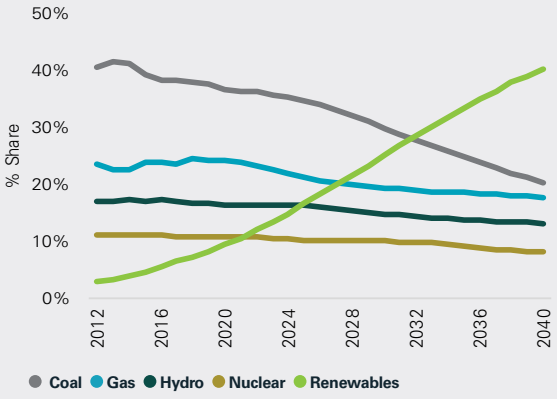
How utilities in transition are transforming the electric power sector

Around the world, the electric power sector is undergoing a profound transformation driven by the **decarbonisation** of the global economy and the **electrification** of energy demand. Utilities are at the forefront of this multi-decade transition. By adapting and, in many cases, substantially overhauling their business models to accommodate new greener technologies and decentralised power sources, utilities are bound to be major beneficiaries of secular growth and attractive returns on significant capital investments.

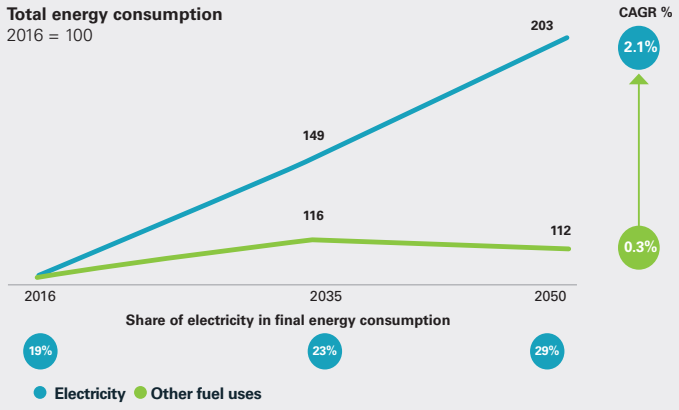
Chart 1 below shows how decarbonized renewables have been gaining ground as a share of total energy sources over the past decade, and Chart 2 illustrates the expected growth in demand for electricity (from transportation, buildings and industrial sources) as electricity takes a greater share of final energy consumption over the next 20 years at least.

Chart 1: Decarbonisation



Source: BNEF. This chart contains projections, there is no guarantee these projections will be met.

Chart 2: Electrification



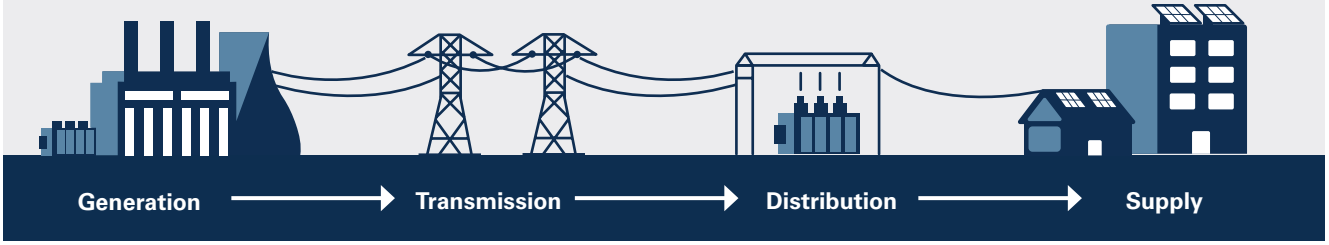
Source: McKinsey. This chart contains projections, there is no guarantee these projections will be met.

We will explain 1) the utilities business model and how it is evolving, 2) how renewables are disrupting the traditional model and underpin growth and returns, and 3) how the equity markets assess the transformation.

Evolution of the utilities business model

The electric power value chain is comprised of three areas: generation, transmission & distribution, and supply (Chart 3 below). Power utilities often have a combination of regulated and non-regulated business segments. In Europe and parts of the United States, generation and supply are largely deregulated – meaning profitability is exposed to changes in market prices of power and retail rates. Meanwhile, transmission and distribution networks in Europe and the U.S. operate under regulated frameworks. This means utilities' networks are granted monopoly power, with regulators playing a key role in overseeing their operations and setting allowed returns on capital investment.

Chart 3: Electric Power Value Chain



Source: GTM, Ecofin

The traditional regulated utilities business model

Regulated utility assets generally operate under a cost-of-service model. Under this scheme, utilities receive a regulated return of – and on – capital expenditures. The key drivers for earnings are: (1) net capital invested, often referred to as rate base or regulated asset base (RAB); (2) allowed capital structure; and (3) allowed return on net capital invested (a function of interest rates, risk profile, system needs, requirement to incentivise investment…). All of these are approved by relevant regulators [and provide certainty of cash flows]. Additionally, some U.S. states and many European countries have adopted performance-based ratemaking, which incentivizes utilities to achieve outcomes consistent with customer or government interests (such as efficiency, customer service and GHG emissions reduction). Chart 4 provides a simplified example.

Chart 4: Determination of allowed return on capital*

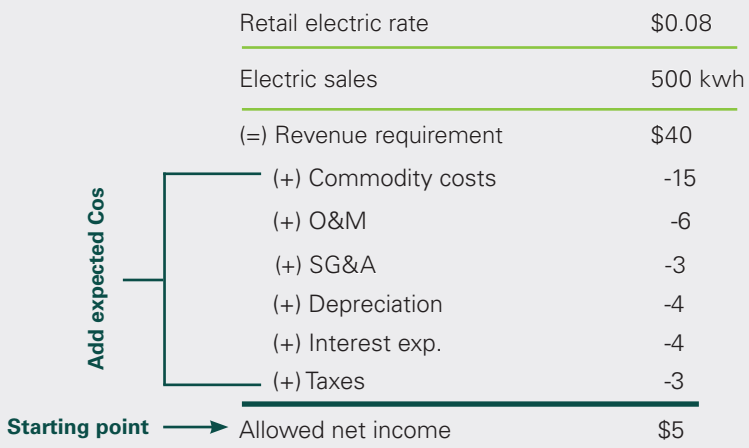
Ratebase (value of property, plant, and equipment		Allowed capital structure (debt/equity)		Allowed return on capital		Allowed net income
$100	x	50% equity	x	10% ROE	=	$5

*Does not include performance-based ratemaking

The key driver of earnings growth under a regulated model is capital expenditure; incremental capital expenditures result in a higher rate base on which to earn returns. The factors governing rate base growth are: (1) system need; (2) adequate regulatory framework; and (3) customer affordability.

Once allowed net income is set, the second step is to work backward to determine the revenue requirement. This is done by adding up all costs of operations. It should be noted that commodity/fuel costs are treated as a passthrough for regulated utilities, so changes in commodity prices do not affect earnings. Required revenue is then divided by total sales to determine the retail electric rate ($/kwh).

Chart 5: Determine revenue requirement



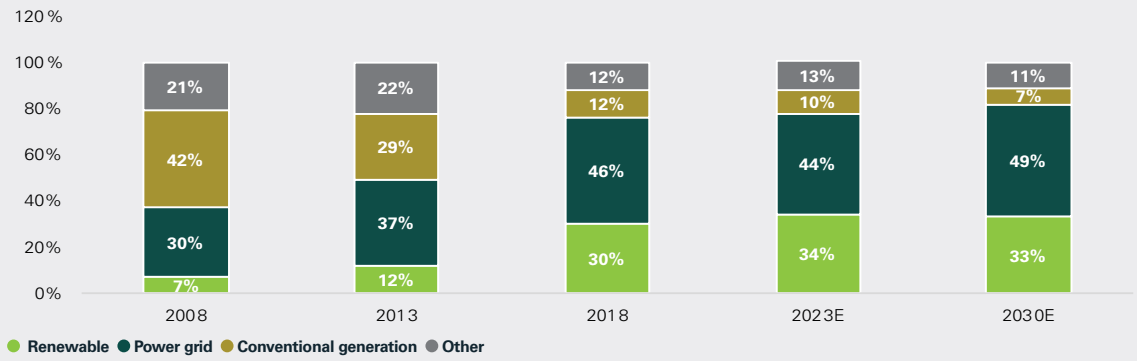
Source: Bank of America Merrill Lynch

De-risking of the integrated utility model

Deregulated thermal power generation has been severely hit in Europe and the U.S. by declining commodity prices and power prices over the past decade. Utilities have been pushed to re-balance their exposure and adapt their business profiles, particularly in Europe where power production is the most deregulated. Integrated utilities have adapted to this new environment by shifting capital investment towards networks and renewables and away from merchant thermal generation.

In 2008, about 42% of the operating profit of a typical utility in Europe came from conventional power generation (see Chart 6 below). Conventional generation was largely merchant, i.e. largely dependent on commodity prices and therefore volatile by nature. Today that proportion has dropped to c. 12%. Meanwhile, the proportion of fully-regulated network activities and contracted renewables projects has increased significantly and now accounts for close to 80% of European utilities' operating profits. Cash flows, therefore, have become much more predictable and dividends more sustainable.

Chart 6: EBITDA split by activity for EU utilities



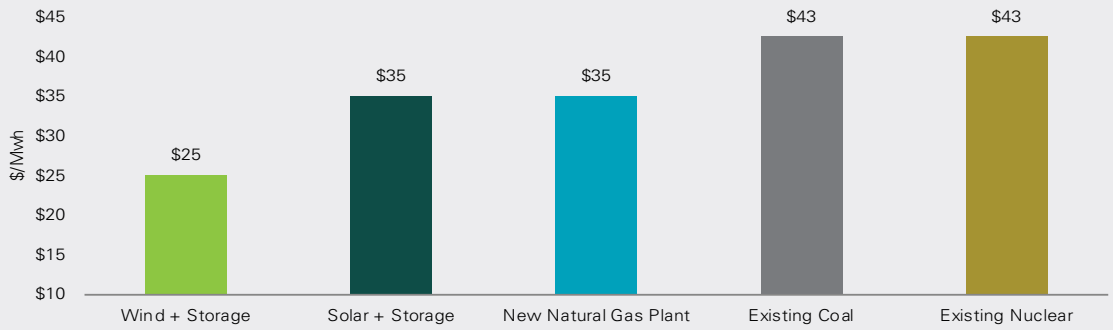
Source: Goldman Sachs. This chart contains projections, there is no guarantee these projections will be met.

Renewables underpin growth and returns

How regulated utilities benefit from the disruption of renewables

For regulated utilities, a key limiting factor on rate base growth is customer affordability. There is significant regulatory pressure on the industry to prioritise customer affordability, so opportunities to deploy capital that result in customer savings (i.e., lower fuel costs) provide a win-win situation. Today, companies can provide such savings for customers by modernizing their generation fleets. As the costs of natural gas and renewable generation have fallen, utilities are replacing older, less efficient coal and nuclear generation with these cost competitive sources. In fact, given the cost declines in renewables, new wind and solar generation are now cheaper than the operating costs of existing coal or nuclear facilities (see Chart 7).

Chart 7: Estimated Costs of Generation Resources (Post-2023)



Source: NextEra Energy

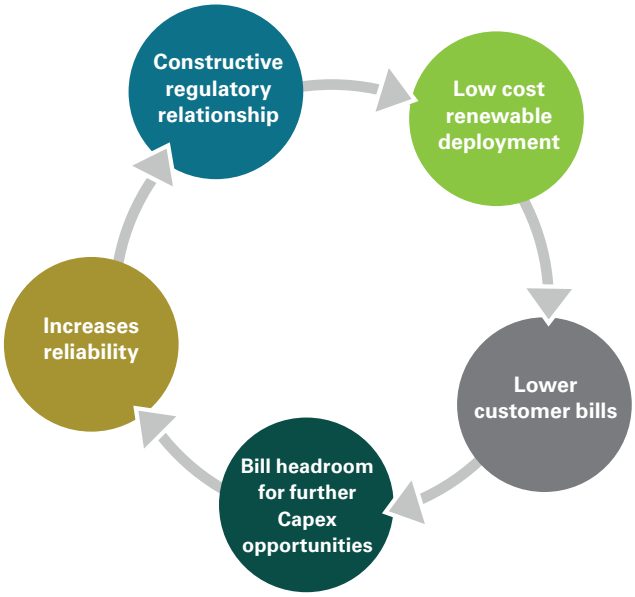
Operating cost savings create an opportunity for additional capital investment. Typically, $1 of savings in operation expense (OpEx) leads to $7-8 of capital investment (CapEx) for the same customer bill impact, as detailed in Chart 8 below:

Chart 8: Capital investment opportunity from cost savings

Savings:	Commodity costs/O&M	$1.00 (a)
New investment: (i.e., renewables)	CapEx	$7.70 (b)
Revenue recovery:	Revenue requirement	$1.00 (c); sum of net income + costs
	Commodity costs	-
	O&M	0.15 2% of (b)
	SG&A	-
	Depreciation	0.31 (b) /25 year useful life
	Interest exp.	0.15 (b) 50% debt financed at 4%
	Allowed NI	0.39 (b) 50% equity financed at 10%
Net revenue impact	-	(c) - (a)

This OpEx-to-CapEx formula creates a cleaner, more reliable electric grid, which in turn leads to a more constructive relationship between a utility and its regulator. Having a constructive regulatory relationship is paramount to utility investors as it ensures appropriate recovery of capital expenditures.

Chart 9: Successful Utility Playbook



Source: Ecofin, NextEra

Renewable development improves cash flow stability

In deregulated markets, where the generation capacity is not rate-based, the shift towards cleaner energy materially improves cash flow stability. Indeed, as opposed to thermal plants which have high variable costs and where returns depend on power prices, new renewable plants are in most cases fully contracted and provide stable returns.

Chart 10 below compares wind and solar technologies with traditional thermal technologies.

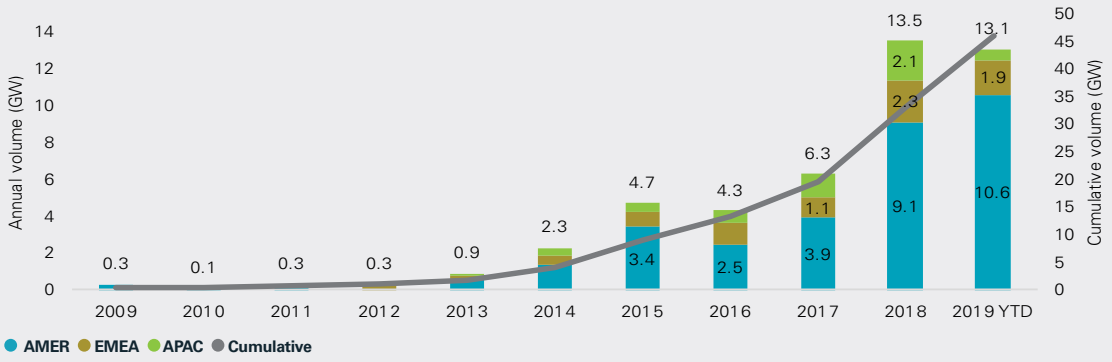
Chart 10: Wind and solar vs. thermal

	Wind/solar technologies	Thermal technologies
Contract life	Fixed price for 10/20 years	No contract unless there is a capacity market mechanism in place
Remuneration	Fixed price for the majority of the production or green certificates* (UK, Australia…)	Energy + capacity payments
Return	c200bps + WACC	Required IRR higher than for renewable
Investment per kw	High	Lower
Gearing	High	Lower
Fuel cost	0	High
O&M cost	Low	High
Greenhouse effect	Low	High

*Some countries have chosen to offer green certificates for each MWh of electricity produced. In this case, the total revenue is the sum of the green certificate price plus the revenue from the sale of electricity. UK is moving from the "Green certificate" model to an inflation-indexed price model.

As explained, renewables have reached 'grid parity' – when alternative energies can generate power at a price below the price of electricity from the grid. This expands the pool of offtakers for renewable power contracts, a pool which now includes corporates. Corporates seeking to reduce their carbon footprint and lock in low electricity prices are increasingly signing long-term power purchase agreements (PPAs) with renewable developers. In the first 9 months of 2019, corporations globally signed contracts to purchase 13GW of clean energy, some 4.4GW higher than at the same period the previous year.

Chart 11: Global corporate PPA volumes, by region

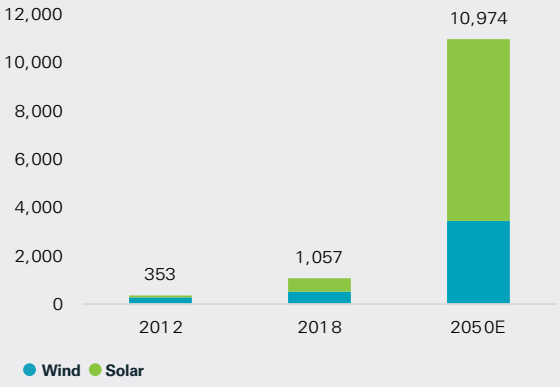


Source: BNEF

Current expectations for global renewable capacity growth could be conservative

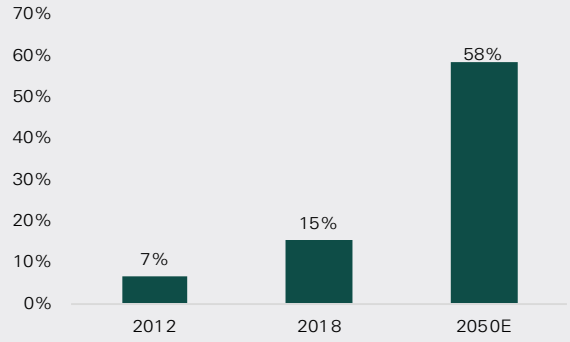
Wind and solar are expected to account for just under 11,000GW or circa 60% of total global generation capacity by 2050 (chart 12). This would imply a 7.6% annual rate of capacity additions over the next 30 years.

Chart 12: Global wind and solar capacity (GW)



Source: BNEF. This chart contains projections, there is no guarantee these projections will be met.

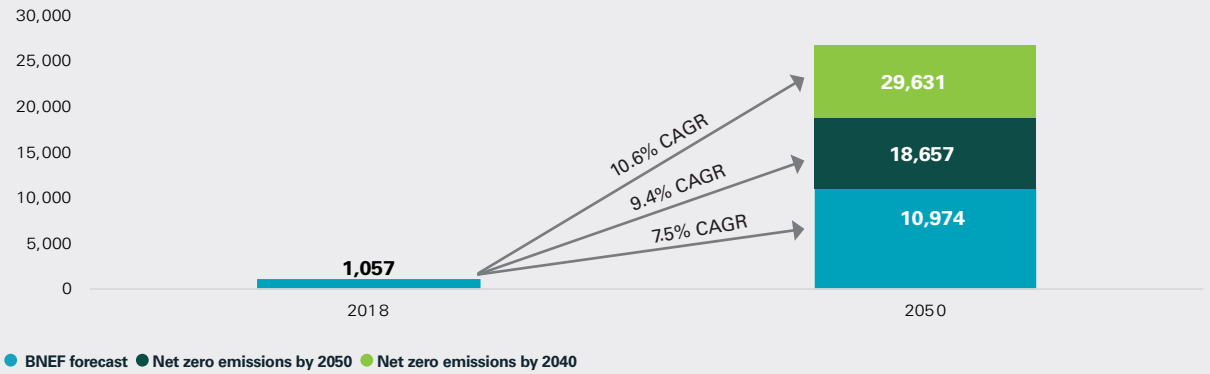
Chart 13: Wind and solar as % of global capacity



Source: BNEF. This chart contains projections, there is no guarantee these projections will be met.

Compared to the 200GW of renewable capacity that the world has been adding annually over the last two years, this run-rate would need to be increased by at least 50% over the next 30 years just to meet BNEF's targets. We believe this number will prove to be conservative in light of the 2050 net zero emissions target already set by more than 70 countries and under discussion in Europe (European Green Deal). According to UBS, the rate of new wind and solar capacity additions would need to be increased to 550GW per annum on average to reach net zero emissions by 2050, a growth rate of 9.4% per annum (Chart 14).

Chart 14: Global wind and solar capacity (GW)

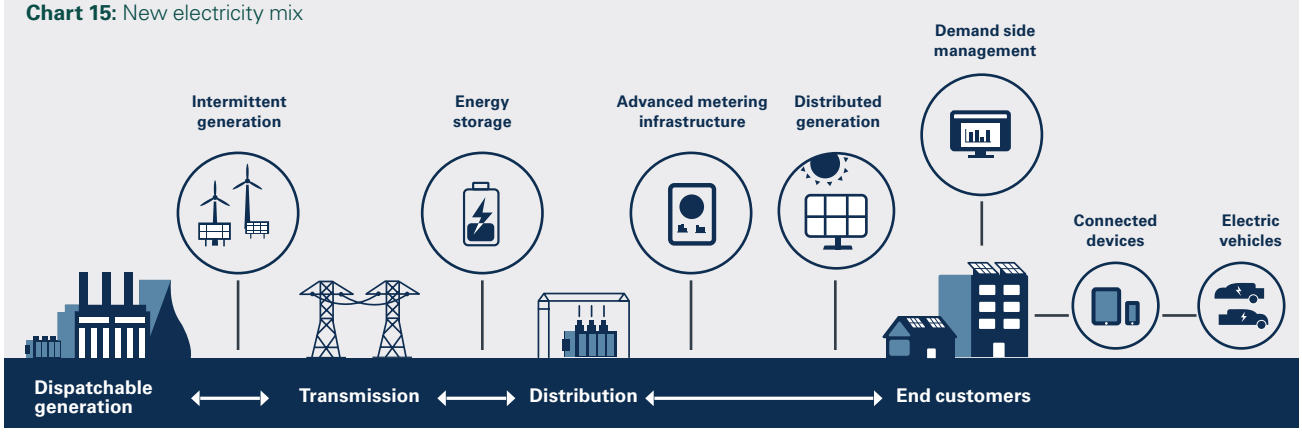


Source : UBS. This chart contains projections, there is no guarantee these projections will be met.

Double benefit for utilities: more renewable means more investment in networks as well as in new technologies

Another positive aspect of the energy transition for utilities comes from the investment needed in networks to accommodate increasingly intermittent and distributed generation. Replacing large and predictable sources of power generation with numerous smaller and intermittent wind and solar farms is not without challenges for the grid. Indeed, the grid must be more robust, more reliable and more responsive to the intermittent generation caused by the new electricity mix. As renewable generation is increasing its share in the overall energy mix, we expect a growing investment opportunity set in adjacent services for utilities.

Chart 15: New electricity mix



Source: GTM

How equity markets assess the evolution

Equity markets have been fast in identifying the combined value of accelerating growth and a de-risked cash flow outlook. The best performing utility groups over the past couple of years have been those which have implemented a structural shift in strategy and business exposure. We describe below two of the most salient examples in the North American and European markets.

Florida Power & Light case study (NextEra Energy group)

Florida Power & Light, a subsidiary of NextEra Energy (NEE), is a good example of a regulated utility effectively transitioning its generation fleet for the good of customers and shareholders. We highlight below in Chart 15 how its business has changed over the last decade.

Key points (2008-2018):

- Revenue was essentially flat (+2%) while average electric rates fell 7%
  - Net income rose 175% driven largely by a 121% increase in rate base
- Generation costs fell over $3 billion or >50%
  - This was accomplished by switching from higher priced coal, oil, and purchased power generation to lower cost natural gas

Chart 16: Florida Power & Light (FPL)
Numbers in 000's, unless otherwise noted

	2008	2018	10 year Δ
Average Electric Rate ($/kwh)	11.68	10.91	-7%
Electricity Delivered	105,406	119,894	14%
Total Revenue	**$11,686**	**$11,965**	**2%**
Operating Expenses:			
Total Electrical Generation Cost	$6,749	$3,250	-52%
O&M	1,438	1,514	
Other Taxes	1,073	1,314	
Depreciation	860	2,633	206%
Interest Expense	334	541	
Income Taxes	443	539	
Net Income	**$789**	**$2,171**	**175%**
Net PP&E (i.e., rate base)	**$18,783**	**$41,499**	**121%**
Generation Mix (%):			
Natural Gas	53%	73%	
Nuclear	22%	22%	
Coal + Oil	11%	2%	
Purchased Power	14%	2%	
Solar	0%	1%	
Emissions:			
CO_2 Lbs / Mwh	~850	~650	**-24%**
US Average	~1,300	~960	

Source: SNL, Company Filings

FPL has successfully grown its net income at over 10% per year while reducing customer electric rates and emissions (CO_2 Lbs/Mwh), creating a positive outcome for customers, the environment, and shareholders. While this was primarily accomplished via an increase in natural gas generation and a fall in natural gas prices, we believe the next opportunity for the company is to increase adoption of renewable energies, particularly solar. In fact, in 2019 FPL unveiled plans to increase solar generation from 1% in 2018 to 15% in 2028 (source: 2019 FPL 10-Year Site Plan) which will help to keep customer bills affordable, lower emissions, and present an attractive investment opportunity for shareholders.

Looking across the US regulated industry, we see opportunities for other companies to follow a similar playbook. Utilities with a high proportion of coal generation have an opportunity to retire and replace coal with low cost renewables. This has the potential to drive savings for customers, lower emissions, and earnings growth for regulated utilities.

Chart 17 presents the highlights of a recent study by Morgan Stanley illustrating the business opportunity related to coal phase-out:

Chart 17: Capex opportunity

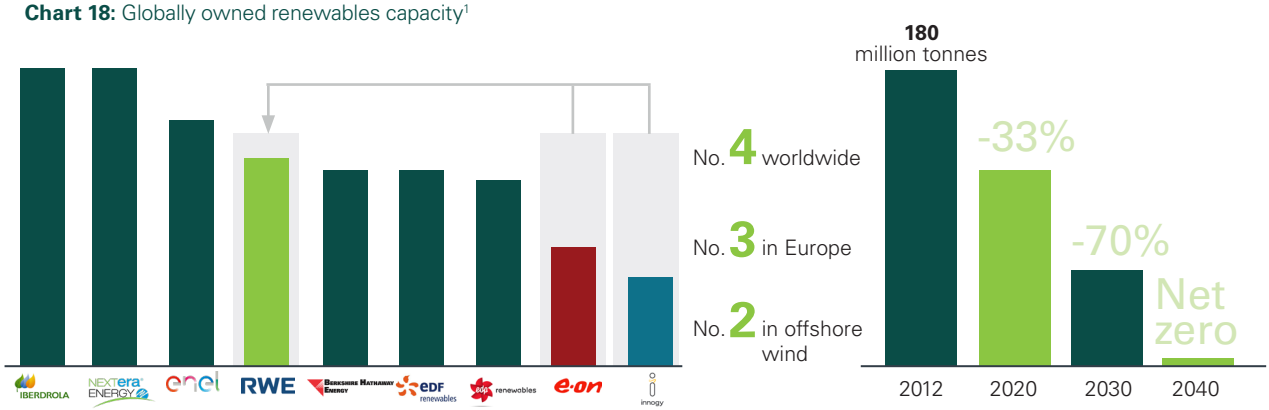
	Total reg. coal capacity (MWs)	Renewables capacity needed (MWs)	Potential savings ($mn)	Identified Capex opportunity ($mn)	Earnings impact in 2025 (%)
AEP	12.4	12.1	$490	$17,249	14%
XEL	6.5	5.7	174	6,756	9
PNW	1.4	1.5	73	2,568	8
FE	3.4	4.9	76	6,335	8
DUK	15.4	11.8	244	16,782	8

RWE case study:

We have several examples worth mentioning in the European context. German utility major RWE, which was largely exposed to coal-fired units prior to the 2018 asset-swap with its main peer E.ON, now generates most of its EBITDA from renewable energy, wind and solar. E.ON, meanwhile, has fully exited renewables to focus on networks and downstream client solutions.

The asset-swap with E.ON has transformed RWE into one of the world's largest clean energy groups with 9.5GW of installed globally (and targeting 2-3GW of additional installations per annum)(please see Chart 18). This deal, coupled with the agreement recently concluded with the German government to phase out its lignite capacity, will enable the company to reach net zero emissions by 2040.

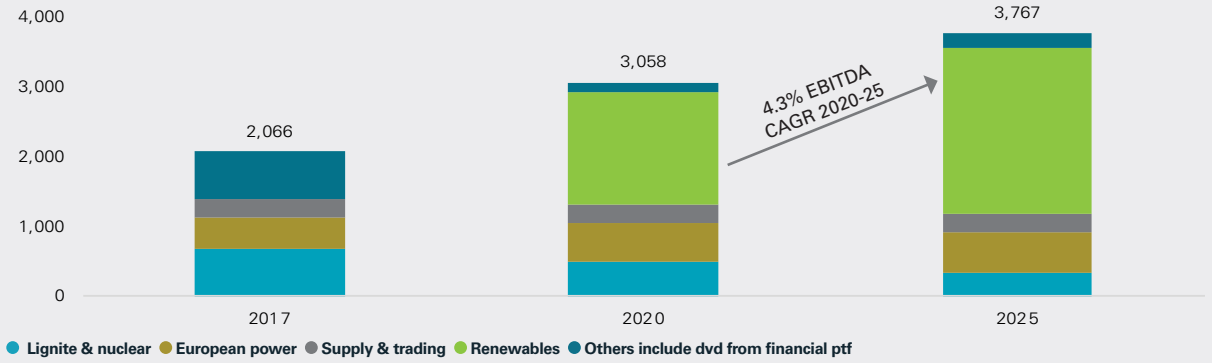
Chart 18: Globally owned renewables capacity[1]



Source: BNEF, as of 31 August 2019. [1]Excluding Chinese players. Includes onshore wind, solar, small hydro, marine, geothermal and biomass.

RWE's business profile has been completely reshaped by the asset-swap deal (Charts 19):

Chart 19: RWE EBITDA evolution 2017-2025E

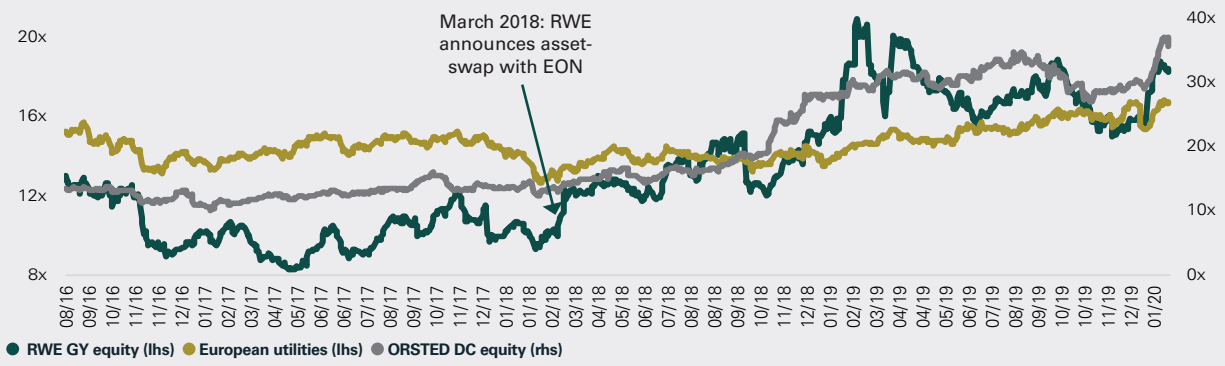


Source: Ecofin. This chart contains projections, there is no guarantee these projections will be met.

RWE's strategic re-positioning has led to a significant re-rating of its shares. The stock, which was trading on a c. 10x P/E ratio until a couple of years ago, started to re-rate as soon as the asset swap with E.ON was announced in March 2018 and has reached a price/earnings multiple of 17x today (Chart 20). The sector's P/E has hardly changed over the same period.

With such a re-rating, RWE seems to follow the example of Scandinavian wind operator Orsted which until 2017 was still deeply involved in oil & gas related businesses (under the name DONG Energy). Orsted is now the world's leader in offshore wind and trades at c. 30x earnings versus 12x four years ago (grey line in Chart 19).

Chart 20: 1-year forward price to earnings



Source: Ecofin

Summary & conclusion

- Utilities are amongst the largest emitters of CO_2 on the planet. As such, they are at the forefront of decarbonisation trends.
- Over the past 5-10 years, utilities have been switching out of the most carbon emitting technologies – above all coal-fired power generation – and have expanded their exposure to clean power sources, primarily wind and solar.
- The fast development of renewable capacity worldwide is a source of secular growth for utilities groups; it is also a supportive factor for returns as technology gains have transformed wind and solar as the most cost-efficient technologies to generate power. Those factors fuel through both regulated and non-regulated utility business segments.
- Renewables are, therefore, the main beneficiaries of both the decarbonisation trend and the growing electrification of energy uses.
- As large-scale renewables projects are increasingly contracted, the evolution has led to a significant de-risking of the utilities business model which is now hardly dependent on commodity price fluctuations.
- **The combination of structural growth, sustainable returns and predictable cash flows is a winning formula for equity markets which are just starting to value the impact on the valuations of utilities of the energy evolution.**