperation to improve security of supply. • Capacity mechanisms: They are used to subsidize back-up power capacity to avert blackouts and guarantee supply during periods of peak demand. The Commission's proposal aims to set a cap of 550 grams of carbon dioxide per kilowatt-hour for new power stations which want participate in capacity mechanism. | <p>One of the key elements in achieving the Energy Union is the new design of the electricity market. The aim of the informal energy ministers' meeting was to have comprehensive discussions on the key issues of the negotiations and to facilitate the progress of negotiations.</p> <p>It was stressed that the Commission's electricity market package can provide real European added value if the EU's 2030 energy and climate targets are achieved: a 1 per cent increase in GDP, up to €177bn injected into the European economy and as many as 900,000 jobs created.</p> <p>Participants also welcomed the "Tallinn E-electricity declaration" signed on 19th September, which will harness the benefits of digitalization to drive the energy transition. This document, signed by governments and industry associations, aims to enhance cooperation between the public sector and companies to make sure consumers can find the best prices and service providers via smart digital solutions.</p> <p>The participants also joined EU transport ministers to discuss developing transport and energy infrastructure for 2020 and beyond with the help of the Connecting Europe Facility, which provides investment at a European level. They focused on how this investment is making possible the Energy Union, the EU's plan to provide Europe with secure, affordable and clean energy, and the Single European Transport Area, which will link different means of transport across the EU.</p> |
| <p>Next steps</p> <p>Next Energy Council is planned for December 2017.</p> | |

[Link: Informal Energy Council](#)

Key consultations from EU

| What is discussed? | Insights | Link |
|--|---|---|
| <p>"Consultation on priorities for the Electricity and Gas Network Codes and Guidelines for 2018 based on Article 6(1) of Regulation (EC) No 714/2009 and Regulation (EC) No 715/2009"</p> | <p>EU seeks to collect views on the priorities for the development of network codes and guidelines for 2018 and beyond. The European Commission has to establish in accordance with Article 6(1) of Regulation (EC) No. 714/2009 ("the Electricity Regulation") and Article 6(1) of Regulation (EC) No. 715/2009 ("the Gas Regulation") an annual priority list identifying the areas to be included in the development of network codes. Closing date: December 15th.</p> | <p>Link to the consultation</p> |

Country reporting on changes in the Policy and Regulation framework

| United Kingdom | | | |
|---|---|--|--|
| Topic | Key features | Insights | Next Steps |
| Next-day switching as the industry standard | <ul style="list-style-type: none"> Ofgem (the regulator) has developed a preferred reform package (RP2a) which involves next-day switching using a new centralized switching service (CSS). Ofgem also proposed a regulatory requirement on suppliers to switch customers within five working days of a contract being entered into. | <ul style="list-style-type: none"> The regulation is aimed to encourage competition among energy suppliers, who may be forced to increase quality of service and decrease household bills to maintain market share. However, despite multiple initiatives current switching rates are lower than expected, which casts some uncertainty on the effectiveness of this regulation in increasing competitive pressure and lowering prices. The regulation could also increase costs for energy suppliers including costs to revamp the relevant systems and to develop the new CSS. | Currently open to consultation until 3 November 2017. Decision to be made in early 2018. |
| Legal separation of systems operator and transmission owner roles within National Grid | <ul style="list-style-type: none"> Ofgem has confirmed that National Grid (NG) should set up a new legally separate company to carry out its electricity system operator (ESO) function within National Grid plc. The ESO is responsible for planning and operating the electricity system, including making independent decisions on developing the transmission network. The ESO will have its own licence, and separate staff and offices to other NG subsidiaries. In addition, the ESO's board members will not sit on NG Group board nor other NG electricity company boards. | <ul style="list-style-type: none"> The regulation addresses perceived conflict of interest between NG's ESO functions and other business interests, given the ESO's expanded role in developing the transmission network following the Electricity Market Reform (EMR). This separation may present new opportunities as the ESO is expected to support the introduction of competition for onshore transmission assets. | The ESO is expected to be fully operational by April 2019. |
| Tougher price controls for electricity and gas from 2021 | <ul style="list-style-type: none"> In July 2017, Ofgem has warned investors to prepare for lower returns starting 2021 with tougher price controls set in place. Consumer welfare and evidence on lower cost of capital for network investments were cited as the main reasons for the tougher price control. Price controls are currently in the form of RIIO (Revenue equals incentive plus investment and output) which combines incentives and Regulated Asset Base type regulation and for gas transmission, gas distribution, electricity transmission and electricity distribution. The current transmission price controls and gas distribution tariff is due to expire in 2021, while the electricity distribution tariff runs until 2023. However, Ofgem has also proposed a mid-period review for the electricity distribution tariff (RIIO-ED1) which will take place in 2019. | <ul style="list-style-type: none"> Lower regulated tariffs reduce profitability of energy companies for a given level of efficiency. The tougher price controls reflect an adjustment in Ofgem's expectations, which believes that investors may be willing to accept lower returns due to market conditions. Since the current price control, the performance of energy network companies has been towards the higher end of Ofgem's expectations. Given that the next price control will take into account the current level of efficiency achieved by energy companies, this creates opportunity for energy companies which are more efficient and vice versa. | The proposed structure of framework for the new price controls will be published in Q1 2018 while the final framework decision will be published in Q2 2018. |

Country reporting on changes in the Policy and Regulation framework

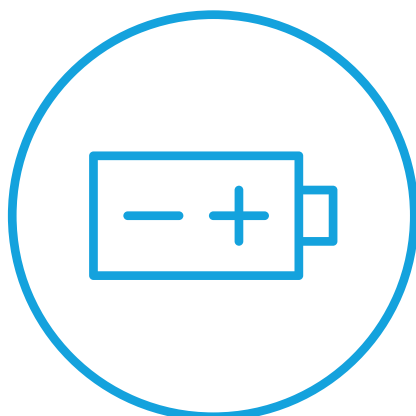
| United Kingdom | | | |
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| Topic | Key features | Insights | Next Steps |
| Reductions in electricity distribution network operator price allowances | <ul style="list-style-type: none"> Ofgem has confirmed the cut in price control allowances of £200m across several electricity distribution network operators (DNOs). This is to reflect significantly lower than expected electricity demand in the previous price control period (2010-2015), as well as lower than expected grid maintenance costs and canceled investment projects by some DNOs. | <ul style="list-style-type: none"> The reduction in allowances will result in lower revenues for affected DNOs, as well as lower end user electricity prices. This is unlikely to materially affect investor confidence since the decision is part of the regulatory framework for this sector. | The final adjustment and determination of allowed DNO revenues will be made in November 2017. |
| Ofgem's strategy for future regulation | <ul style="list-style-type: none"> Ofgem published its vision for future regulation which account for the transition to low carbon energy sources, intermittent generation and new technologies. The key message is the need for the new RIIO-2 framework to incentivize investment whilst protecting consumers. The regulatory proposals considered include: <ul style="list-style-type: none"> - Potential introduction of sharper imbalance prices through the Electricity Balancing Significant Code Review; - Assessment of whether more balancing responsibility can be put to market to reduce the system operator's role; - Improvement of the efficiency of the system operator's procurement of balancing services through Capacity Market reforms; and - Review of signals for network charges which is expected to start this autumn. | <ul style="list-style-type: none"> This publication signals the direction of future regulation and should reduce uncertainty over medium to long-term regulation. Regulatory stability is crucial to provide a stable environment for companies to invest and innovate their business models. This is especially true given investments in technology and low carbon sources are unlikely to be recovered in the short term. The proposals to improve the system operator's efficiency are likely to obligate investments which may adversely impact cash flow. There is likely to be market opportunities for providers of flexibility and new forms of flexible generation and interconnectors. | Future regulation, including RIIO-2, are indicated to be based on this strategy. |

Country reporting on changes in the Policy and Regulation framework

| Spain | | | |
|---|--|---|--|
| Topic | Key features | Insights | Next Steps |
| Consultation on the new climate change and energy transition law | <ul style="list-style-type: none"> Last July, the Spanish government opened a consultation process on a new climate change and energy transition law. The government's objective is to have the maximum participation of all agents and sectors before drafting the law. This new regulation will help Spain to comply with the EU's 2030 energy and climate targets and with the Paris Agreement. In addition, a Committee of Experts has been created in order to elaborate a report about the different scenarios in energy transition and different alternatives in energy policy considering the environmental and economic impact. | <ul style="list-style-type: none"> The future law should be draft based on the results of the consultation. The objectives of the Spanish government are that the future law should <ul style="list-style-type: none"> - Facilitate the fulfilment of international obligations for Spain about climate change and contribute to the economic development and well-being of all citizens. - Promote the actions with greater capacity to achieve commitments at the lowest possible cost. - Establish the principles that will guide the actions of public authorities and the society as a whole affecting all sectors: society, economy and institutions. It should promote economic activity, competitiveness and employment in Spain and ensure the financial sustainability of the energy system. - Include quantitative targets: <ul style="list-style-type: none"> - A decarbonization path to 2050 with a quantified target for Spain: to reduce greenhouse gas emissions by 80% to 95% compared to 1990. - EU's 2030 energy and climate targets for Spain. | <p>The consultation will be open until October 10th.</p> <p>The Committee of Experts should finish the report in six months.</p> <p>Detailed measures are awaited.</p> |
| Closure of the "Santa María de Garoña" nuclear power plant | <ul style="list-style-type: none"> Last August, the Spanish government rejected the request of renewal of the operating permit for the Santa María de Garoña nuclear power plant. The plant is owned by Nuclenor (50% Endesa and 50% Iberdrola) and it came into operation in 1970. | <ul style="list-style-type: none"> This nuclear power plant has a production capacity of 466 Mw (the lowest capacity of all Spanish nuclear plants). In addition, the plant has been in a provisional shut down since December 2012 due to economic reasons. Thus, the definitive closure won't have significant effects on the Spanish electricity system. The decommissioning will be performed by ENRESA (the Spanish radioactive waste management agency). ENRESA estimates that the decommissioning process will start 6 years after the definitive closure, and it will go on for 10 years. | <p>Decisions regarding the continuity of the other nuclear power plants that currently have operating permit will be taken considering the future Spanish Energy and Climate Comprehensive Plan (expected for 2018).</p> |

Country reporting on changes in the Policy and Regulation framework

| France | | | |
|---|---|---|---|
| Topic | Key features | Insights | Next Steps |
| Regulated gas sales tariffs in France | <ul style="list-style-type: none"> The Council of State issued a sentence in July 2017 to remove regulated sales tariffs for natural gas in B to C. It argues that regulated tariffs is contrary to European Union law. | <ul style="list-style-type: none"> In 2016, 49 % of B to C gas sales are invoiced on the basis of regulated tariffs. As an exceptional measure, the Council of State ruled that the past effects of the decree are final and permanent, and consumers cannot ask for a retroactive application. In its decision, the Council made a distinction between gas and electricity in accordance with French Energy Code, stating that electricity is an 'essential product' that must be supplied 'over the whole national territory'. In 2016, 86 % of B to C electricity sales are invoiced on the basis of regulated tariffs. | Regulated tariff should remained applicable only for electricity. |
| Energy savings certificates: fourth period (2018-2020) | <ul style="list-style-type: none"> The decree substantially increased the overall level of obligations for the three-year period from January 2018 to December 2020: 1,200TWhc for the "standard" obligations and 400TWhc for the obligations that are to benefit households in situations of energy poverty, compared to 700TWhc and 150TWhc respectively for the previous period. | <ul style="list-style-type: none"> Energy sellers may fulfil their obligation in three ways: <ul style="list-style-type: none"> - by supporting customers in their energy efficiency operations, - by funding ministry-approved energy savings certificate schemes, and - by purchasing certificates from eligible actors. Any surplus of certificates gained in the previous period also contributes to fulfilment of the obligation. If there is a shortfall at the end of the period, energies sellers must pay a penalty of €15 per MWhc of shortfall laid representing approximately five times the current cost of the standard obligation. | Companies are exposed to shortfall as result of the strong increase in obligations combined with the lack of liquidity in the energy savings certificates market |



Country reporting on changes in the Policy and Regulation framework

| Germany | | | |
|--|---|--|--|
| Topic | Key features | Insights | Next Steps |
| New Decisions on reserve energy | <ul style="list-style-type: none"> The German transmission system operators (TSOs) have to maintain the balance between electricity generation and consumption. For the performance of this task, the TSOs need different types of reserve energy (primary control reserve, secondary control reserve as well as minute reserve). These types differ according to the principle of activation and their activation speed. TSOs auction reserve energy according to their projected needs. Power plant operators and consumers having flexible loads offer in the auction their available capacity. Now, the Federal Network Agency (Bundesnetzagentur) has issued three decisions on reserve energy: <ul style="list-style-type: none"> - Minute and secondary reserve: Terms and conditions of auctioning procedure and publication duties; in particular, the auctioning now starts 7 days prior to delivery and every day is split into 6 time slots. The minimum capacity to bid is 5 MW. - Delivery of reserve energy (minute and secondary) by consumers: Terms and conditions for the power supply agreements between relevant end consumer offering reserve energy and their supplier are regulated. It relates to the rights and obligations, when the end consumer uses the balancing group of the supplier and how the delivery of reserve energy is carried out (i.a. data exchange). | <ul style="list-style-type: none"> The new regulations are clarifications (reserve energy offered by end consumers) and modifications of the legal framework facilitating measures to grant system stability. It is an opportunity for utilities' energy services, when offering to aggregate end consumer's capacity, because the conditions are now much easier to fulfill. It is also an optimization opportunity for end consumers to gain money by offering needed flexibility. Moreover, power plant operators of smaller plants are now also entitled to participate in further revenues by offering reserve energy, because the minimum capacity to be offered has been lowered. In general, these mechanisms are a central part of the "Energiewende" and reflect the applying EU network code (EU COM Regulation (EU) 2016/1388). It is expected that due to smart meter roll-out the use of flexibilities of end consumers will play an important role and be thus subject to further mechanisms. | <p>The decisions on minute and secondary reserve energy will be effective from 12 July 2018.</p> <p>The decision on power supply contracts with end consumers offering reserve energy will apply as from 1 January 2018.</p> |



Snapshot on surveys and publications

Deloitte

Corporate Procurement Rivals Policy in Driving Growth of Renewable Energy: Five Strategies to Meet Their Unique Needs - 2017

This report explores corporate demand for renewables and the emerging opportunity with small and medium-sized businesses. It examines their unique challenges, resources, and priorities and outlines specific ways that utilities, developers, and providers can target this next wave of renewable energy customers.

[Link to the survey](#)

Agencies or research institutes

International Energy Agency

Global EV Outlook 2017 – 2017

The Global EV Outlook 2017 provides insights on recent EV technology, market, and policy developments. It provides detailed information for the past five to ten years on EV registrations (vehicle sales), number of EVs on the road, and modal coverage across the most relevant global vehicle markets.

[Link to the survey](#)

World Energy Investment 2017 - Executive Summary – 2017

It provides a critical foundation for decision making by governments, the energy industry and financial institutions. With analysis of the past year's developments across all fuels and all energy technologies, the report reveals the critical issues confronting energy markets and features the emerging themes.

[Link to the survey](#)

Electricity Information: Overview – 2017

The paper includes detailed electricity and heat supply by sources and demand balances by country and by product for OECD up to 2015, with provisional data for 2016. It also contains a summary of the most recent trends in electricity production, trade and consumption.

[Link to the survey](#)

European Commission

Environmental baseline study for the development of renewable energy sources, energy storages and a meshed electricity grid in the Irish and North Seas – August 2017

This study sets out the effects (positive and negative) of future energy and grid scenarios up to 2030. The future energy and grid scenarios have been developed as a complementary part of the study in the form of a Regional Concept Report.

[Link to the survey](#)

Design of flexibility portfolios at Member State level to facilitate a cost-efficient integration of high shares of renewable electricity – August 2017

This study aims to measure the flexibility needs arising from a higher penetration of variable renewable electricity, and to identify and select options for increasing the flexibility of the electricity system.

[Link to the survey](#)

The macro-level and sectoral impacts of energy efficiency policies – July 2017

This study follows IEA's authoritative work 'Capturing the multiple benefits of energy efficiency'. It attempts to apply this framework to make a comprehensive quantitative assessment of such multiple benefits. It shows the economic impact of an energy efficiency in Europe beyond a 27% target in 2030.

[Link to the survey](#)

Modelling study contributing to the Impact Assessment of the European Commission of the Electricity Market Design Initiative – July 2017

This report covers the Impact Assessment of the Market Design Initiative. The first part focuses on electricity market and evaluates a number of policy options. The second part examines the behaviour of investors and assesses the ability of markets to sustain adequate levels of investments in future years.

[Link to the survey](#)

Eurelectric

Demand Response Activation by Independent Aggregators As Proposed in the Draft Electricity Directive – August 2017

This analysis shows that the insufficient compensation of what we call the bulk energy and imbalance issues is likely to result in compromising two important criteria of power market functioning: compatibility with principles in the power system and power market and economic efficiency

[Link to the survey](#)

BREXIT: Maintaining free and fair trade of electricity and gas in Europe – June 2017

This report shows how it is important to keep in mind the impact of Brexit on the following areas: the Internal Electricity Market (IEM); SEM, the EU energy and climate frameworks; the EU Emissions trading Scheme (ETS), the Euratom Treaty and Community; trading (hedging).

[Link to the survey](#)

A Bright Future for Europe, The value of electricity in decarbonizing the European Union – July 2017

This report proposes the progressive electrification of final energy demand in Europe by 2050. The value proposition of electricity in European societies today is magnified by the fact that other sectors can benefit from the European electricity sector's trajectory towards carbon neutrality.

[Link to the survey](#)

Oxford institute for Energy

Brexit's Impact on Energy Markets: Brexit and Security of Supply for the UK and Ireland – September 2017

This paper provides an arena to mobilize WBS (Warwick), OIES (Oxford) and UKERC research capacity to consider the impact of Brexit upon future UK gas security.

[Link to the survey](#)

Fiscal policy for decarbonisation of energy in Europe – September 2017

This report calls attention on especially transport and buildings, which together account for about 60% of energy-related carbon emissions in the EU. Consumers will be active participants and at the center of this energy transition.

[Link to the survey](#)

Methane Emissions: from blind spot to spotlight – July 2017

This paper argues that the environmental impact of methane emissions has received growing attention. Methane emissions that occur across the gas supply chain have long been seen by the industry as an unfortunate, if necessary, part of doing business.

[Link to the survey](#)

Biogas: A significant contribution to decarbonising gas markets? – June 2017

With a current focus on the need to decarbonise the energy system, and increasing interest in decarbonising the gas industry, this short paper provides an overview of the current status and considers the potential for further growth in the production and use of biogas and biomethane.

[Link to the survey](#)

The Significance of the US Withdrawal from the Paris Agreement on Climate Change – June 2017

This comment discusses the significance of the US Withdrawal from the Paris Agreement on Climate Change. Although it is too early to predict the long-term implications for climate change of the US decision to withdraw from the Paris Agreement, arguing that the decision is unlikely to have a major impact.

[Link to the survey](#)

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