

European Electric Power and Natural Gas



Beyond the storm –
value growth in the EU power sector

Preface

This report summarizes McKinsey's outlook on the EU electric power sector. This perspective is based on a course of comprehensive, granular research that analyzed each step of the value chain in each country. The estimates and forecasts are derived from our EU power model, which simulates the hourly demand-supply balance and power prices in European markets based on industry fundamentals, analysis of industry data, and interviews with McKinsey and external experts.

We have developed this perspective to help utilities navigate the "perfect storm" that is hitting the industry and develop new strategies for growth. The report describes a series of medium-term implications for the sector and its stakeholders.

We hope you enjoy reading this report and that you find our conclusions insightful and valuable to your organization.

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Executive summary

Over the last five years, the EU power sector has been hit by a “perfect storm” of macroeconomic and industry-specific factors that have led to overcapacity and low prices. As a result, the region’s large publicly traded utilities have, on average, lost half of their market capitalization since 2008, destroying around EUR 500 billion of shareholder value.

Beyond its financial impact, the crisis has fundamentally changed the game and called the business model of utilities into question. Many structural and asset-related competitive advantages have disappeared, while additional skills are required to compete in growth areas such as renewable energy and new downstream activities.

Market fundamentals remain weak and suggest that the “storm” could continue for the foreseeable future. Nevertheless, we believe that the impact of these continuing downward trends could be offset by the actions currently being taken by utilities, such as operational improvement and capacity rationalization. Therefore, our base-case scenario – i.e., if no additional action is taken – is a stabilization of the value pools for the sector and for utilities by 2020.

We also believe that, on top of this base case, there is a significant value upside potential (of up to more than 40 percent) that could be won by pushing further operational excellence, solving the generation capacity dilemma and capturing market share from growth in new value pockets. This could bring the sector value pools back to 2008 levels by 2020.

Incumbent utilities will only drive this recovery and realize the upside if they make bold moves, e.g., radically re-allocating capital and developing completely new organizational capabilities. Research from the McKinsey Strategy Practice suggests that in challenged and transforming industries only those companies that take step changes and make unprecedented shifts to their investments in both assets and capabilities are able to survive and grow.

Most incumbent utilities are already pursuing key recovery activities with similar levers, and new strategies are just emerging, e.g., regional growth, refocusing along the value chain. Going forward, however, utilities will need to adopt a more radical approach to differentiate themselves. These actions will be needed across a range of levers, e.g., portfolio restructuring, operational excellence, new skill development and innovation, and financial engineering.

The paradigm shift in the sector, with higher and more evenly spread value across the value chain, seems irreversible. The identified upside will be tough for incumbent utilities to capture, and it is rather unlikely that they will all be able to take part.

In the past five years, the European power sector has faced a perfect storm

The EU electric power sector experienced a period of growth and high profitability between 2004 and 2008. This was driven by a sustained increase in demand across Europe and a steady increase in commodity prices. Together, these trends led to an increase in wholesale prices by an average of 40 percent across most major European markets between 2005 and 2008.

Since 2008, however, market forces have converged to create excess capacity in the sector and drive prices down, leading to a significant decline in profitability for incumbent utilities¹.

Market forces have combined to shift the power sector's capacity-price balance

The sector's high-growth trajectory suddenly and dramatically changed in 2008. Wholesale power prices dropped from around EUR 70 per MWh in Germany in 2008 to EUR 35 per MWh at the end of 2014. Four major factors have contributed to the sector's excess capacity and price decline:

- **Sluggish economic growth.** The economic crisis had a significant impact on energy demand. Steady growth stopped and power demand declined by 0.3 percent per year on average from 2008 to 2012. The demand for power in the EU is currently 2 percent (60 TWh) under the pre-crisis level and 9 percent (300 TWh) under pre-crisis projections – which were the basis for investment decisions in the capital-intensive assets that are commissioned today.
- **Boom in renewable generation.** Subsidies for renewable energy sources (RES) have helped drive more than EUR 80 billion in annual investment, with a peak of almost 30 GW RES capacity commissioned in 2011. RES production almost doubled in five years, from 238 TWh in 2008 to 463 TWh in 2013, and merchant generation has suffered as a result. The combined effect of the economic crisis and the increase in RES generation drove an average decline in net demand for merchant generation of 1.7 percent per year from 2008 to 2013.
- **Pipeline of legacy investments.** Over the same period, merchant generation capacity increased as legacy investments (83 GW) outweighed capacity retirements (65 GW).
- **Low fuel prices.** The last significant event was a sharp decline in fuel prices. CO₂ prices crashed, and they remain at very low levels as the push for an early EU-ETS reform continues to be limited. Coal prices have almost halved since 2011 – mainly driven by the rise in US exports made possible by the recent shale gas boom.

¹ In the context of this report, we consider incumbent utilities to be both traditionally established utilities as well as those companies that – due to divestment decisions – evolved from established utilities companies and have not been taken over by investors from outside the sector (e.g., pure financial investors)

Due to these four effects, load factors of fossil merchant generation have decreased by approximately 26 percent across Europe since 2008 and prices have dropped. Gas-fired power plants, which have lost competitiveness versus coal, are the biggest victims.

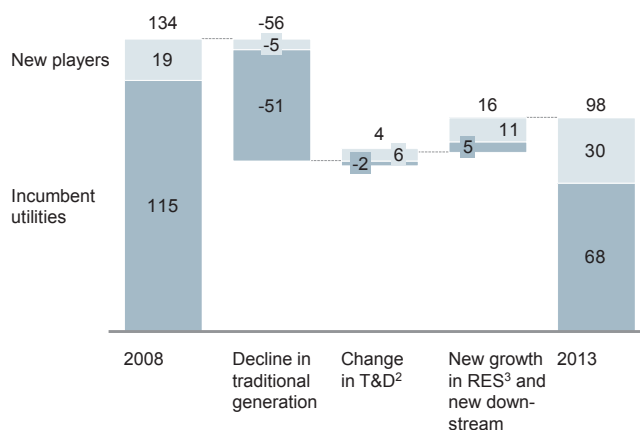
Beyond its financial impact, the crisis has profoundly changed the competitive dynamics in the sector

Not surprisingly, these events had severe financial consequences. Total profits for the sector decreased almost 30 percent between 2008 and 2013.

Incumbent utilities, which used to represent 85 percent of the industry profit pool, have been hit the hardest. Their high degree of exposure to merchant generation – the traditional core of the industry – made them especially vulnerable and resulted in a combined profit loss of around EUR 50 billion, a 40 percent decline, between 2008 and 2013 (Exhibit 1).

Total sector profits decreased by ~ EUR 35 billion and incumbent utilities lost about one-third of overall value to new entrants¹

Sector value pool EBIT
EUR billions



¹ Including non-European utilities, tech companies, equipment manufacturers, and private equity investors

² T&D = transmission and distribution

³ RES = renewable energy sources

SOURCE: Companies' financials; McKinsey

Exhibit 1

On average, Europe's large publicly traded utilities lost half of their market capitalization between 2008 and 2012 and embarked on the path to recovery later than most other sectors.

At the same time, the rules of the game have changed profoundly. The traditional competitive advantages of incumbent utilities, e.g., the integrated position along the value chain and significant ownership of central merchant generation assets, have now lost their edge, if not turned into disadvantages:

- Many conventional gas and coal power plants are barely profitable due to the forces discussed above and represent a significant financial burden for utilities' balance sheets. Merchant generation represented around 70 percent of industry profits in 2008. By 2013, however, it had lost almost two-thirds of its value and represented less than 40 percent of industry profits.
- Synergies across the value chain have diminished due to unbundling requirements and increasing market liquidity.

In addition, a new set of skills is required to be successful in new growth areas such as renewable energy and new downstream products and services. Key success factors in this part of the value chain include decentralized operations and management, a strong customer focus, fast decision making, flexible financing and project development, and the ability to design and implement partnerships with players outside the industry.

These capabilities are not inherent to incumbent utilities, whose success previously relied on the careful planning, construction, and safe operation of large centralized and risky assets as well as on the management of a large customer base with a rather centralized approach.

As a consequence, during the storm, new entrants managed to grow their profits in the sector from EUR 19 billion in 2008 to EUR 30 billion in 2013. They have been able to capture about one-third of the value lost by incumbent utilities.

In our base-case scenario, utilities' ongoing efforts will lead to a partial recovery through 2020

We have projected the likely evolution of the industry, anticipated how market factors will impact the sector in the future, and identified several factors that could change the current momentum. Our analysis was conducted at country level and for each step of the value chain. The results are based on the McKinsey EU power model (see text box) and are complemented with a series of additional purpose-built models, an analysis of industry data, and interviews of McKinsey and external industry experts.

Overview of the McKinsey power model

To assess the wholesale market development in the EU power sector, we leveraged the McKinsey power model, which simulates the hourly demand-supply balance and power prices in 22 European markets based on market fundamentals.

The model dispatches power units against load curves per market, including interconnections between countries, and delivers prices, production mix, and cash flows as main outputs. The value pool and missing money analyses presented in this report, for example, are based on the outputs of this model. Exhibit 2 illustrates the structure of the power model: the main input parameters, the geographic and value chain scope covered, and the key outputs.

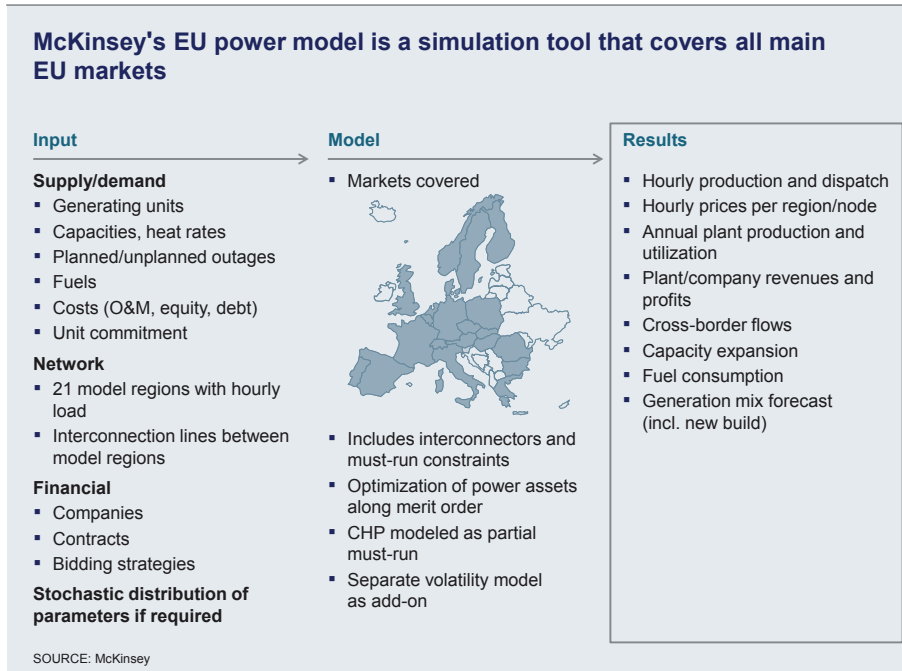
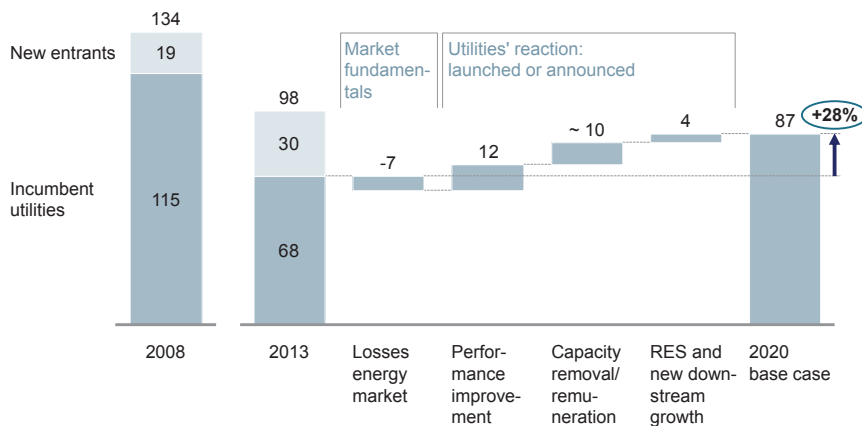


Exhibit 2

In our base-case scenario, the value pool of utilities is expected to increase by 28 percent through 2020 (Exhibit 3), recovering half of the value pool lost since 2008. In this scenario, we expect the actions already undertaken by utilities to counterbalance the effect of the continued degradation of market factors.

Our base case is a partial recovery of the value pool for incumbent utilities

Sector value pool EBIT (base case)
EUR billions



SOURCE: McKinsey

Exhibit 3

Several drivers of the “perfect storm” will continue to impact utilities

Economic growth is expected to remain sluggish in most European economies – McKinsey’s Global Institute projects an average of 0.7 percent annual GDP growth for Europe in a conservative scenario. At the same time – and although there is some uncertainty regarding the support that will be available for renewables and the amount of new build – the RES capacity buildup will likely continue and further reduce the need for merchant generation. 23 GW of new capacity additions per year are required to meet the EU’s 2020 RES targets, which is in line with the historical average of 22 GW per year since 2008.

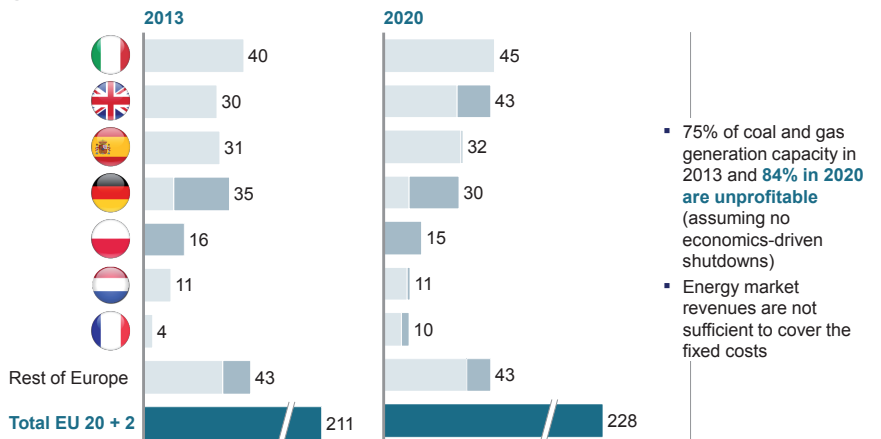
As a result of these economic growth and capacity buildup forecasts, overcapacity in the system is likely to increase through 2020. We estimate an overall capacity margin of around 520 GW in Europe by 2020 (compared to 400 GW currently). This would lead to:

- Decreasing load factors for fossil generation (31.5 percent average load factor for gas and coal plants in 2020 versus 39.0 percent today)
- No significant power price recovery (as prices are expected to remain at ~ EUR 30 to 40 per MWh in major continental markets) – which is in line with the current market view, given the levels of power forward prices for the next 3 years
- Approximately 230 GW of fossil capacity is likely to remain unprofitable on the energy-only market, despite all currently planned closures and mothballing (a 26 GW decrease in traditional generation capacity by 2020 is expected) (Exhibit 4).

A large volume of fossil generation will remain unprofitable through 2020

Coal and gas generation capacity with a negative EBITDA on the energy-only market

GW



Utilities are implementing a series of measures to weather the storm

Incumbent utilities have reacted to the value-destroying market forces with a series of measures:

- **Performance improvement programs.** The top six European power utilities have announced cost improvement programs that promise savings of ~ EUR 12.5 billion. This figure increases to EUR 19 billion when we account for smaller utilities, of which ~ EUR 11 to 13 billion could materialize after inflation.
- **Divestment, deleveraging programs, and capacity removal.** Incumbent utilities have announced over 50 GW of closures and mothballing.
- **Shaping regulation.** Utilities have started to team up to shape the future regulation of the industry (e.g., the Magritte Group), especially the implementation of capacity remuneration mechanisms (CRM), to maintain a healthy power demand-supply balance and avoid the closure of loss-making plants, which would increase the risk of capacity shortage at peak demand.
- **Targeting new growth areas.** Overall sector value is expected to be significantly lifted by further RES buildup and the development of the new downstream. This will create an additional value pool of EUR 26 billion by 2020 for the sector. In particular, the new downstream could cover a wide range of services such as decentralized generation (solar PV, combined heat and power installations), the substitution of gas heating by heat pumps, demand management, and storage solutions. In the base-case scenario, we anticipate that new entrants will continue capturing most of this new growth and that incumbent utilities will continue to struggle to compete, securing only EUR 4 billion, which is in line with their historical share.

We estimate that these actions could increase the utilities value pool by ~ EUR 26 billion through 2020 (cf. Exhibit 3). This should give them some much needed breathing room to adapt to the changing competitive dynamics.

That said, there is significant uncertainty about the key assumptions, especially commodity prices, in our scenario. To test the robustness of the base-case scenario, we ran sensitivity analyses on key parameters of which coal and CO₂ prices appear to be the most sensitive variables. These analyses suggest that if coal prices were to remain at current, historically low levels (of USD 75 per ton versus USD 106 per ton in our base case) through 2020, the value pool in the base-case scenario would be reduced by around EUR 10 billion. However, even in this case, incumbent utilities' profits would still increase slightly.

Far beyond the base-case scenario, value pools could grow by up to more than 40 percent through 2020 if utilities dare to make bold moves

We believe that utilities have an opportunity to capture significantly more value. Specifically, we have identified four sources of additional value that could push the total value pool for utilities EUR 30 to 40 billion higher by 2020 compared to the base case and above the 2008 level (Exhibit 5).

Stakeholders can work together to move the industry in a healthier direction, yielding a significant value pool upside by 2020

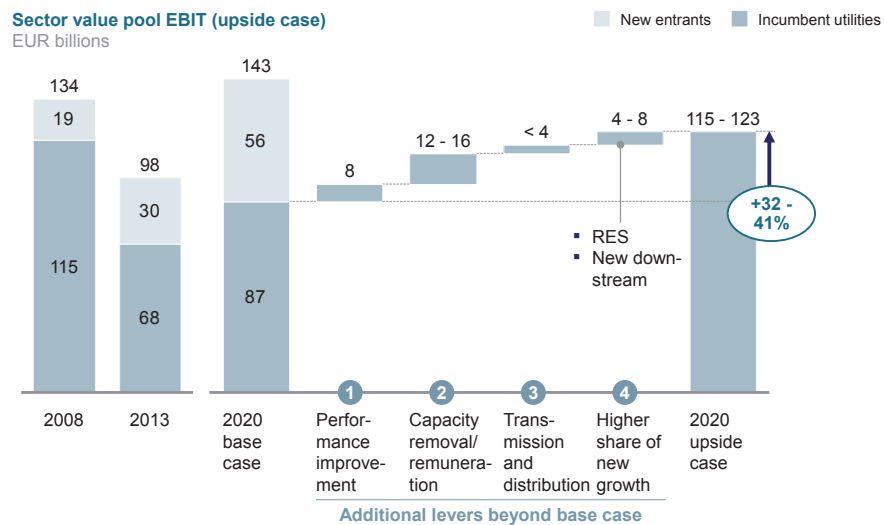


Exhibit 5

SOURCE: McKinsey

In the following section, we first describe the four sources of this additional value potential and then discuss bold moves that utilities have to make in five areas to capture the additional potential.

Four additional sources of value creation for utilities exist

We have identified four sources of value that, if properly leveraged, could enable utilities to reach a level of profitability exceeding the pre-crisis level:

Capturing additional performance improvement. Incumbent utilities have further potential to cut costs and streamline their organizations beyond the actions currently being taken. We estimate that an upside of at least EUR 8 billion is possible by achieving the level of operational performance of companies in the first quartile of benchmarks.

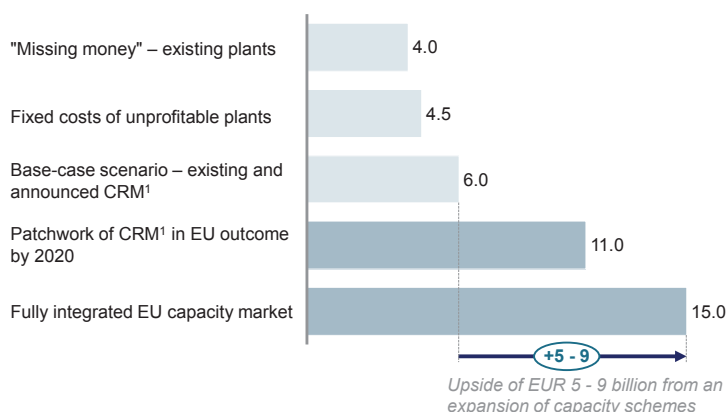
Addressing the capacity dilemma. As discussed in Chapter 2, there is significant remaining potential for capacity closures beyond those recently announced. We estimate in our base case that ~ 230 GW of fossil fuel capacity will be unprofitable by 2020 from energy market revenues only.

That said, drastic plant closures would put further pressure on the system by tightening the capacity margin over peak demand, thus creating security-of-supply concerns. On average, the system is confronted with significant overcapacity. However, in some hours of high demand and low intermittent production – e.g., when the wind is not blowing or the sun is not shining – it still faces tight capacity margins with risks of recurrent forced demand curtailment and possible blackouts.

To avoid this extreme situation, an increasing number of countries can be expected to reinforce existing or introduce new capacity remuneration mechanisms (CRM) to maintain spare capacity in the system. Introducing new country schemes (as Poland did, for example) or pushing existing schemes could add EUR 5 billion of annual value by 2020, while the introduction of a Europe-wide capacity market with the participation of all markets would add ~ EUR 9 billion to the ~ EUR 6 billion coming from the existing and announced CRM schemes (Exhibit 6) already accounted for in the base case.

Industry value of up to EUR 15 billion is at stake in regulatory debate

Value in 2020
EUR billions



¹ CRM = capacity remuneration mechanism
SOURCE: McKinsey power model; McKinsey

Exhibit 6

By working with systems operators, regulators, and governments to solve the capacity dilemma, we estimate that utilities could create additional value in the amount of EUR 12 to 16 billion through a combination of further closures and capacity support schemes.

Growth in transmission and distribution. The value pool in transmission and distribution (T&D) will likely increase by ~ EUR 4 billion, which – according to our base-case scenario – will be mostly captured by new entrants. A few trends underlie this expected increase. First, after a period with a primary focus on efficiency, regulators now increasingly honor quality and stability. Next, the need for renewables connection and integration will continue to rise as RES penetration grows. Finally, there are more opportunities to upgrade to more intelligent networks.

Utilities are currently pursuing different strategies, including the decision by some to divest their T&D assets as financial investors enter the market. An opportunity remains for incumbent utilities to capture a major share of the value pool increase. They could, for instance, team up with financial co-investors in bidding tenders as industrial partners or participate in some cross-border consolidation.

Increasing market share in RES and new downstream. Annual investment of up to EUR 70 billion is expected in the EU power sector over the next six to seven years. The investment is driven by the further build-out of renewables and new downstream infrastructure (e.g., smart grids) and will happen alongside growing direct support (e.g., feed-in tariffs) from more market-based approaches (e.g., auctions). So far, utilities have not managed to capture much of the growth in RES and new downstream, ceding most of the value to new entrants (see base case). However, utilities have the opportunity – provided they act quickly and decisively – to capture more of this growth and thus ensure a long-term presence across the value chain.

Incumbents need to take more radical actions

Many utilities are already partially pulling some of the levers described above but often not with sufficient speed and depth. Some new strategies are even beginning to emerge, e.g., regional growth or refocusing along the value chain. To achieve and sustain performance that exceeds the partial recovery predicted by our base-case scenario, however, incumbent utilities will need to significantly accelerate their efforts and make even bolder moves.

In particular, utilities will need to shift gears in their efforts to build the capabilities required to capture the new growth opportunities and reallocate their capital at a much faster pace. We suggest the following actions:

1. Become an operations champion. Incumbent utilities are in the process of significantly reducing their costs. To reach the next stage of operational excellence and capture the remaining potential, they could consider several moves that have already been taken in other industries. For instance:

- Radically increasing the outsourcing of noncore business activities
- Developing joint structures (e.g., procurement JVs, carve-outs, platforms) with competitors for selected businesses to raise synergies
- Bringing in co-investors with strong performance cultures (e.g., PE funds)
- Rapidly digitizing end-to-end processes
- Systematically benchmarking their operational performance versus technical limits of the equipment
- Creating and implementing their own “operating system” to ensure continuous improvement and best-practice exchanges
- Significantly reducing overheads and simplifying governance.

2. Systematically address the industry capacity dilemma. Utilities have already started decommissioning or mothballing capacity. Still, despite the ongoing and planned closures, we expect that up to 230 GW of coal and gas capacity will be loss-making on the energy-only market by 2020.

At the same time, concerns over the security of supply at peak times are legitimately growing, as the recent development in Belgium has shown. Thus, utilities need to amplify their efforts to get the sector out of this dilemma. A few no-regret moves could be taken immediately:

- Openly addressing the consequences of maintaining loss-making plants and discussing the implications of plant closures to trigger the CRM debate and avoid reputational risk
- Reviewing the efficiency of maintenance strategy and identifying opportunities for improvement
- Assessing the optimal “shutdown strategy.” As several companies in the same market are executing similar steps, this will require a “war-gaming” approach
- Helping their respective governments maneuver sufficient thermal power generation capacity through the current storm, which may be beneficial for some utilities.

For a fair and effective reinforcement of capacity support, it is essential that incumbent utilities actively work with regulators and policymakers to create transparency on the consequences of actions or inaction and influence the future structure of the industry. To take their participation in the shaping of the regulatory environment to the next level, utilities should consider:

- Evaluating options on national and international levels
- Proposing solutions to regulators and governments
- Forming alliances with industry peers and others (e.g., customers).

Utilities should use both existing and new channels (e.g., associations) to communicate their messages regarding the need for market reform and CRM. Building close relationships with regulators at the national and EU levels is critical beyond the introduction of CRM mechanisms only. Changes to the CO₂ pricing mechanism, retail pricing, and T&D regulation are other important topics to add to the regulatory agenda. Industry players need to intensify their dialog with regulators and strive to play a central role in the regulatory debate to ensure the new industry paradigm is shaped fairly.

3. Make bold portfolio moves. Research from McKinsey’s Strategy Practice reveals that corporate performance is sticky and that it is difficult for a company to significantly improve its position relative to its peers. According to empirical evidence, only 15 percent of companies across sectors have been able to move up more than 10 percentage points in their profitability rankings within one year.

Unfortunately, it is even harder to break out of the pack when the overall industry trends are not favorable. Companies can, however, “move the needle” if they make several simultaneous, bold portfolio moves in the areas of:

- Overall company structure and businesses
- Continuous portfolio evolution, i.e., many deals, acquisitions, and divestments

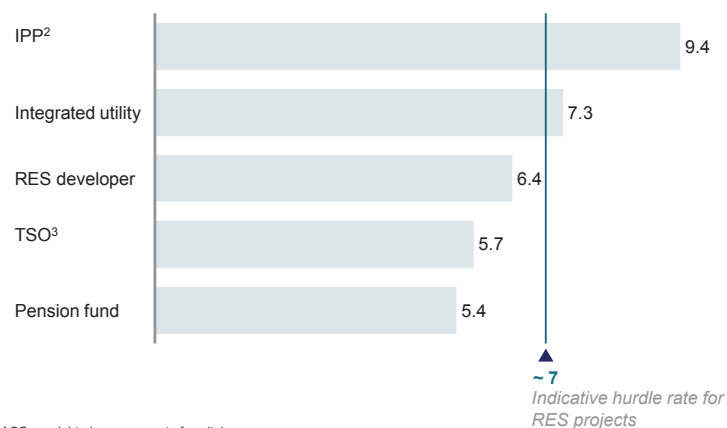
- Quick, high-level resource reallocation across businesses
- Capital investment that is significantly above industry median.

The recent move by E.ON to split into two companies and to spin off a majority stake in its power and gas up- and midstream businesses is a recent example of such a bold portfolio move.

4. Optimize the financing structure. Given our base case and the measures taken by utilities, we expect that utilities will have additional balance-sheet financing capacity. However, this level of financing capacity may not be sufficient if it is not adapted to the investment risk-return profile of certain types of investments. This is particularly true for investments in RES. Many RES projects are not currently subject to market exposure. As a consequence, they typically have a lower risk profile once in operation and attract investors ready to accept lower return in exchange. At the same time, these investments are very likely to be inaccessible to utilities through traditional balance-sheet funding, as their cost of capital would be too high (Exhibit 7).

Higher WACC¹ for integrated players makes it difficult for incumbent utilities to compete with new entrants

Indicative WACC, nominal pre-tax; percent



1 WACC = weighted average cost of capital
 2 IPP = independent power provider
 3 TSO = transmission system operator
 SOURCE: McKinsey

Exhibit 7

Accordingly, this would require incumbent utilities to access new sources of capital and new ways to finance their projects. Multiple alternatives exist:

- A yield company is a publicly traded company formed to own operating assets that produce predictable cash flow, typically distributed via dividend; structure already commonly used for RES projects (e.g., Abengoa Yield)
- A special-purpose vehicle (SPV) is a discrete business created around a project to permit debt and equity investments, disconnected from other obligations of the parent company; often used for JV on a project (e.g., Biomass Energy Solutions – DRT, GDF Suez, Solarezo et la Caisse des Dépôts)

- A spin-off is a division of a company that becomes an independent business and can be listed; often used for renewable business units (e.g., EDP Renováveis, Enel Green Power)
- Rotating capital means that a project developer sells a stake in the new asset once construction is complete to free up capital; used for some offshore wind farm projects (e.g., DONG Energy).

As incumbent utilities think about bold growth strategies, they also need to consider how to structure their capital and investments to maximize their opportunities and reduce their financing costs.

Utilities can also seek moves that are more structural in nature, as in the example of E.ON mentioned above, separating the primarily merchant up- and midstream business from the downstream growth business.

5. Build organizational capabilities for growth. New growth opportunities in the sector require new organizational capabilities. These opportunities are typically more granular (e.g., small-scale, decentralized installations), technology- and innovation-driven (e.g., smart grids), and customer-centric (e.g., value-added services) than traditional activities of utilities. The skills, capabilities, and experience needed to succeed in these new growth areas are significantly different from those required in the past, which mainly focus on developing and operating large, capital-intensive assets and managing large-scale customer interactions.

These new opportunities in the sector attract an increasing number of players with different profiles, value propositions, and skills. Many of these new entrants, such as IT companies, will come from industries with faster clock speeds than the incumbent utilities. As a result, incumbent utilities will be under increasing pressure as multiple steps of the value chain become more and more competitive. Value chain integration alone will not be enough to protect incumbents from new entrants and enable them to capture new business opportunities. Utilities must also clearly articulate their “sources of distinctiveness” to become competitive players and attract capital, or be able to offer a compelling value proposition to enter into partnerships. This could mean investing to develop unique capabilities (e.g., project execution) or specializing in selected technologies. Utilities will need to make bold moves and set their businesses up quickly to capture this growth. Four moves in particular can help make this happen:

- **Hiring external talent.** Utilities now need to align their talent pools with the changing requirements of the sector. In the context of cost reduction in traditional business, the approach in many cases has been to move internal people from one position to another. Given the scale of the challenge and the skill gap versus some new entrants – including with regard to culture and approach to risk – it is also essential to hire external talent. New hires can help drive expansion in new growth areas and act as a catalyst for the transformation of the existing talent pool. These external hires should focus on both technical and managerial talent with relevant experience (customer-centric marketing practice, experience with new technologies, etc.).
- **Innovating via partnerships and investments.** As utilities will need to move fast to innovate, they will need to intensify and focus their R&D efforts and identify

innovation partners. Partnerships can be an effective way to accelerate innovation; several utilities have already started collaborating with universities or small, innovative companies. In some cases, utilities could even adopt a more VC-type approach and try to enter into the innovation cycle earlier, for example, by investing in start-ups.

- **Boosting M&A capabilities.** M&A activities will be increasingly critical to expansion to new areas of growth. Many successful companies develop business through acquisition. However, success requires that an organization be set up to make fast decisions and trade-offs between acquiring scale versus acquiring skills. Therefore, having a strong M&A team able to identify opportunities, assess them, and execute transactions is key. The team needs to be closely connected to the company strategy and senior management to ensure that business development happens in the company's areas of focus and that decisions can be made at an appropriate pace.

- **Rethinking governance and organization to increase flexibility and speed.** In the new downstream areas in particular, the companies that have found success so far are fast-moving and technology-driven. This requires more flexible governance than is currently in place in most utilities. New downstream also requires a high degree of organizational flexibility to respond to an emerging and continuously changing market. Some utilities have set up new units or subsidiaries. Others have integrated downstream activities into existing business lines but with a strong managerial focus. Beyond the variability, incumbent utilities have a track record of not fully implementing their new governance plans. Winning utilities will strengthen the resources deployed, change the KPIs used to monitor business performance, and review capital allocation and the approach to risk.

□ □ □

At this stage, there should be no doubt that the identified upside will be tough for incumbent utilities to capture and, it is rather unlikely that all of them will be successful in securing the additional value. Yet the paradigm shift in the sector, with higher value that is more evenly spread value across the value chain, seems irreversible. Thus, if utilities do not act proactively and decisively, new players will take the lion's share of the new value pools and the value chain could become increasingly fragmented.

Contacts



Thomas Vahlenkamp

Director
Düsseldorf
Tel +49 (211) 136 4390
thomas_vahlenkamp@mckinsey.com



Sebastien Leger

Principal
Paris
Tel +33 (1) 4069 9376
sebastien_leger@mckinsey.com

This report was authored by a group of experts that – in addition to the contacts above – included Konrad Bauer (Senior Expert in McKinsey's Stuttgart Office), Per-Anders Enkvist (Expert Principal in McKinsey's Stockholm Office), Octavian Puzderca (Engagement Manager in McKinsey's London Office), Marcin Purta (Principal in McKinsey's Warsaw Office), Christer Tryggestad (Director in McKinsey's Oslo Office), and Antonio Volpin (Director in McKinsey's London Office).