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Newsletter Power & Utilities in Europe May 2019

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Commodities



Source Capital IQ

Oil markets saw a marked upturn throughout the first quarter of 2019 on the back of shifting supply and demand fundamentals. Both the spot Brent and WTI benchmarks rose by approximately US\$9 since the December 2018 low point, with Brent crude leading the rally. Nonetheless, the price of crude remains below the average seen throughout 2018.

On the supply side, **compliant OPEC members vowed to reduce the levels of supply** in the oil markets at the turn of the year. The cuts were led by the largest producer in OPEC, Saudi Arabia, which produced 9.8 million bpd in March 2019, down from 10.6 million bpd in December 2018. Reflecting lower production, OECD petroleum inventories fell below the five-year average.

Furthermore, falling oil exports were recorded in both sanction-hit Iran and Venezuela. In particular, **Venezuelan supply deteriorated following lengthy power cuts** across the country throughout March 2019. According to estimates, exports fell below 650 thousand bpd during the blackouts, well below previous highs of over 3 million bpd seen previously.

In terms of demand, **concerns about a potential slowing of global economic growth subsided** towards the end of first quarter 2019, owing to reports of stronger manufacturing growth in the U.S. and China and the likelihood of no interest rate rises for the rest of the year by the U.S. Federal Reserve. These factors, alongside reduced fears of escalation in the U.S.-China trade war, supported a stronger picture for global economic growth and reduced concerns of falling oil demand.



The first quarter of 2019 saw a sharp reduction in the price of natural gas in Europe, with both spot NBP and TTF falling to their lowest respective points in over a year-and-a-half. The fall in Q1 was particularly pronounced for NBP, which fell by 39 per cent since December 2018 to \leq 15.6/MWh in March.

A move away from set LNG contracts with fixed destinations towards looser restrictions has increased active trading of the commodity, thereby leading to greater liquidity in the global natural gas market. This, alongside a **mild Asian winter and nuclear-plant restarts in Japan**, meant that suppliers directed shipments of LNG towards Europe, leading to record high European gas stocks. The effect of **oversupply on the price of natural gas was further compounded by above average temperatures** in Western Europe and weaker economic growth resulted in reduced demand for natural gas.



Continuing the general trend recorded since October last year, coal prices fell further in the first quarter of 2019. In fact, the monthly average for the commodity in March 2019 was \$71.8 per metric tonne, the lowest recorded since September 2016. The **primary driver behind the fall was an oversupply of natural gas in Europe and unseasonably warm weather** which put downward pressure on the price of coal and other energy prices.

Meanwhile, declining consumption of coal was recorded in Q1 2019 across Europe. German industrial production fell throughout the quarter leading to concerns towards the health of the economy and its demand for coalderived electricity. Furthermore, Germany and the UK recorded **strongerthan-expected renewable energy generation**, thereby reducing dependence on coal-for-power generation.



Following a near two-fold increase in price throughout 2018, **European carbon prices fell during Q1 2019**, driven by weak natural gas prices alongside the bygone risk of increased selling activity by British industry in the event of a 'no deal' Brexit.

The threat of the UK dropping out of the EU and no longer using the EU's Emissions Trading Scheme (ETS) impacted carbon markets during the first quarter of 2019. This came after the UK minister for energy and clean growth announced the UK government's stance on the EU's Emission Trading System (ETS) in a Brexit 'no deal' scenario, which outlined the following:

- the UK would implement a new carbon tax of £16/mt;
- this would combine with the existing Carbon Price Support tax of £18/mt; and
- the UK's preferred position would be to launch a UK ETS which is linked to the European scheme.

This announcement contributed to concerns around the fact that the UK's exit from EU could leave a surplus of unallocated carbon allowances.

Meanwhile the **demand for carbon allowances in Germany deteriorated sharply** at the end of January 2019 as the nation's coal commission reached an agreement where additional coal-burning plants would be closed between 2019 to 2022.

The marked decline in the price of natural gas during the first quarter of 2019 also weighed on European carbon allowance prices. As natural gas prices decreased due oversupply and milder-than-normal temperatures across Europe, the incentive for energy suppliers to switch from coal to gas has increased. Gas-fired energy generation produces lower CO2 emissions than coal which has therefore led to a reduction in demand for carbon credits under the ETS.



In France, baseload electricity prices rose during January 2019, which was followed by over 40 per cent decline in February and March. A key factor behind the fall was an **increase in nuclear energy production** which saw a partial recovery from the 18-year low in January 2019. This increase in nuclear power generation was attributed to a reduction in personnel strikes and additional reactors being cleared to restart in the regulator ASN's Creusot review.

Baseload electricity prices in Italy during fell to an 11-month low at the end of the first quarter of 2019. **Temperatures approximately two to four degrees Celsius higher** than the seasonal average, particularly in the central and southern regions, contributed the decline during Q1.

The first quarter of 2019 saw a fall in baseload electricity prices in the UK. After prices stabilised at around €70/MWh for around three months, February and March 2019 saw a marked decrease. Falling natural gas prices and **high levels** of wind power generation were the key factors behind the decline.

In a trend similar to France, German power markets saw a steep fall in the first quarter of 2019. **Falling industrial production stoked fears of declining electricity demand**. In addition, Q1 wind energy production was more than double the previous forecast, further contributing to the decline in baseload prices.



The UK power spreads saw a divergence in the first quarter of 2019. Continuing the trend recorded since December 2018, **clean spark spreads were more profitable than clean dark spreads**. In addition, clean dark spreads fell into negative territory in January 2019 for the first time since August 2018, reaching a low of -£11.1/MWh in March. Clean spark spreads were at the lowest point in over three-and-a-half years at £2.4/MWh in February and March 2019.

The deteriorating clean dark spread indicated the falling competitiveness of power generation using coal in the UK in Q1. Despite weaker coal prices, natural gas prices have fallen to a greater extent which, alongside the cost of emitting CO2 remaining above the long-run trend thereby raising the costs associated with running operating coal-fired power stations, has led to fuel-switching amongst power generation in the UK. **The falling competitiveness of coal was compounded by falling baseload electricity prices** in response to unseasonably warm temperatures and rising levels of wind power generation.

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German Clean dark & spark spreads (€/MWh)



In Germany, both spark and dark spreads ended Q1 with negative margins due to a fall in baseload electricity prices. Despite negative margins, **dark spreads exhibited an upward trend in the first quarter**. This was due to falling carbon costs and coal prices. That said, in February 2019 the German government backed plans to decommission all of its coal-fired power plants by 2038 at the latest. Coal-burning power stations still account for over a third of Germany electricity production.

Following positive margins in December 2018 and January 2019, **natural gas** electricity production became loss-making during the remainder of the first quarter in 2019. This was in part due to **natural gas prices at the German hub** trading at a premium when compared to neighbouring countries thanks to a dependence on Norwegian-supplied natural gas. Germany lacks access to imported LNG which has been oversupplied in the first quarter of 2019, leading to falling prices at other European hubs. This, coupled with lower baseload prices, led to negative clean spark margins.



Spotlight on Power and Utilities market

Capital market overview

	Deloitte Index ⁽¹⁾	Enel	Iberdrola	EDF	ENGIE	Naturgy	EON	RWE	Centrica
Market cap. ratios									
Currency		EUR	EUR	EUR	EUR	EUR	EUR	EUR	GBP
Market cap. (March 19)		56 211	48 769	37 798	32 131	24 477	21 053	14 045	<mark>6 850</mark>
3m stock price performance	8%	12%	12%	-12%	6%	11%	11%	23%	-16 %
YoY stock price performance	13%	15%	31%	5%	-3%	28%	10%	19%	-18 %
Market multiples									
EV/EBITDA 2018	8.2x	8.0x	10.1x	9.3x	7.7x	11.3x	n/m (2)	n/m ⁽²⁾	4.5 x
EV/EBITDA 2019	7.1x	7.1x	9.1x	7.8x	6.8x	9.0x	n/m (2)	n/m (2)	5.2x
P/E 2018	10.5x	11.7x	16.2x	n.m.	31.1x	n.m.	n/m (2)	n/m (2)	n.m.
P/E 2019	12.3x	11.7x	15.3x	14.8x	12.5x	17.0x	n/m (2)	n/m (2)	12.5x
Price/book value 2018	1.4x	1.8x	1.3x	0.8x	0.9x	2.2x	n/m (2)	n/m (2)	2.2 x
Profitability ratios									
ROE forward 12m	9%	15%	8%	6 %	7%	13%	n/m (2)	n/m ⁽²⁾	17%
ROCE forward 12m	6%	10%	6%	5%	6%	9%	n/m (2)	n/m (2)	16%
EBITDA margin 2018	19%	21%	25%	20%	14%	15%	n/m (2)	n/m (2)	9%
EBITDA margin 2019	19%	22%	26%	23%	15%	19%	n/m (2)	n/m (2)	8%
EBIT margin 2018	11%	14%	15%	7%	8%	8%	n/m (2)	n/m (2)	5%
EBIT margin 2019	11%	14%	16%	10%	9%	12%	n/m (2)	n/m (2)	4%





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

(2) Due to the large asset swap between E.On and RWE, financials and multiples are irrelevant

Key messages from brokers and analysts

"European gas: we lowered our short-term price forecast but remain construtive long term" (Morgan Stanley – March 11, 2019)

"UK utilities: Retail churn data – still too early to see signs of change energing" (JP Morgan Cazenove – February 20, 2019)

"Baseload power price forward curve broadly flat since september whilst Q4 saw a weakening of commodity prices. Power price have held steady, pricing in tightness in the near term. Longer term outlook lowered due to a fall in commodity prices"

(JP Morgan Cazenove – January 30, 2019)

"The regulated utility spece has done well, especially over the past three months, as investors sought more defensive equity stories in the market"

(Morgan Stanley – January 28, 2019)

M&A Trends

Transactions involving Power & Utilities companies

Engie and Canada's Caisse de dépôts et placement du Quebec will buy a 90% stake in Petrobras gas transport unit Transportadora Associada de Gas in a \$8.6bn acquisition. Transaction is subject to clearance from Brazilian and European competition authorities. (Business News America – April 8, 2019)

Engie sold its 69.1% interest in Thai independent energy producer Glow Energy Public, to Global Power Synergy Public Company, a Thai state-owned energy company, for \$2.9bn. After this divestment, ENGIE will no longer have any coal assets in the Asia-Pacific region. (*Reuters* – March 14, 2019)

Total Eren, a renewable energy company, agreed to acquired NovEnergia Holding Company, a Southern-Europe energy actor, for a total deal value of **\$1.1bn** and total **renewable installed capacity** of **657MW**. The acquisition strengthens Total Eren's footprint in Europe. (*Financial Deals Tracker* – March 1, 2019)

NBT AS, a Norwegian renewable energy company, acquired 82% of the charter capital of **Azovinvestprom LLC** hosting the **750MW wind farm** project to be built in Zaporizhia region, Ukraine, at total cost of **\$1bn**. (*Interfax Russia & CIS Energy Daily* – February 18, 2019)

Iberdrola SA has closed the sale of its gas and hydro power plants in the UK, **Scottish Power Generation**, to **Drax Group PLC**, a British power generation company, in a **£702m** transaction. Scottish Power Generation portfolio consists in **2.6GM of hydro assets and gas-fired generation** plants in England and Scotland. (*SNL Generation Markets Week* – January 8, 2019)

Swiss utility companies **EOS Holding SA** and **Primeo Energie** (formerly EBM) have agreed to acquire 25.04% stake in **Alpiq Holding AG**, a Swiss utility company, from **Electricité de France** for **\$489m**. The transaction is set to close in first half 2019 and is subject to approval by German competition authorities. (*Reuters News* – April 5, 2019)

HMN Naturgas I/S, a Danish natural gas company owned by 57 Danish municipalities, divested its 100% ownership share in HMN GasNet P/S, a Danish natural gas distribution company, to Energinet, a state-owned company, for a total consideration of DKK1.8bn or approx. €240m. (*MHS Corporate Finance press release* – March 29, 2019)

Japanese **Mitsubishi Corporation** has bought 20% stake in **OVO Energy**, a British power supplier, for **GBP200m**. (*Reuters News* – February 14, 2019)

Elektroprivreda Republike Srpske (ERS), a Bosnian utility company, agreed to invest **€200m** in the construction and development of two hydropower plants on the **Drina river**, Bosnia, for a combined installed capacity of 95MW. (*Financial Deals Tracker* – January 26, 2019)

Ventient Energy Ltd, a generator of onshore wind energy, has acquired for an undisclosed amount 49% stake in a wind generation portfolio (total capacity of 998MW with 56 wind farms across Spain, France, Portugal and Belgium) from Vortex Energy Polska Sp, a renewable energy company backed by private equity fund EFG Hermes. (*Financial Deals Tracker* – March 16, 2019)

Transactions involving equity funds

Ørsted A/S, a Danish power company, agreed to sell a 50% interest in the 1,218 MW Hornsea 1 offshore wind farm in UK to Global Infrastructure Partners, an American independent infrastructure fund, for £4.46bn. (*SNL Energy M&A Review* - October 1, 2018)

Greencoat UK Wind plc, a listed renewable infrastructure fund, in partnership with a UK pension fund, has closed the acquisition of 49.9% stakes in the 228MW Stronelairg and the 94MW Dunmaglass wind farms from Scottish Energy Company SSE plc for a total deal value of \$585m. (*M&A Navigator* – March 29, 2019).

Ørsted A/S agreed to acquire **Deepwater Wind**, a company with potential generation capacity of approximately 3.3 GW from private equity firm **D.E. Shaw & Co. LP** for **\$510m** to create a leading U.S. offshore wind platform. (*SNL Energy M&A Review* - November 1, 2018)

A consortium comprising **Commerz Real**, **Ingka Group**, **wpd invest and KGAL Group**, have acquired 80% stake in **Veja Mate offshore wind farm** project in Germany from **Highland Group Holdings Limited**, **Siemens Financial Services GmbH**, and **Copenhagen Infrastructure**. Total capacity of the plant is 402MW and the deal value is **\$452m**. (*Financial Deals Tracker* – February 18, 2019)

Ofgem, the UK energy regulator, awarded Diamond Transmission Partners TSO to own and operate the high voltage transmission connection to the Galloper offshore wind farm in UK, representing a 353MW capacity, for £329m. (*Financial Deals Tracker* - November 24, 2018)

Tessenderlo Group NV, a Belgium industrial group, completed the acquisition of remaining 80% stake in T-Power N.V, a 425 MW gas-fired power plant in Belgium, from Siemens Project Ventures GmbH, Tokyo Gas Co., Ltd. and Itochu Corporation, for €313m. (*Financial Deals Tracker* - October 2, 2018)

Pensionskassernes Administration (PKA), a Danish pension service provider has acquired a 49% equity stake from **Canadian Solar Inc** in two solar parks in California totaling 530 MW of capacity for **\$306m**. (*Renewables Now* - October 25, 2018)

Macquarie Infrastructure and Real Assets, through is European infrastructure fund, has agreed to acquire Magma Energy Sweden A.B., an Icelandic geothermal operator, from Innergex Renewable Energy Inc. for a consideration of \$305m. (*Financial Deals Tracker* – March 27, 2019) British investment trust The **Renewables Infrastructure Group Ltd** agreed to acquire the 213MW **Jadraas wind farm** in Sweden from **Arise AB**, a wind power utility, and **Sydvastanvind AB**, a renewable focus investment fund, for approx. **€207m**. (*SNL Renewable Energy Weekly* – March 8, 2019)

Engie has agreed to sell some coal-fired power plants in the Netherlands and Germany (total capacity of 2,345 MW) to investment fund Riverstone Holdings LLC. The deal would cut Engie's net consolidated debt by around €200m. (*Reuters* – March 26, 2019)

Duet Private Equity, a private equity fund investing in emerging markets, acquires 100% of **Red Union Fenosa S.A. and Gas Natural Fenosa Furnizare Energie in Moldavia**, accounting for 70% of market share in electricity distribution, in a **€141m** transaction (P*R Newswire Europe* – April 15, 2019).

Transactions in progress

Enel is considering **a bid** for **Sempra Energy's** electricity distribution assets in Chile with **Chiliquinta Energa** and in Peru with **Laz del Sur**, after the company activist investor Elliott Management kicked off the sale process. The assets are estimated worth between **\$2.5 to \$3bn** (*Barrons's Online, Dow Jones & Company* – April 12, 2019)

KKR, US private equity fund, and Gestamp, a Spanish engineering company, entered in final stage in the sale of the 80/20-owned X-Elio company, with photovoltaic portfolio of 650MW in Spain, for around €1.2bn. Winning bidder is likely to be announced after Easter. (*Renewables Now, See News* – April 9, 2019)

Alpiq Holding AG, a Swiss utility company, decided to sell all the company's assets in foreign countries including Spain, Italy and Hungary, after Electricté de France has sold its 25% stake to EOS Holding and Primeo Energie. (*All Data Processing* – April 8, 2019)

Engie SA and Verbund AG, an Austrian utility company, have dropped out the race to buy Dutch energy company Eneco Groep NV which operates 2,000MW of renewable capacity and 522MW of gas capacity and has a company value estimated at €3bn. Major bidder is about to be Royal Dutch Shell PLC. (SNL Energy Financial Daily – April 5, 2019)

German utility company **EWE** is looking to sale its 26% own minority stake for a fair valuation of around **€1.2 to 1.4bn**. First bids are expected in May as at least four parties are interested including Shell, the Dutch pension fund PGGM, Deutsche Bank and Macquarie. (*Reuters News* – March 29, 2019)

Total SA, and the renewable energy companies Orsted SA and Elicio NV jointly submitted a bid, through an industrial consortium, for Dunkirk offshore wind farm project in France with a **total installed** capacity of 600MW. (*Financial Deals Tracker* – February 21, 2019)



European Power and Utilities companies wrap-up

Most of European Power Utilities achieved their 2018 guidance.

In Q4 2018, European Power Utilities benefit from higher power prices thanks to better commodities prices, and increased generation from hydro and renewables. However utilities having a footprint in South-America globally suffered from adverse foreign exchange impacts.

Transformation of utilities is still going-on with **significant investments in renewables** combined with **divestments from thermic merchant power generation** namely on coal (**E.ON**, **Engie**). In this respect the assets swap between **E.ON and RWE** is expect to receive green light from antitrust authorities in the second half of 2019.

From a regulatory standpoint, the UK is still under spotlight with negative impacts from **tariff cap** and **cancellation of capacity market mechanism**.

FY19 guidance are globally higher than 2018 results. Nevertheless analysts point out that **power price outlook remains uncertain** due to fall in commodity prices.





	In billion of €	2018	2017 ⁽¹⁾	Var.
	Sales	69.0	64.9	6%
	EBITDA	15.3	13.7	11%
	Impairment	-0.6	-0.5	15%
Key	Operating Income	5.3	5.6	-6%
	Recurring net income Gr	2.5	2.8	-13%
Financials	Net Income Gr Share	1.2	3.2	-63%
Thanciais	Operating CF	12.9	10.2	27%
	Net Capex	-14.0	-16.0	-12%
	Net debt	-33.4	-33.0	1%

In billion of € 2018 2017 Var. Sales 60.6 59.7 2% EBITDA 0% 9.2 9.2 -1.3 39% Impairment -1.8 Operating Income 2.6 2.7 -3% Recurring net income Gr 2.4 2.7 -9% Discontinued operations⁽²⁾ 0.4 175% 1 1 Net Income Gr Share 10 13 -24% **Operating CF** 7.3 8.5 -14% -12% Net Capex -8.2 -9.1 Net debt -21.1 -22.5 -6%

(1) Figures 2017 restated from IFRS 15

2018

(2) Classification as "Discontinued operations" of upstream liquefied natural gas (LNG)

- 2018 guidance achieved and exceeded.
- Revenues increased by 6.3% to €69.0bn and increase by 4.0% on an organic basis:
 - France (+3.5% organic excluding Framatome's contribution (€3.3bn)): (i) higher nuclear (+14.1TWh) and hydropower (+9.4TWh) outputs in France and (ii) better conditions on the wholesale market (+€0.6bn) partly offset by erosion of market share (-13.1TWh).
 - Energy services and Renewables (+8.5% organic): benefits from wind and solar power plants commissioning in 2017 and higher prices.
 - UK (+3.9% organic): higher tariffs and volumes with business customers partly offset by a drop in nuclear output (-4.8TWh) and a 4.2% clients erosion.
 - Italy (+6.2% organic): (i) favourable changes in Oil & Gas prices, (ii) higher sales volumes to business customers and (iii) growth in hydropower generation.
- EBITDA amounts to €15.3bn i.e. +11.1% vs 2017 (+11.3%

organic) and reflects the positive impact of (i) higher sales, (ii) **Highlights** better nuclear and hydropower outputs in France and (iii) increase in the trading margin driven by high volatility on the markets

- However net income decreases compared to 2017 due to: (i) net gain of €1.3bn recorded in 2017 on the interest disposal (49%) in RTE, the French TSO, and (ii) first adoption of IFRS9 and significant capital gains within its dedicated asset portfolio recorded in 2017 leading to a decrease in financial income of €2.2bn.
- Impairment of €0.6bn linked to E&P assets.
- €10bn asset disposal plan achieved 2 years early.
- Decrease in Net Capex due to Framatome acquisition in 2017. Linky (smart metring) and strategic investments remain steady.
- Disposal of 65% stake in Dunkirk LNG for €1.0bn.
- Issuance of \$3.75bn senior bonds and €1.25bn of new perpetual hybrid.

FY 2019 For 2019 EDF targets are: - EBITDA of €15.3bn to €16.0bn; Outlook

- Free Cash flow > 0 (excluding Linky and HPC);
 - Net financial debt/EBITDA < 2.7x;
 - Pay-out ratio of Net Income excluding non-recurring items: 45-50%.

2018 guidance achieved.

- Revenues increased by 1.7% to €60.6bn in total and organic terms driven by:
- (i) tariff increases in France and Latin America, (ii) new power supply contracts in Latin America, (iii) growth in hydro power sales in France and Brazil, (iv) higher retail power sales in France and (v) higher energy sales in Europe;
- Partly offset by (i) the new accounting treatment of long-term gas supply contracts in Europe (EBITDA neutral) and (ii) decrease in gas sales in France;
- Reported Revenue growth benefited from acquisitions in Client Solutions and Hydro in Brazil offset by foreign exchange effect (-€0.9bn), due to the depreciation of the BRL and USD and disposals in thermal generation.
- EBITDA amounted to €9.2bn, stable (+0.4% but +4.7% organic) driven by France (€1.7bn, +14.2% organic) and Latin America (€1.8bn, +11.1% organic) due to (i) higher hydropower outputs and (ii) higher margins in B2B and B2T segments in France, partly offset by unscheduled outages of nuclear plants in Benelux.
- Net income impacted by impairment losses (€1.8bn) on thermal generation assets namely in Europe and nuclear generation assets in Benelux.
- · Decrease in Net capex impacted by fewer investments in Latin America. They mainly concern low CO2, global networks and client solutions business in line with the €14.3bn investment program over 2016-2018.

• Transformation plan on track:

- €14.0bn between 2016-2018 from disposals plan including in 2018 the Loy Yang B coal-fired power plant in Australia and thermal generation activities in UK. Scheduled disposal of the interests in Glow in 2019 to achieve a total disposal level of €16.5bn.
- €1.3bn cumulated gains on EBITDA since 2015 linked to performance program "Lean 2018".

For 2019 Engie targets are:

- A net recurring income Group share between €2.5bn and €2.7bn. Guidance based on an estimated range of EBITDA of €9.9bn to €10.3bn;
- A net debt/EBITDA ratio < 2.5x;
- New medium-term dividend policy, in the range of 65 to 75%.



⁻ EON Eurostock utilities

•or

	In billion of €	2018	2017 ⁽¹⁾	Var.
	Sales	30.3	38.0	-20%
	EBITDA	4.8	5.0	-2%
	Impairment	-0.2	-1.1	-84%
Key Reported	Operating Income	3.0	3.1	-3%
	Recurring net income Gr	1.5	1.4	5%
Financials	Net Income Gr Share	3.2	3.9	-18%
	Operating CF	4.1	-2.2	nm
	Net Capex	-3.5	-3.3	6%
	Net debt	-16.6	-19.2	-14%

(1) Figures 2017 not restated from IFRS 15

(2) Results restated of Innogy discontinued operations

• 2018 results at upper range of full year guidance. • Sales declined by 20% to €30.3bn in 2018 due to:

- (i) First application of IFRS 15 reducing sales by €7.9bn, (ii) expiration of contracts for the wholesale-customer business in Germany (Uniper) and (iii) disposals of gas assets in Sweden and Germany
- Partly offset by Customer Solutions and Renewables segments which sales rose respectively by €0.6bn and €0.2bn, and by higher sales price in Europe.
- Adjusted EBIT at €3.0bn (-3%):

Decrease in Energy Networks (-€0.2bn) due to (i) non-recurring impact (restructuring and (ii) disposal of Hamburg Netz), and in Customer Solutions due to (i) market conditions, (ii) regulatory changes in UK and (iii) the unavailability of cogeneration power plants,

2018 **Highlights**

- being offset by higher margins and higher tariffs in power business in Sweden and higher margins in the power and gas businesses in Germany.
- Adjusted net income at €1.5bn (+5%) benefits from lower interest expenses and a slightly lower tax rate (24%) than in 2017.
- Significant increase in Operating cash flows due to 2017 non-recurring impacts (payment of €10.3bn to finance nuclear-waste disposal partly offset by a €2.9bn nuclear fuel-tax refund).
- Investments grow by +6% mainly driven by Energy Networks (+€0.2bn vs 2017) for expansions and grid maintenance.
- Sale of E.ON 46.65% stake in Uniper to Fortum, generating net income of €1.1bn. Proceeds used to decreased net debt (-€2.6bn). In addition, liquid funds were used to repay €2bn of financial liabilities.



RWE

Dax RWE Eurostock utilities

In billion of €	2018	2017 ⁽¹⁾	Var.
Sales	13.5	14.0	-3%
EBITDA	1.5	2.1	-28%
Impairment	-0.0	-0.4	-88%
Operating Income	0.6	1.2	-47%
Recurring net income Gr	0.5	2.1	-78%
Discontinued operations ⁽²⁾	1.1	0.6	90%
Net Income Gr Share	0.3	1.9	-82%
Operating CF	4.6	-3.8	nm
Net Capex	-1.3	-0.9	40%
Net debt	-19.3	-20.2	-4%

• 2018 adjusted guidance achieved.

- Sales declined by 3% reaching €13.5bn in 2018 due to: (i) lower generation in electricity output in all technologies (-24.2TWh vs 2017) partly due to the decommissioning of the nuclear plant Gundremmingen in late 2017, (ii) Gas revenue which dropped by -13% and (iii) a decrease in revenue from hedging transactions.
- EBITDA lower 28% at €1.5bn vs 2017 in lower range of the guidance: Decreasing EBITDA in all segments, especially (i) Lignite & Nuclear (-€0.3bn or -47%) due to the closure of Gundremmingen, (ii) lower wholesale prices and European Markets (-€0.1bn or -28%) due to significantly lower payments in UK caused by the suspension of the UK capacity market and (iii) decrease in supply and trading activity (-€0.1bn).
- In 2018, Non-operating result represents -€0.2bn adversely driven by (i) a net book loss on the sale of RWE 51% stake in Màtra, (ii) negative earnings on derivatives and (iii) impairment recognised on Stayhorpe gas-fired power station with the execution of the asset swap with E.ON. It was positively impacted in 2017 by the German nuclear fuel tax refund (€1.7bn).
- Income from discontinued operations amounted to €1.1bn (+€0.5bn vs 2017) and mainly refers to Innogy activities to be swapped with E.ON.
- Capex significantly rise (+40% at €1.3bn) thanks to enhanced renewables investments. It concerns Innogy continued operations with Triton Knoll and Limondale projects and the conversion of the Dutch coal-fired plant to biomass co-firing.
- Disposal of 51% in Matra (Hungary utility company) operating 840MW in March 2018.
- RWE and E.ON signed an agreement in which (i) E.ON should acquire Innogy and (ii) RWE should obtain the control of E.ON and Innogy renewables businesses:
- E.ON receives (i) 76.8% of Innogy and (ii) a €1.5bn cash payment from RWE;

- RWE to get in exchange (i) 16.67% in new E.ON by a capital increase with against contribution in kind (ii) E.ON and Innogy renewables businesses and (iii) E.ON's minority stakes in two RWE operated nuclear power plants, Innogy's gas storage business and minority participation in Kelag

- After this operation, E.ON would become an energy retailer and networks operator, and RWE would aggregate power generation with coal, gas and renewable assets.
- Antitrust approval on track with closing expected during second half 2019.

FY 2019 For 2019 E.ON outlooks are: - Adjusted EBIT of €2.9bn to €3.1bn; Outlook - Adjusted net income of €1.4bn to €1.6bn;

- Dividend for 2019 at €0.46/share.

- For 2019 RWE outlooks are: - Adjusted EBITDA of €1.4bn to €1.7bn;
- Dividend 2019 at €0.80 per share;
- Completion of the asset swap with E.ON.

GNG





	In billion of €	2018	2017 ⁽¹⁾	Var.
	Sales	75.7	74.6	1%
	EBITDA	16.4	15.7	4%
	Impairment	-0.1	-0.9	nm
Key	Operating Income	9.9	9.8	1%
Reported	Recurring net income Gr	4.1	3.7	9%
Financials	Net Income Gr Share	4.8	3.8	27%
	Operating CF	11.1	10.1	9%
	Net Capex	-8.5	-8.5	0%
	Net debt	-41.1	-37.4	10%

(1) Figures 2017 not restated from IFRS 15

• 2018 guidance achieved.

- Revenues in 2018 increase by +1.4% vs 2017 to €75.7bn driven by:
- (i) higher revenues from renewables in Italy, Spain and North, Central and South America, (ii) higher revenues from the free market in Italy, (iii) the effect the acquisition of Eletropaulo (now Enel Distribuição São Paulo) and (iv) higher tariffs and demand in Colombia and Peru.
- Partly offset by the adverse exchange rates in South America
- EBITDA in 2018 amounts to €16.4bn, up by 4.5% vs 2017. The change essentially reflects:
- The increase in end-user market in Italy (free market) as well as in Renewables and Infrastructure. South America contributes to higher EBITDA (+€0.3bn) with (i) increased margins in Brazil, Argentina and Peru thanks to wind and solar generation and (ii) impact of Electropaulo acquisition.

2018 **Highlights**

- These effects being partly offset (i) adverse exchange rates impact namely in South America, and (ii) margin decrease in North and Central America due to higher operating and personnel expenses.
- Operating income, up 1.1% vs 2017 is penalized by higher depreciation and amortisation (+€0.3bn), mainly due to the acquisition of Enel Distribuição São Paulo, and by new impairments on PPE (+€0.2bn) in Italy and Spain (Alcudia Plant).
- Net income Group Share stood at €4.8bn (up 27%) reflecting (i) the increase in EBITDA, (ii) decrease in financial expenses and decrease in tax due to non-recurring tax impacts in 2017.
- · Portfolio simplification, especially in South and North America, with Chilean restructuring in Q1 2018 and expansion in Brazil.
- Stable Capex composed of renewables investments in Spain, South Africa and India, and of the acquisition of Enel Distribuição São Paulo.
- Net debt increased by +€3.7bn at €41.1bn in connection with the acquisition of Enel Distribuição São Paulo and adverse exchange rate effects.
- Enel increased its end-user market share by 11% over 2018.

FY 2019 For 2019 Enel outlooks are namely: Outlook - Recurring EBITDA approx. €17.4bn: - Net ordinary income approx. €4.8bn.



centrica

In billion of €	2018	2017 ⁽¹⁾	Var.
Sales	29.7	28.0	6%
EBITDA	2.4	2.1	15%
Impairment	0.1	-0.7	nm
Operating Income	1.4	1.3	12%
Recurring net income Gr	0.7	0.7	-7%
Net Income Gr Share	0.2	0.3	-44%
Operating CF	1.9	1.8	5%
Net Capex	-0.9	-0.9	3%
Net debt	-2.7	-2.6	2%

- 2018 guidance achieved.
- Revenue is up 6% at £29.7bn, due to (i) increased activity in Energy Marketing and Trading and (ii) increased gas sales volumes in North America.
- Adjusted operating profits increased by 12% to £1.4bn reflecting:
- E&P profit grew up 159% (+£0.3bn) benefiting from the (i) successful transition of Rough plant from a storage facility into a production asset, (ii) higher European production resulting from the consolidation of Spirit Energy and (iii) higher gas and liquids prices;
- Partly offset by (i) the drop in Centrica Consumer business (-15%) with lower profit in UK Home reflecting the **impacts of the UK** energy prepayment tariff cap, lower energy account holdings, (ii) and the decrease in Centrica Business operating profit (-25%) due to continued retail pressure in North America and historical gas contracts in EM&T becoming loss-making.
- Recurring net income, down by 7% at £0.7bn, due to increased tax expense (41% in 2018 vs 22% in 2017), partly offset by higher adjusted operating profit and lower net finance costs (-£0.3bn vs 2017) due to debt repayment (£1.1bn) in 2018.
- Increase in net debt driven by the debt repurchases program and bond matured in September 2018 (cash outflow of -£2.5bn in 2018), partly offset by increase in operating cash flow (+5% vs 2017).
- Centrica won contract for the use of the Easington gas terminal until 2030.
- Sale and purchase agreement signed with Tokyo Gas for t2.6/year of natural liquefied gas with Mozambique LNG until the 2040s.
- Centrica Business Solutions launched the distributed energy and power proposition in North America with planned investments of approx. \$1.0bn.

For 2019-2020 Centrica outlooks are namely:

- Adjusted operating cash flow £2.1bn-£2.3bn;
- £500m of efficiency savings per annum;
- Net debt in a £2.7-£3.7bn range.



	In billion of €	2018	2017 ⁽¹⁾	Var.
	Sales	35.1	31.3	12%
	EBITDA	9.3	7.3	28%
	Impairment	-	-1.0	nm
Key	Operating Income	5.4	2.8	100%
Reported	Recurring net income Gr	na	na	-
Financials	Net Income Gr Share	3.0	2.8	7%
	Operating CF	7.3	6.5	13%
	Net Capex	-5.3	-5.9	-10%
	Net debt	-34,1	-32.9	4%

(1) Figures 2017 not restated from IFRS 15

2018 guidance achieved.

- Sales increase by 12% at €35.1bn supported by the combined contribution of Elektro and Neoenergia:
- Sales benefited from (i) higher demand in Brazil (+2.8%) and in the US (+3.2% for electricity and +8.8% for gas), (ii) better hydroelectric output (+72%) in Spain and, (ii) increase in transmission and distribution revenues thanks to greater assets base in the UK.
- Being partly offset by negative exchange rate impact of all reference currencies (BRL, GBP, and USD).
- EBITDA amounts to €9.3bn, +28% vs 2017. Excluding the negative impact of exchange rates for -€0.3bn, EBITDA benefits from (i) the contribution of NEOENERGIA (€0.6bn), (ii) high hydroelectric production, (iii) better operating capacity and load factor in onshore wind generation, and (iv) increased generation capacities commissioned in Mexico.
- 2018 • Operating income at €5.4bn and +100% is mainly attributable Highlights to lower Amortization and Provisions which dropped by 15.1% vs 2017 due to non-recurring write-offs in 2017 on gas in Canada and USA.
 - Net income rose by 7.5% and is negatively impacted by the decrease in financial result (-23%) and lower contribution of non-current events due to the extraordinary Gamesa-Siemens Wind merger dividend in 2017.
 - Net debt totals €34.1bn and increased by €1.2bn notably in connection with investment in renewables and cogeneration for +2,789MW in 2018.
 - As part of the asset rotation plan, divestment in conventional generation in UK with the sale of Scottish Power to Drax Group for £702bn.
 - Planned investment in renewable energies of more than 10GW of installed capacity over 2018-2022. Around 3GW added in 2018

FY 2019	Iberdrola follows its strategic plan long term outlook for
Outlook	2018-2022 with the following outlooks:
	- 2022 EBITDA: €11.5bn - €12bn;
	- 2022 net profit: €3.5bn - €3.7bn;
	- 2022 FFO / net debt: 24% (23% in 2020);
	- 2022 net debt / EBITDA: 3.3% (3.5% in 2020).

2018 guidance achieved.

140

130

120

110

100

90

80

- Sales increased by 5% vs 2017 to €24.3bn in 2018 thanks to strong revenues in Gas & Power segment (+€1.7bn vs 2017) partly offset by a decrease of (€0.6bn) in Latin America infrastructures segment revenues notably in Brazil and Chile.
- EBITDA amounts to €4.0bn, up 3% vs 2017:
- EBITDA benefits from (i) the performance of Gas & Power segment (€0.5bn) with higher margins in gas and LNG activities, and (ii) the reduction in operational expenses of €0.2bn over 2018.
- Being partly offset by (i) adverse exchange rate impact (-€0.2bn) and (ii) non-recurring items (-€0.4bn).
- Operating income fell from €2.1bn in 2017 to -€2.2bn in 2018. This is mainly explained by a €4.3bn impairments recorded in 2018 with no equivalents in 2017. Such impairment related to €3.9bn on conventional power plants in Spain and €0.5bn on the 50% interest in Union Fenosa Gas (equity consolidated).
- Drop in net income from €1.4bn in 2017 to -€2.8bn in 2018 linked to the impairment recorded in 2018.
- Capex increased by 30% vs 2017 with a focus on renewables. On the other hand, total disposals amounted to €2.6bn including the sale of a 20% minority stake in the gas distribution business in Spain (Nedgia) for €1.5bn.
- Naturgy completed **bonds repurchases** at Holdco for €1.2bn and bonds refinancing or issue in Latin America for €1.1bn.
- Renewal and extension of the gas supply contract with Sonatrach to 2030 under better terms
- Naturgy sold its 20% minority stake in Negocios de Gas, a Spanish gas network, to long-term investors generating a €1.0bn capital gain.

Naturgy announced in June 2018 its 2018-2022 "Strategic Plan" with new outlooks for 2019:

- EBITDA approx. €4.6bn;
- Net income approx. €1.4bn;
- Capex approx. €2.0bn;
- Net Debt approx. €15.2bn.

Naturgy

Mar-18 Jun-18 Mar-19 Sep-18 Dec-18

IBEX35 —— Naturgy —— Eurostoxx utilities				
In billion of €	2018	2017 ⁽¹⁾	Var.	
Sales	24.3	23.2	5%	
EBITDA	4.0	3.9	3%	
Impairment	-4.3	-	nm	
Operating Income	-2.2	2.1	nm	
Recurring net income Gr	1.2	0.7	57%	
Not Incomo Gr Sharo	28	1 /	nm	

Net Income Gr Share nm 2.8 **Operating CF** 2.9 2.8 4% 30% Net Capex -23 -18 Net debt -13.7 -15.2 -10%

Talking points

1. The challenge of decarbonizing energy use in buildings

Energy use in buildings accounts for nearly 40% of the final energy consumption in the European Union. Electricity powers appliances like washing machines, dishwashers, TVs, air-conditioners and provides lighting. While electricity is also used for space and water heating, this is really the domain of natural gas in Europe. As such, the buildings sector is the largest gas consuming sector in the European Union (before power generation, industry and transport), accounting for nearly 40% of the region's gas consumption in 2017.

The European Union has a distinct winter heating period typically running from October to April and therefore gas consumption varies with the seasons (Figure 1). The day with the highest gas use typically occurs in December or January, depending on weather conditions. Gas demand during the peak day is three times higher than average daily gas demand and can exceed 1.5 bcm per day. **To handle such pronounced seasonal swings in gas demand, significant underground storage capacities have been established, in** which gas is filled in the summer and withdrawn in the winter **to serve heating demand.**

Figure 1: Heating degree days and gas consumption by seasons



Source: Eurostat

Much focus is on power generation and mobility in the debate on how to decarbonize the EU's energy system, with clearly formulated policy goals for renewables and electric vehicles as well as financial support schemes in place. **The buildings sector accounted for 550 million tonnes of direct CO₂ emissions in 2017, some 18% of the European Union's total CO₂ emissions in that year**. (As the buildings sector also accounts for 60% of EU electricity consumption, it is also responsible for an important share of indirect CO₂ emissions). The direct CO₂ emissions in the buildings sector can almost exclusively be attributed to the use of fossil fuels – most notably natural gas – for heating. **The public debate on decarbonizing the buildings sector is rather silent and long-term strategies as they have been announced for the power sector are largely absent**.

Decarbonising the buildings sector is a priority in any strategy to achieve a low-emissions energy system and mitigate climate change. Naturally, heating is at the core of the question how to reduce buildings' CO, emissions.

There are three primary options how to diminish the carbon footprint of heating systems in buildings:

- Electrify heating systems in buildings and decarbonize electricity supply;
- 2) Use decarbonized fuels such as synthetic gas or biogas;
- 3) Reduce the demand for energy by improving energy efficiency of buildings.

A large-scale shift to electric heating – using heat pumps or electric resistance radiators - in the European Union would thus require storing electricity in the summer when there is oversupply - due to abundant availability of solar power – and discharge the energy in winter when electricity demand exceeds supply. In recent years, the momentum behind battery storage has increased significantly and costs have fallen rapidly. The economic proposition behind battery storage is to charge when electricity is amply available (i.e. electricity prices are low) and discharge the electricity when it is scarce or unavailable (i.e. electricity prices are high). The technical and economic characteristics of batteries make this technology particularly suitable for short-term electricity storage with a large number of charging and discharging cycles. Globally there only some 4 GW of utility-scale batteries in operation, allowing to store and discharge less than 20 GWh. Scaling up other longer-term storage options, such as pumped storage hydroelectricity, is also challenging given the limited topographical potential that remains in Europe.

Even if battery storage capacity growth was to follow the trajectory proposed by the IEA, i.e. topping 220 GW globally by 2040, this would not make any meaningful contribution to seasonal electricity storage. The absence of seasonal storage technologies for electricity is an important potential constraint for the electrification of the residential heating sector. Biomass which has excellent storage characteristics - faces important supply constraints due to competition for arable land with other agricultural products. That is why, given the need to move, over the longer term, to a zero-emissions energy system, there is increasing attention given to the possibility of decarbonising the gas itself. Such decarbonisation could happen directly at the source (i.e. splitting natural gas into hydrogen and CO₂, re-injecting the CO, into the gas field and selling the hydrogen), through the use of biogases (obtained through the fermentation of biomass) or by using renewable electricity to produce hydrogen or, if pure CO, is readily available, methane. The latter suite of technologies is typically referred to as 'Power-to-Gas' and would allow to seasonally store electricity in the form of gas.

There are currently over 140 underground gas storage sites with a combined capacity of more than 100 bcm in operation in Europe, additionally there is some shorter term storage potential in the network via pressure adjustments. A back-of-the-envelope calculation suggests that current underground storage would be sufficient to store the equivalent of some 750 TWh of electricity, nearly half of annual electricity consumption in buildings in the European Union. Moreover, decarbonising gas supply would prevent gas networks from becoming stranded assets, even in a low- or zero-emissions future. Whether 'Power-to-Gas' technologies are a viable option depends on how quickly their costs can be brought down, which is also a function of the cost of the renewable energy they would run on. For the purposes of securing emissions reductions during the energy transition, a significant competitor to the marketability of 'Power-to-Gas' remains energy efficiency in buildings. The European Union has a relatively old buildings stock: in most EU countries half of the buildings were constructed before 1970 i.e. before the first energy efficiency regulations were introduced and the IEA estimates that 60% of today's buildings stock will still be in place in 25 years. Energy efficiency of the buildings stock is thus low and regulation on energy efficiency improvements has so far largely focused on new construction. In 2018, the EU has updated its Energy Performance of Buildings Directive which will also need to deal with the economics of retrofitting existing buildings to make the entire stock near-zero-energy buildings by 2050. The structure of the current stock implies that there is plenty of low-hanging fruit for retrofits such as window replacement and roof insulation but the sort of energy efficiency improvements needed to achieve deep decarbonisation would require significant labour-intensive measures that change the buildings shell itself. While decarbonising gas supply is capital intensive (carbon capture and storage, renewable energy plants or electrolysers all require huge upfront capital spending), energy efficiency improvements are labour intensive. **So, the trade-off between decarbonizing gas supply and improving energy efficiency will not only be determined by the success of the EU's Energy Performance of Buildings Directive and the cost evolution of 'Power-to-Gas' but also by the relative costs of labour and capital in the European Union**.

2. A cautionary tale on the use of LCOE

The levelised cost of electricity (LCOE) is among the most common metrics to assess and compare the cost of different power generation technologies. However, the concept comes with numerous pitfalls and limitations that should be taken into account when using LCOEs, especially in the context of the energy transition. The LCOE expresses the specific cost of a given power generation technology in terms of electricity produced i.e. in Dollars or Euros per MWh. Typical elements of an LCOE calculation are a technology's fixed and variable costs, its load factor (or utilization rate), its lifetime and the weighted average cost of capital. **The LCOE is essentially the total cost of a project or technology over its lifetime, divided by its total electricity generation over that period**.

In calculating LCOEs one makes a number of assumptions on parameters that are in reality – over 20 or 30 years asset lifetime – inherently variable and dynamic. Fuel prices, for gas, coal or oil evolve, new cost elements such as CO2 pricing might be introduced or reinforced and a plant's load factor depends on its competitiveness vis-à-vis other power stations. Before power systems were liberalized in Europe such considerations were of minor importance as the utilities could essentially decide on the load factor of their plants and long-term fuel supply agreements were more common than today.

The concept lends itself well to variable renewable energies like wind and solar whose load factor depends on the weather rather than competition (despite annual fluctuations due to meteorological aberrations it typically regresses to the mean over sufficiently long time periods). Moreover, wind and solar power plants have no exposure to the vicissitudes of the international energy commodity markets. LCOEs of variable renewables are thus primarily a function of their upfront investment expenditure and the cost of capital. **As such, LCOE is well suited to track the cost evolution of variable renewables over time or make comparisons between the cost of the same technology in different countries, say solar PV in China or Europe** (Figure 1).

Figure 1: Levelised costs of electricity by selected technologies and regions, 2012-2017



Sources: Deloitte; IRENA Renewable Cost Database; Bolinger and Seel (2018); World Energy Outlook (2018).

However, what is problematic are comparisons of LCOE between technologies that do not provide the same service, even though their output is a homogenous good, electricity. Why? Let's take an example from Figure 2 (next page). The LCOE of an open-cycle gas turbine is, with just under 160 Euro/MWh, twice as high as that of an ultrasupercritical coal-fired power plant. Should we conclude from this that no open-cycle gas turbines (OCGT) should be built and instead only coal-fired power plants? No, because an OCGT serves peak load whereas a coal-fired power plant primarily serves baseload and as such they do not render the same service to the system. Naturally, they also receive different prices for their service and the price an OCGT can achieve typically justifies its high cost in terms of LCOE.

Figure 2: Indicative levelised costs of electricity for selected technologies in Europe, 2017



Sources: Deloitte; World Energy Outlook (2018).

Note: LCOEs represent averages over a vast geographical area, i.e. including various different qualities of sites for renewables, and are benchmarked at the time of installation rather than at the time of the auction result (which typically anticipate further cost declines).

With the rapid rise of wind and solar PV, economies of scale and learning have brought down costs. Their falling LCOEs are often used to underscore wind and solar PV's increasing competitiveness vis-à-vis fossil fueled power plants or nuclear power stations and suggest that investment in variable renewables is more attractive than investment in other power plants. Such use of LCOE is flawed for two interrelated reasons:

- 1) As the above OCGT example highlights, one cannot conclude that a lower LCOE also implies a higher return on investment. Return on investment depends on both, costs and price.
- 2) Growing deployment of variable renewables means that their costs come down but, also their market value, in terms of the price they can achieve from electricity sales. With a high share of wind and solar, prices on sunny or windy days are low...

LCOE is an easy to calculate and intuitive metric to assess the cost of power generation technologies. LCOE is particularly useful to compare the cost of a given technology in different countries or to track cost evolution over time. It can support decision-making when the choice is between different projects that render the same service, for instance, comparing a lignite-fired power plant with a nuclear power plant for baseload generation. **However**, great caution is necessary whenever LCOE is used to assess the competitiveness of a certain technology vis-à-vis other technologies.



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?

European Parliament's adoption of new electricity market design proposals

Key features	Insights				
On 30 November 2016, the Commission presented, as part of the Clean Energy for All	The adoption of these four rules marks the finalisation of negotiations regarding the Clean Energy for All Europeans package.				
Europeans Package (see Q4 2016 Newsletter), its proposals for:	The aim of these rules, as well as the other Directives included within the package, is to make the EU's electricity market fit for the future . Another one of its main goals				
• A new Electricity market Regulation.	is putting the consumer at the centre of the energy transition following up on the				
• A new Electricity market Directive.	already adopted 2030 climate legislation and meeting the Paris Agreement commitments.				
• Regulation on Risk Preparedness.	 The new rules regarding electricity market are designed with the following objectives: Empowering energy consumers to play an active role in driving the energy transition and fully benefit from a less centralised, and more digitalised and sustainable energy system. Enabling the active participation of consumers while putting in place a strong framework for consumer protection. Greater cross-border trade and competition will help to keep energy costs and 				
• Regulation on the Agency for the Cooperation of Energy Regulators (ACER).					
In December 2018, political agreement among European institutions was reached					
regarding the aforementioned four issues (see Q4 2018 Newsletter).					
On 26 March 2019, the European Parliament has adopted the four pieces	prices in an appropriate range . In this sense, the new rules will allow electricity to mo freely to where it is more needed.				
of policy by completing the parliamentary approval process.	• Phasing capacity subsidies out for those plants that emit more than 550 $\rm grCO_2$ per kWh.				
	• Making Europe the world leader in energy production from renewable energy sources by allowing more flexibility to accommodate an increasing share of renewable energy in the grid.				
	Next steps				

Following this parliamentary approval, the Council of Ministers of the EU will have to formally approve the texts of the Directive and three Regulations, after which the new laws will be published in the Official Journal of the Union. **The Regulations will enter into force immediately (with a date of application of 1 January 2020 for the Electricity Regulation) and the Directive will have to be transposed into national law within 18 months.**

Link: European Parliament's adoption of new electricity market design proposals

European Commission Innovation Fund announcement

Key features	Insights
European Commission has announced in February 2019 the implementation of an	The Innovation Fund expects to fund programmes related to climate action: • Innovative low-carbon technologies and processes in energy intensive industries.
investment plan ("the Innovation Fund")	including products substituting carbon intensive ones.
provided with over 10 billion euros for	Carbon capture and utilisation (CCU).
Include a second and a star for any second as an an	Construction and encyclic of Corbon conture and stars as (CCC)

low-carbon technologies in several sectors.

The Innovation Fund will focus on **highly innovative technologies and big flagship projects** with European value added that can bring on significant emission reductions. It is about **sharing the risk** with project promoters to help with the demonstration of first-of-a-kind highly innovative projects.

This plan aims to improve competitiveness as well as avoid emissions.

The EU Emissions Trading System (EU ETS), the world's largest carbon pricing system, is providing the revenues for the Innovation Fund from the auctioning of 450 million allowances from 2020 to 2030, as well as any unspent funds from the NER300 programme.

- Construction and operation of Carbon capture and storage (CCS).
- Innovative renewable energy generation.
- Energy storage.

By this Fund, European Commission expects to:

- Help create the **right financial incentives for projects to invest now in the next generation of technologies** needed for the EU's low-carbon transition.
- Boost growth and competitiveness by empowering EU companies with a first-mover advantage to become global technology leaders.
- Support innovative low-carbon technologies in all Member States in taking off and reaching the market.

Some of the developments and improvements of this Fund compared to previous experiences are:

- $\boldsymbol{\cdot}$ It is open to projects from energy intensive industries.
- It **improves the risk-sharing for projects**: its grants cover up to 60% of the additional capital and operational costs of innovation.
- It provides **support that is more flexible** by following the cash flow needs of the project through pre-defined milestones.
- · Selection process is simplified.
- · It has stronger synergies with other EU funding programmes.
- · Streamlined governance and simplified decision-making.

The projects' implementation allows sharing the risk with project promoters. Projects shall be sufficiently mature in terms of planning, business model and financial and legal structure. Additionally to bigger projects, the Fund is also open to small-scale projects with total capital cost under 7.5 million euros which can benefit from simplified application and selection procedures.

Next steps

The application process has two phases: expression of interest and full application. **Project proponents can apply by submitting their projects when there is an open call for proposals**.

Finally, the Commission **expects to launch the first call in 2020, followed by regular calls until 2030**.

Link: European Commission Innovation Fund announcement

2019 CEF Energy call for proposals

Key features	Insights
European Commission has published a call of 750 million euros of funds for key energy infrastructure projects within the EU. This programme has significant cross- border benefits and will be available to finance projects of common interest geared determined objectives. The publication has taken place on 20 March 2019.	 The 2019 CEF Energy Work Programme aims to contribute to the development and implementation of Projects of Common Interest (PCIs) in the energy sector. This programme comprises both electricity (e.g. smart grids), gas and cross-border carbon dioxide networks. Grants given under CEF Energy will help to fulfil some of these objectives: Ending energy isolation. Increasing competitiveness by promoting the integration on the internal energy market and the interoperability of electricity and gas networks across borders. Enhancing the Union's security of supply. Integrating energy from renewable sources and developing smart energy networks. Eliminating energy bottlenecks. Completion of the internal energy market. Contributing to sustainable development and protection of the environment through the integration of energy from renewable sources and the development of smart energy networks and cross-border carbon dioxide networks.
	Next steps
	After the initial publication, the 2019 call will have a virtual information day on 9 April 2019 .
	On the other hand, 2019 CEF related proposals shall be presented before 13 June 2019 .

Link: 2019 CEF Energy call for proposals

Quarterly reporting on changes in the Policy and Regulation framework

United Kingdom				
Торіс	Key features	Insights	Next Steps	
Informal consultation on designing the Industrial Energy Transformation Fund (IETF)	 The Government has opened a consultation seeking views to help it design a £315 million IETF fund which is aimed to support energy intensive businesses to reduce their bills and emissions. It also aims to enable energy intensive businesses to transition towards decarbonisation over the next five years (up to 2024). The questions in the consultation range from seeking views on wider benefits of decarbonisation to barriers that industries face when making investment decisions to support a lower use of carbon in their processes. Some of the features of the fund could potentially include differentiated criteria for different types of projects, budget or sectoral ring fencing, phasing of energy efficiency and industrial decarbonisation elements or even creating two separate schemes for its two objectives. 	 The IETF aims to focus primarily on industrial decarbonisation by supporting investment in energy efficiency measures for businesses, which could potentially improve their competitiveness. A low carbon economy achieved with the help of the fund is expected to bring associated benefits in terms of jobs, skills, productivity and exports. IETF will try to cover carbon emission reductions in the near term while the Industrial Clusters Mission supports decarbonisation over the longer term. The fund will support projects from feasibility study stage through to deployment. The fund will also aim to promote investment in mature deployable technologies, such as, heat pumps and biomass steam boilers. Promoting uptake of low carbon industrial processes (such as low carbon steel and cement production) and support for technologies that are important to long-term emissions reductions are among the few options that IETF is considering in order to achieve its objectives. 	 The Government expects to hold a formal consultation later in the year on the design of the fund. A market intelligence exercise for the fund is proposed to be carried out in summer of 2019. 	
Consultation on future for small- scale low-carbon generation	 The Government recently closed its consultation on introducing a mandatory supplier-led route to market called a Smart Export Guarantee (SEG). Under the SEG, the Government would legislate for suppliers to remunerate small-scale low-carbon generators for the electricity they export to the grid. Remuneration would be available to all technologies currently eligible for the FIT scheme up to the capacity of 5MW. Large electricity suppliers (>250,000 domestic electricity supply consumers) would offer small- scale generators a price per kWh of electricity exported to the grid. The determination of tariff per kWh and length of the contract would be the responsibility of the suppliers and they would be obliged to provide at least one export tariff. Remuneration must be greater than zero and the generators must not be required to remunerate suppliers at times of negative pricing. 	 If implemented, the scheme would facilitate entry of more small-scale low-carbon generators of electricity into the market. This would also encourage innovation and competition, in particular the growth of aggregators and a digital marketplace. A greater number of low-carbon generators would play a major role in contributing to the achievement of targets set out in the Clean Growth Strategy. The scheme is expected to lower costs for consumers by supporting the development of affordable and low carbon electricity. This would promote export of electricity when the grid is experiencing high demand which means that the electricity produced is used more efficiently. 	 The consultation has closed and the Government response is pending. The Government response will contain its decision on whether, and how, to proceed with the SEG. 	

United Kingdom			
Торіс	Key features	Insights	Next Steps
Ofgem - Notification – default and pre-payment price caps	 Ofgem has published its latest update of the default and pre-payment price caps that will apply from 1 April 2019. The price caps for these customers have increased as a result of higher energy wholesale costs. For customers on default (including standard variable) tariffs will increase by £117 to £1,254 per year, from 1 April for the six-month "summer" price cap period. For pre-payment meter customers, the price cap will increase by £106 to £1,242 per year for the same period. 	 Ofgem adjusts the level of the caps twice a year to reflect the estimated costs of supplying electricity and gas to homes for the next six-month period. Around £74 of the £117 increase in the default tariff cap is due to higher wholesale energy costs. According to Ofgem's analysis, customers on default deals are still better off by £75-£100 a year. 	 The price cap was introduced by Ofgem on 1 January 2019 and will be updated every six months from 1 April 2019. The price cap is likely to stay in place for at least the next three years.

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	France		
Торіс	Key features	Insights	Next Steps
Energy multi- year energy programme (PPE)	The energy transition law for green growth adopted in 2015 sets out several medium and long term objectives relating to greenhouse gas emissions, energy consumption and energy mix. This law led to the drawing up of a national low carbon strategy and a multi-year energy programme (PPE) to manage these targets.	The PPE drafts a pathway for a clearly decarbonised energy mix combined with a decreased in carbonised energy consumption. The achievement of these targets relies notably on a higher share	Tenders for future renewable capacities would be scheduled at an average rate of seven per year between the first quarter of 2019 and the last days of 2025. They should benefit from (i) lower production costs of wind and solar, (ii) experience gained with the latest offshore wind farm developments and (iii) extended generation efficiency.
	 On March 5, 2019 the Government published the draft decree on the PPE setting out objectives of the French energy policy, with the horizons 2023 and 2038 setting the following targets: reduction of greenhouse gas emissions to 277Mt CO₂ in 2023 and to 227Mt CO₂ in 2028; 	 from renewable for both gas and electricity. These targets mean: To consume up to 247 TWh per year of heat from renewable sources: 60% better than in 2012; 	
	 decrease in the primary consumption of fossil fuels of 20% in 2023 and 35% in 2028 compared with 2012; 	 To reach in 2028 55 times more the quantity of biogas injected in gas networks in 2017; To double by the end end of the next decade the total renewable generation capacity (hydraulic included) in order to reach 113 GW. In early 2018, RTE, the French TSO, published a report focusing security of supply and the related impact of authorities energy scenarios. In this context targets of the PPE are questionable since it means to replace 14 nucelar reactors by renewable capacities. In other words without clear signal to develop renewable capacities the security of supply would ask to maintain nuclear capacities. 	
	 reduction by 7% in final energy consumption between 2012 and 2023 and 14% in 2028; 		
	 higher consumption of renewable heat of 196TWh in 2023 and a range of between 218 and 247TWh in 2028; 		
	 development of renewable energies with installed capacity of renewable electricity of 74GW in 2023 and a range of between 102 and 113GW in 2028; 		
	 development of electric vehicles (1.2 million private electric cars on the road in 2023); 		
	 end to the sale of new greenhouse gas emission vehicles in 2040; 		
	• 500,000 energy efficient home renovations every year.		
	The PPE also targets:		
	 the closure by 2022 of electric power generation plants that are exclusively coal-fired; 		
	• for 2035 a share of 50% nuclear power in the French energy mix. 4 to 6 nuclear reactors will be shut down by 2028 including two by Fessenheim. Closure of 14 nuclear reactors by 2035, date set for achieving a 50% share of nuclear electricity in the electricity mix.		

Spain			
Торіс	Key features	Insights	Next Steps
National Energy and Climate Plan Submission to the European Commission and additional measures development regarding the Energy and Climate Strategic Framework	 The National Energy and Climate Plan (NECP) is one of the key elements included within the Spanish Government Energy and Climate Strategic Framework. This Strategic Framework aims to fight Climate Change through developing a competitive and sustainable economy. Spanish Council of Ministers approved NECP submission to the European Commision on 22 February 2019. According to the governance of the energy union and climate action rules, EU countries are required to submit a draft of its National Energy and Climate Plan (NECP). NECP identifies, for period 2021- 2030, challenges and opportunities concerning the five dimensions of the energy union: Decarbonising the economy –including renewable energies Energy security. A fully-integrated internal energy market. Energy efficiency. 	 By means of the following principles set by NECP, the Spanish energy system will be substantially transformed. Key elements of these process will be: Greater energy self-sufficiency through a more systematic and efficient renewable sources utilization (mostly solar and wind). Increased national energetic security by a system that is less dependant on imports that may be affected by geopolitics and price volatilities. NECP expects to achieve the following results by 2030: 21% of greenhouse gases reduction in comparison to 1990. 42% of renewable origin on total energy consumption. 39,6% improvement on energy efffiency. 74% renewable origin on electricity generation. By 2050, the Plan expects: Climate neutrality by a greenhouse gases reduction of 90%. A 100% renewable electricity system. NECP expects to raise a total investment of 236,000 million euros along period 2021-2030. 80% of this investment will be carried out by private stakeholders while the remaining 20% is expected 	According to European Commision guidelines, each Member State shall submit the final plan by 31 December 2019. Additionally, the Public Hearing process regarding Climate Change and Energy Transition Law Preliminary Project as well as Fair Transition Strategy Draft has been opened until 22 March 2019. This Preliminary Project shall enter into legislative development in coming months.
	 Additionally to the aforementioned Plan, Spanish Ministry for Ecological Transition has launched two additional pieces of policy regarding the Energy Transition: Climate Change and Energy Transition Law Preliminary Project, (for more information about the public consultation opening procedure on the initial Law Draft, see Q4 2018 Newsletter). This law will facilitate the Spanish economy decarbonisation by 2050, following the European Union and the Paris Agreement determinations. Fair Transition Strategy Draft, which focuses on the key role that economic sectors will play during the energy transition process. This role includes R&D support and enterprise fitting in the new environment. 	 to be collected by public sector. Regarding the two additional pieces of policy launched by the Spanish Government, the key aspects would be: The main features included within the Climate Change and Energy Transition Law Preliminary Project are aligned with the NECP key elements described above which allows new regulatory and taxation schemes. According to the Law Preliminary Project, all commercialized vehicles, from 2040 onwards, shall be zero-emission vehicles (ZEV). In this sense, this Law Preliminary Project encourages public administrations to develop policies that shall facilitate electric vehicle integration. The Fair Transition Strategy launched by the Spanish Government follows guidelines set by International Labour Organization (ILO) as well as Paris Agreement's recommendations. The main goal of this Strategy is maximizing job opportunities related to the transition forward a low-carbon model. 	

Germany			
Торіс	Key features	Insights	Next Steps
Amendments of Energy Services and Energy Efficiency Measures	 On March 13, 2019, the Federal Cabinet adopted the draft of the new version of the Energy Services and Other Efficiency Measures Act (EDL-G). With the adaptation of the EDL-G, the Federal Government is pursuing the goal of further developing the regulations on mandatory energy audits laid out in the EDL-G, in particular as follows: Exemption from the implementation obligation for companies with a total energy consumption of 400,000 kWh p.a. or less; Implementation of a registration obligation for energy auditors; Introduction of an obligation to prove that the energy audit was carried out. Municipal companies are affected by the amendment on two different levels: Eirstly, due to the application of the European 	The amendment clarifies the existing law and even introduces slight relief from its obligations to companies with a lesser energy consumption. The clarification addresses mainly municipal companies as energy consumers not being classified as SMEs and thus not being privileged. Correspondingly, the BAFA recently revised its guidance on the preparation of energy audit reports in consultation with the Federal Ministry of Economics and Energy, confirming its previous practice.	The amended EDL-G will enter into force at the earliest at the end of June 2019.
	 Commission's SME Recommendation (2003/361/EC), most of them are classified as non-SME and must therefore carry out an energy audit. On the other hand, municipal energy supply companies (EVU) can offer energy audits to their end customers as an energy service if the prerequisites are met. According to EDL-G, non-SMEs were obliged for the first time to carry out an energy audit by 05.12.2015 and thereafter at least every four years. This means that most of the obligated companies will have to carry out a repeated audit in 2019. 		
Offshore Grid levy	 On January 31, 2019, the lead economic committee of the Federal Council discussed the government's draft ordinance on the calculation of the offshore grid levy and adjustments to regulatory law. The committees of the Federal Council propose to the plenary session of the Federal Council, among other things : To limit the grid charge for singular grid use pursuant to § 19 (3) StromNEV to voltage levels above the medium/low voltage transformer and not only - as proposed by the Federal Government - to voltage levels above the low voltage. 	Among other things, the regulation is intended to specify how these offshore grid costs are to be calculated. The main amendments are the Electricity Grid Charges Ordinance and the Incentive Regulation Ordinance . In addition, adjustments to the investment measures are made in the Incentive Regulation. The other amendments concern the Electricity Grid Charges Ordinance, the Low Voltage Connection Ordinance and the Basic Electricity Supply Ordinance. These measures will help TSOs regarding their calculation of grid fees and costs to be reimbursed. Moreover, all market participants interested in sector coupling technologies (e.g. Power-to-X) might see this as one next step towards a favourable regime to facilitate sector coupling.	The Federal Council has approved the Ordinance on the Calculation of the Offshore Grid Allocation and on Adjustments to Regulatory Law. The Network Charges Modernisation Act came into force on 1 January 2019.
	• To adopt a resolution in which it is pointed out, inter alia, that the Bundesrat considers it essential to link the electricity and gas networks in a systemically appropriate manner in order to strengthen sectoral coupling and to use the well-developed gas infrastructure in order to reconcile supply- dependent electricity generation with demand and to store energy temporarily in the quantities required.		

Germany			
Торіс	Key features	Insights	Next Steps
Publication of the network development plan	On Feb 4, 2019 the four transmission system operators have published a draft of the network development plan. It deals with the likely developments in the electricity sector from now to 2030 and 2035. It is based on the sixth confirmed scenario framework . During the consultation from 4 February to 4 March 2019, the general public had the opportunity to comment on the first draft.	There is yet no impact due to the Draft Plan. However, this plan will be subject to discussion given Germany's plans for decarbonization, inter alia the pahse-out of coal-fired power plans. It remains to be seen, whether the plan will remain or is subject to amendments on the basis of the consultation.	
Ordinance regulating the procedure for the procurement, use and settlement of a capacity reserve (CapResV Capacity Reserve Ordinance) - Publication in the Federal Law Gazette on 05.02.2019	The Capacity Reserve Ordinance creates a framework for power production capacity, which is solely bound to be used by the TSOs. The market for capacity reserve had already been introduced by Section 13e EnWG, yet up to now there has not been an ordinance pursuant to Section 13h EnWG regulating the "market" and corresponding procedures in detail.	Capacity reserve was introduced to safeguard security of supply. This has been an alternative for power plant operators of non-profitable power plants to run their power plants. These plants must not participate in the power market but rather offer their capacity exclusively as network reserve. However, OPEX are remunerated. Against the background of the coal-phase-out, capacity reserve will in the medium-term play an important role to safeguard security of supply and minimize the need for network expansions. Moreover, it will still be an alternative for power plant operators to not decommission non-profitable plants.	In Force since Feburary, 6th 2019

Snapshot on surveys and publications

Deloitte

Digital innovation: Creating the utility of the future - March 2019

Since disruptive forces transform the power and utilities sector, many companies are turning to digital technologies and a more innovative mindset to thrive in the new era. This paper explores opportunity offered by this trend and the risk being left behind or displaced by more agile players.

Link to the survey

Smart Renewable Cities - March 2019

As cities expand and strive to become "smart," solar and wind power can play a crucial role in helping them achieve their goals. This paper describes the concept of smart renewable cities (SRCs) and talks about the role renewables play in shaping smart cities. *Link to the survey*

2019 Renewable Energy Industry Outlook - December 2018

The renewable energy sector remained remarkably resilient in 2018, gaining ground despite uncertainty about new tax and tariff policies. The fundamental drivers of this growth appear poised to continue. But we also see three trends coming into sharper focus that look likely to shape growth in 2019.

Link to the survey

2018 Human Capital Trends: Power & Utilities - November 2018

This survey delivers insights from more than 11,000 business and human resource leaders across 124 countries making it the largest survey to date. It provides a Power & Utilities industry-specific perspective on the 2018 Global Human Capital Trends Survey report. *Link to the survey*

Agencies or research institutes

International Energy Agency

In order to gain access to studies and analysis from IEA you have to create an account to be able to download the above publications.

Perspectives for the Clean Energy Transition – April 2019

This report explores the role buildings can play in meeting climate change ambitions, using a portfolio of clean energy solutions. It considers the investment needs and strategies to enable the buildings sector transition. Importantly, it sets out what policy makers can do to overcome the economic and non-economic barriers to accelerate investment in low-carbon, energy-efficient solutions in the buildings sector.

Link to the survey

Buildings 2018 Global Status Report - November 2018

This Report documents the status and trends of key indicators for energy use, emissions, technologies, policies, and investments to track the buildings and construction sector, and it highlights examples of how countries, cities, organisations and other stakeholders are already working towards sustainable buildings and construction.

<u>Link to the survey</u>

Global Gas Security Review 2018 - October 2018

The report shows the most recent trends in LNG flexibility, based on a detailed assessment of contractual data. It examines the impact of the growing role of emerging LNG buyers and of the development of market liquidity on trade and new contracts. And, this year, it includes a special focus on short-term LNG deliverability as well as shipping fleet availability, two important factors in assessing gas security of supply around the world.

<u>Link to the survey</u>

Energy Efficiency 2018 – October 2018

The report provides a special feature in the form of a new World Energy Outlook Efficient World Scenario, which answers the question: What would happen if policy makers realised all the economically viable potential for energy efficiency that is available with existing technologies?

Link to the survey

European Commission

The future electricity intraday market design - March 2019

The Commission Regulation (EU) 2015/1222 of 24 July 2015 defines the target model for a single European market for electricity. However, its current requirements for the single intraday coupling - namely congestion pricing based on actual bids, efficient use of cross-border transmission capacity and continuous trade - are difficult to reconcile. In that context, this study aims at analyzing possible options for improvements in the intraday market design, with a view to establishing a scheme for an efficient and effective transmission capacity pricing method.

Link to the survey

Distribution system operators observatory 2018 - February 2019

This report provides a picture of the features of distribution grids in Europe, on the way they are operated and how far Distribution System Operators (DSOs) are from the paved provisions proposed in the recent Electricity Directive of the European Commission. *Link to the survey*

Novel carbon capture and utilisation technologies - February 2019

The study draws on the best available scientific and technical evidence from across. It concludes that for CCU to contribute to climate change mitigation, the energy used in CO2 conversion must be of low carbon origin. It recommends that the European Commission develops a regulatory and investment framework to enable the deployment of CCU technologies, and a methodology to allow the calculation of the climate mitigation potential of CCU applications.

Link to the survey

Smart grid laboratories inventory 2018 - February 2019

This report presents aggregated information about the smart grid topics of research, the technologies, the standards and the infrastructure used by top organisations that hold smart grid activities at a laboratory level. Several categories of smart grid research have been identified and information is provided with respect to standards and sub-topics of research. *Link to the survey*

Deployment scenarios for low carbon energy technologies - January 2019

This report provides an outlook for deployment of a set of low carbon energy technologies, as well as background on how JRC-EU-TIMES baseline and decarbonisation scenarios are derived. The results help inform decision makers on the technology choices through which the EU can meet its climate and energy goals under different global energy scenarios. *Link to the survey*

Slope energy storage - January 2019

This study analyzes an innovative energy storage method called Slope Energy Storage. it presents a detailed analysis of the feasibility of the system installation. The results show the very promising potential of the approach, as a large amount of energy can be stored. The estimated efficiency of a Slope Energy Storage system is 70%.

Link to the survey

Strategic Energy Technology Plan delivering results - November 2018

The SET Plan aims at at accelerating the development and deployment of low-carbon technologies, at improving new technologies and at bringing down their costs, by coordinating national research efforts and facilitating financing of projects in the energy sector. This paper resume the results.

Link to the survey

The role of Trans-European gas infrastructure in the light of the 2050 decarbonisation targets - October 2018

The required sharp decrease in CO2 and other greenhouse gas emissions by 2050 – as committed to in the Paris Agreement - may drastically reduce the share of natural gas in the European energy mix. The objective of the study is to assess the role of Trans-European gas infrastructure in the light of the EU's long-term decarbonisation commitments. *Link to the survey*

EU energy in figures - October 2018

The energy sector is one of the pillars of growth, competitiveness and development for modern economies. This publication provides an overview of the most relevant annual energy related statistics for the European Union as a whole and for each of its Member States. *Link to the survey*

Eurelectric

Eurelectric Annual Report 2018 - March 2019

This report exposes Eurelectrics achievements and commitments for the year ended and 2019 in regard with decarbonation, electrification, power distribution and sustainability.

Link to the survey

Enabling sustainable investments via sustainable finance - January 2019

This paper proposes on approach to sustainable finance that should allow to achieve the long-term decarbonisation objective of carbonneutrality, as defined in the Paris Agreement.

Link to the survey

Decarbonisation pathways – November 2018

In the 2015 Paris Agreement, 195 UN member states agreed to limit the global temperature rise to well below 2 degrees Celsius by 2100. This paper resume the Europe's climate commitments to reduce CO2 emissions with electrification, and explain what will be needed to achieve this ambitious target.

Link to the survey

Oxford institute for Energy

New Players New Models - April 2019

The LNG business is in a period of considerable change as it moves from a structured to a traded market. The report concludes that for new Final Investment Decisions to happen, in the absence of a fully liquid market and the lack of availability of independent LNG pricing indices, long-term contracts or equity investment/offtake structures with high credit counterparties will still be required. *Link to the survey*

Outlook for Competitive LNG Supply – March 2019

This paper provides an overview covering ~300 Mtpa of LNG projects seeking a FID over the next two years, selects five promising areas (Mozambique, Nigeria, Qatar, Russia, and the United States) for potential new LNG Final Investment Decisions. *Link to the survey*

Quarterly Gas Review - Analysis of Prices and Recent Events - March 2019

The presentation provides insights and analysis on recent regional and global pricing issues while also commenting on relevant questions concerning policy and market-related matters.

Link to the survey

Auctions for allocation of offshore wind contracts for difference in the UK - February 2019

The study shows that implementing a stringent non-delivery penalty and holding regularly scheduled auctions can improve deployment rate without increasing support costs and better incorporate information on technology cost decreases into the bids. *Link to the survey*

Quarterly Gas Review - Analysis of Prices and Recent Events - November 2018

The presentation provides insights and analysis on recent regional and global pricing issues while also commenting on relevant questions concerning policy and market-related matters.

Link to the survey

Decarbonized Market Design: An Insurance Overlay on Energy-Only Electricity Markets - October 2018

In the face of challenges to energy-only market design under the electricity sector transition, an option considered by many jurisdictions is to incorporate some form of centralized capacity mechanism to respond to shortfalls in the market provision. This paper proposes a new model for electricity market design—the insurer-of-last resort model—that works as a risk overlay on an existing energy-only market. *Link to the survey*

Power-to-Gas: Linking Electricity and Gas in a Decarbonising World? - October 2018

Power-to-gas (P2G) relies on the principle of electrolysis: using electricity to separate water into its component parts of hydrogen and oxygen. This paper reviews the status of power-to-gas and makes an assessment of potential future development pathways and the role which it could play in decarbonising the energy system.

Link to the survey

The EU ETS phase IV reform: implications for system functioning and for the carbon price signal – September 2018

This paper aims to look at what the current outlook for the EU ETS in phase IV is. It will do so by examining the history and functioning of the EU ETS to date, by outlining the main elements of the phase IV reform, as proposed by the European Commission and as subsequently amended in the course of the legislative process, and their effects on the system. The paper will end by offering an outlook on the future of the EU ETS.

Link to the survey

Oxford Energy Forum - The Future of Gas - September 2018

This issue of the Oxford Energy Forum looks at the future of gas from different perspectives. Future development of decarbonised gases – biogas, biomethane and hydrogen – and the consequences for gas networks.

Link to the survey

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