



Power Market Study 2030
A new outlook for the energy industry

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Abstract

The Power Market Study 2030 provides an analysis of the German power market, based on the three major value chain segments: generation, distribution, consumption. The study shows how these segments have changed, gives a comprehensive overview of trends and expected developments by 2030, and concludes with a summary of implications for utilities.

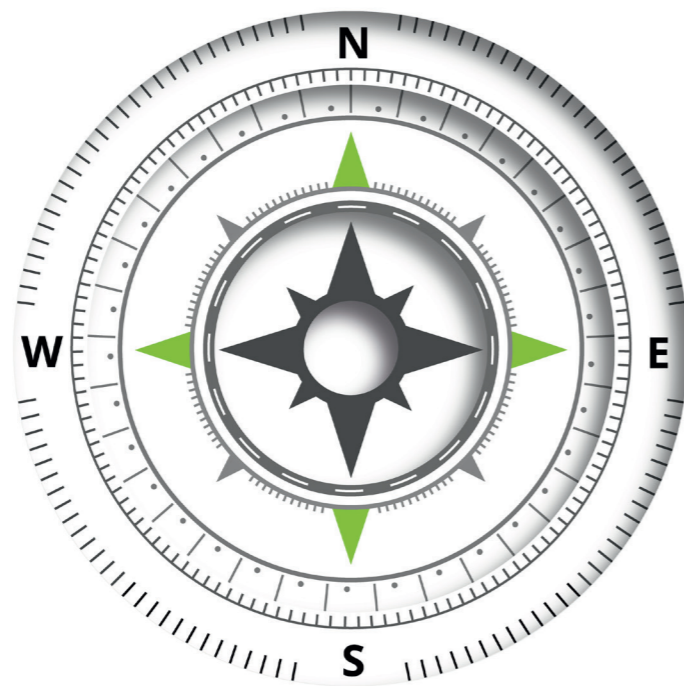
The major trends identified in Deloitte's 2015 Power Market Study 2025 remain valid; the traditional utilities business continues to be under significant pressure. Major players have made necessary adjustments (e.g. via portfolio restructuring), but new drivers of change have emerged – generation is driven by consolidation and recovering wholesale prices, distribution by the interplay between high-voltage transportation requirements and need for new revenue streams, and consumption by changing customer expectations and transformation needs. Based on the new market environment, utilities have to reprioritize their business model portfolio and investment decisions, as well as adjusting their Target Operation Model into an even clearer set-up.

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Recap: Power Market Study 2025

The main challenges and trends identified in Deloitte's Power Market Study 2025 have been confirmed over the last two years and are largely still valid:

- In generation, there is ongoing margin pressure, as over-capacity is only slowly reduced.
- In distribution, the imbalance of consumption and generation remains a challenge; the number of dispatching incidents increases.
- In consumption, customers have the option to choose their preferred technology for power generation.

Despite the general confirmation of the Power Market Study 2025, some "surprises" have occurred:

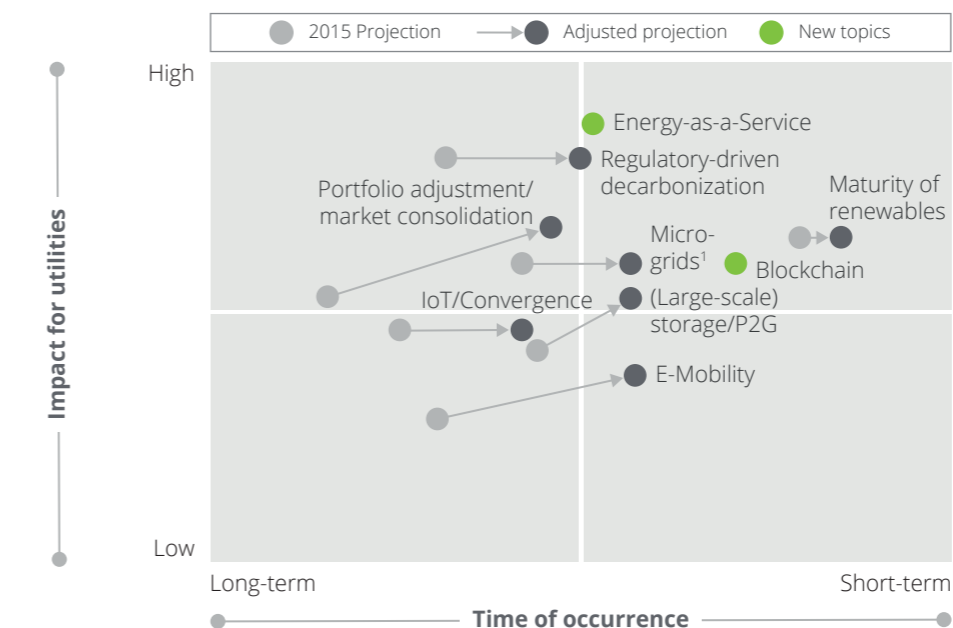
- Very effective auction model for renewables
- Extent of portfolio adjustments across all major utilities
- Speed of storage technologies to become relevant

A regulatory-driven decarbonization (e.g. the introduction of CO2 taxation, potential lignite phase-out), is no longer a vision of the future. Furthermore, ongoing consolidation in large-scale traditional generation is expected.

Figure 1 shows how the major trends have been projected in 2015 and how their development has changed.

It seems that challenges have not diminished – and that new market realities have appeared, which utilities have to adjust to.

Fig. 1 – Major trends and their development



¹ Microgrids include Peer-to-Peer-Trading Platforms and Energy Communities

Generation

The development in the generation business can be summarized as follows:

1. Decarbonization will be the major driver influencing the future generation landscape and shaping sector consolidation.
2. Centralized, conventional generation is however not “dead” as it is required to balance the system at least for the next decade.
3. Key to a healthier generation system is recovering wholesale prices that need to be underpinned by increasing CO2 prices allowing for merchant marketing of more technologies.

Price development

Due to the improvement of wholesale prices, the profit situation for utilities will be relieved. After persistent low prices over the last years, Germany will potentially see an upturn in wholesale power prices driven by the nuclear phase-out and the decommissioning of coal power plants. Such a development is underpinned by a (potentially tax-based) increase in CO2 prices that seems imperative to achieve climate protection goals. (see figure 2).

The more pronounced price fluctuations on the spot and intraday market show the increasing need for flexibility due to rising PV (photovoltaic) and wind capacity.

Consolidation in fossil generation

The current merger wave in large-scale conventional generation is expected to be continued. At the same time, their relevance for system stability remains. To guarantee security of supply, new (gas) power plants will be required – at least in 2022 after finalization of the nuclear phase-out. Conventional generation will become profitable again as wholesale power prices rise.

Development of Renewables

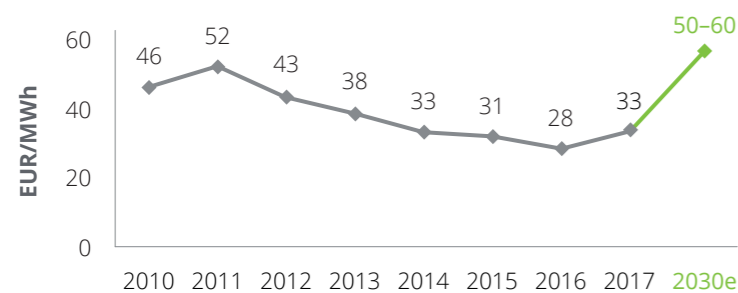
Due to the increasing share of fluctuating renewables, variability of residual load (i.e. the share of electricity demand that is independent from fluctuating wind and solar power generation) is increasing. A recent study by the German Meteorological Service (DWD) indicates that situations with prolonged yield losses of fluctuating renewables are rare when viewed over time. However, if they occur, large spreads need to be covered. So far, dark doldrums (“Dunkelflaute”, i.e. times during which solar or wind power generation is very low) are covered by conventional gener-

ation and electricity imports. However, considering a lignite phase-out, cross-border capacities might not be sufficient to ensure security of supply during “cold dark doldrums”, i.e. the coincidence of low wind and solar generation, and high electricity demand during winter months. Therefore, balancing mechanisms awarding conventional generation will be required, e.g. capacity mechanisms or price peaks to incentivize the use of flexible power plants.

The growth of renewables is also increasingly backed by their superior

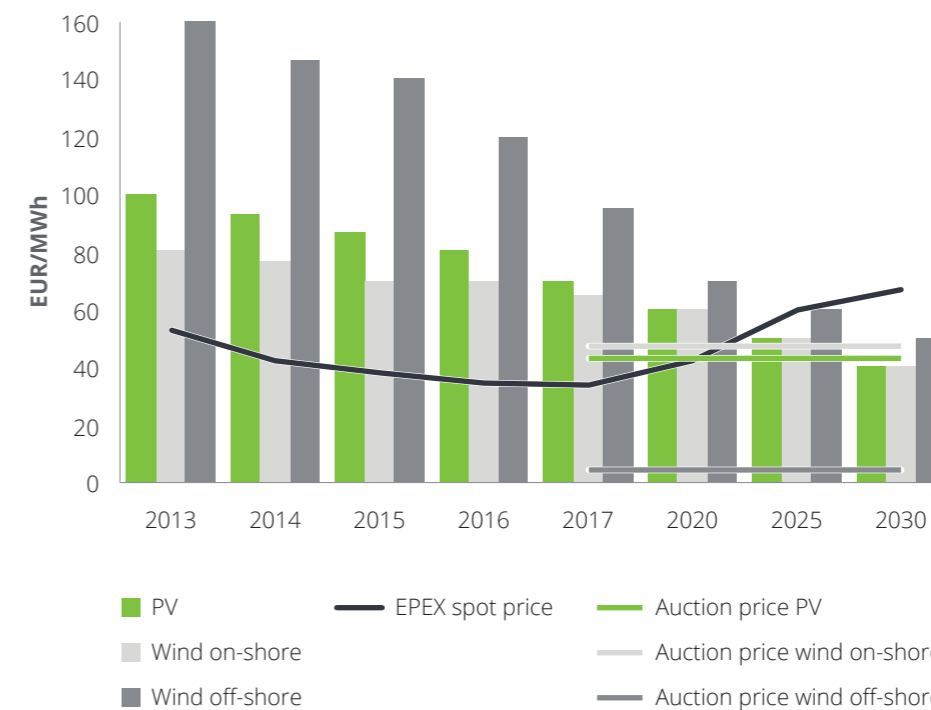
cost position. The rising profitability of renewables – driven by the ongoing decline in Levelized Cost of Electricity – also becomes evident from the constant decrease in the results of renewable energy auctions which have been established as part of the 2017 amendment of the Renewable Energy Act (“EEG”). Due to the expected rise in wholesale power prices, it might become more profitable to market renewable capacities via merchant markets than to rely on subsidies (see figure 3).

Fig. 2 – German wholesale power price (spot)



Source: EPEX; Monitor Deloitte analysis

Fig. 3 – Levelized Cost of Electricity (LCOE), average auction prices, wholesale electricity price



Note: Average auction prices reflect the most recent auction results in Germany (PV/wind on-shore: February 2018; wind off-shore: April 2017)
 Source: EPEX Spot; Federal Ministry for Economic Affairs and Energy (BMWi); Federal Network Agency (BNetzA); Agora Energiewende

Distribution

The development in the grid business can be summarized as follows:

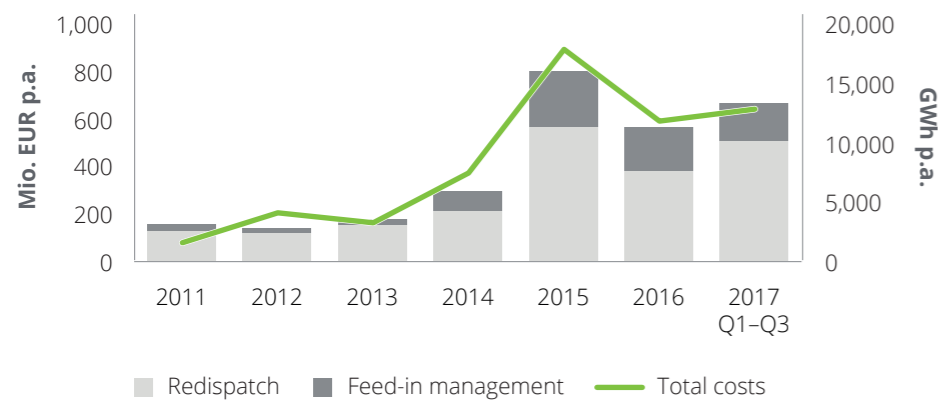
1. Grid expansion stays relevant with more innovation-driven investments to push for sustainability and digitalization along the entire power value chain.
2. Grid operators have to tap into alternative revenue streams, based on changing end-customer behaviors and evolving local opportunities, e.g. storage and micro-grids.
3. Focus on (critical) infrastructure might be reasonable – but utilities have to develop competences and build partnerships with regard to new infrastructure systems.

Regulatory environment

Changing realities in regulation creates pressure on earnings. The return on equity before taxes is planned to be significantly decreased for the third regulation period; after the third regulation period (2024), a switch towards Yardstick regulation (e.g. capital expenditure per grid kilometer) is probable. Due to this margin pressure, new revenue streams from competitive grid services and digitalization (e.g. energy consulting, demand response, or gateway administration) are gaining importance.

At the same time, regulators are pushing for investments in smart grids. An increase in innovation-driven investments can be observed. However, local regulations on data protection and data security are still a main obstacle for innovations, especially in the development of smart grids.

Fig. 4 – Development of measures for grid congestion management
(costs in million EUR p.a., duration in GWh p.a.)



Source: Federal Network Agency (BNetzA); Agora Energiewende; Monitor Deloitte analysis

Grid expansion

To maintain security of supply, grid expansion remains an inalienable imperative. The development of the cost for congestion management measures, i.e. redispatch (contractually-based adjustment of electricity feed-in from power plants) and feed-in management (curtailment of electricity generation from renewables and combined heat and power plants) have increased significantly over the last years (see figure 4).

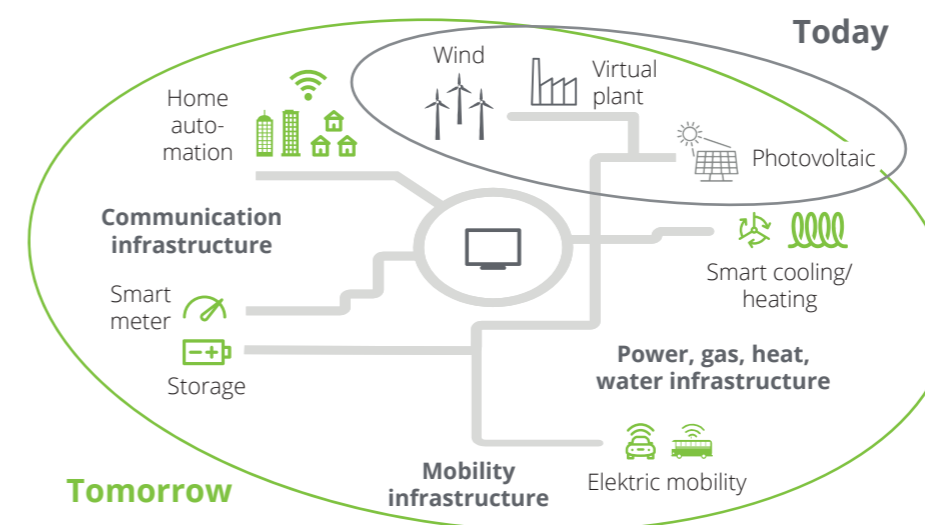
Therefore, further funding and adjusted regulation to ensure an adequate return on equity seem required to foster grid expansion, thus responding to public sensitivity for security of supply and EU requirements (assurance of cross-border exchange capacity).

Grid expansion investments can reduce pressure on earnings for grid operators – nevertheless, the number of delayed or rescheduled investment shows the complexity of upgrading existing grids.

New services

To benefit from changing customer behavior and to respond to pressure on earnings, grid operators need to identify further on- and off-grid solutions. Besides power, gas, heat and water infrastructure, new infrastructure systems such as communication, data and mobility infrastructure become relevant to utilities. Whereas existing infrastructures are digitally optimized (e.g. equipment of lines with sensors), new infrastructures are built (e.g. charging infrastructure). Some utilities strategically consider focusing on (critical) infrastructure, others plan to expand their portfolio towards the end-customers' needs (e.g. support of self-consumptions and local micro-grid with external advice and energy consulting). Considering the constant increase of complexity and opportunities for the end-customer, and offering a clear end-to-end package, possibly via partnerships, can become a potential unique selling proposition (see figure 5).

Fig. 5 – Evolution of the electricity grid



Consumption

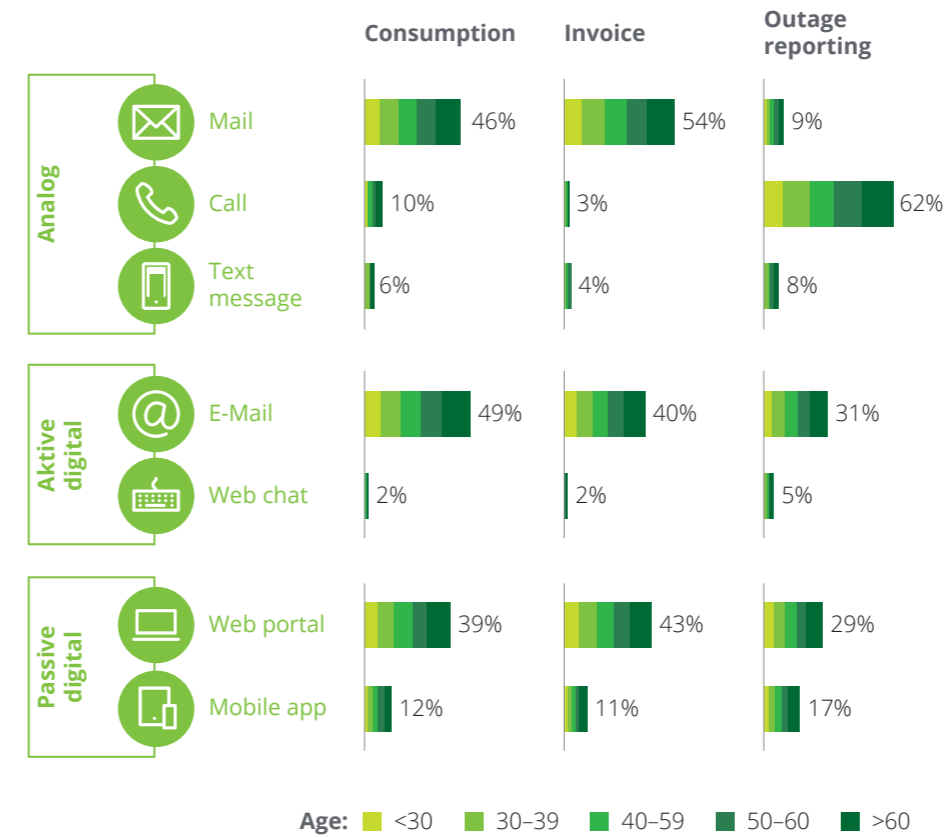
The development in the end-customer business can be summarized as follows:

1. Customers, independent of age, demand leading experience and channel consistency. Therefore, utilities now need to deliver a cost-effective digital channel landscape.
2. Competitive cost-to-serve in the digital-only scenario becomes a matter of scale, and small utilities require joint digital platforms to cope with new customer demands.
3. Currently, German utilities focus on re-build – but disruption might come from within the industry through new standards being set by “First Movers”, followed by concentration and cooperation.

New customer expectations

The Monitor Deloitte study “Kundenerlebnis@EVU” demonstrates the change in customer expectations. The study was based on a survey among more than 1,000 German utility consumers of different age groups. They were questioned about their preferred contact channels for consumption and invoice related topics, as well as for outage reporting. Traditional mail, email, and web portal are still the preferred contact channels for consumption and invoice to easily store provided data. Mobile app is used by 10-20% of participants. Integrating other digital channels, the app has the potential to become the favorite digital channel of the future. This survey clearly declares the readiness of the customers for change by embracing user-friendly opportunities to connect with energy and their utility. It also proves that age does not play a major role for any contact channel preferences. This digital readiness unlocks future digitalization and thus the potential to reduce costs for consumption and invoice related information (see figure 6).

Fig. 6 - Preferred customer channels by age group



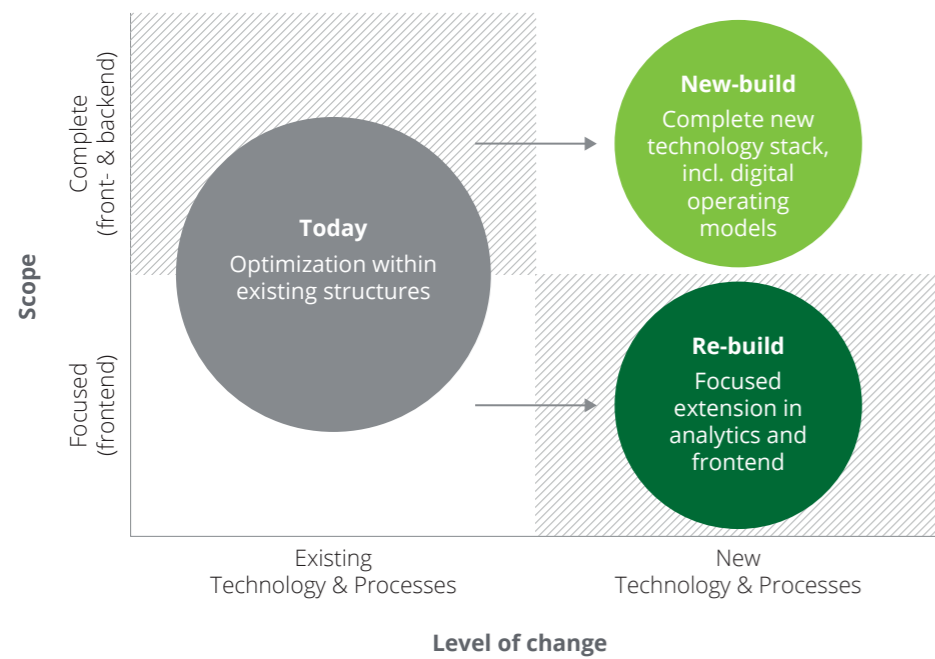
Source: Monitor Deloitte Study “Kundenerlebnis@EVU” (survey across more than 1,000 German utility customers in 2017)

New requirements

To meet and exceed new customer expectations and achieve competitive cost levels, existing structures require re- or new-build. A new-build includes a completely new technology stack and digital operating models. This is related to high investment and migration costs; however, this measure also provides the opportunity to reach leading Cost-to-Serve levels

and a respective long-term competitive edge. In contrast, re-build concentrates on the focused extension in analytics and frontend. The main challenges lie in the high cost-of-change and operating expenditure (mainly personal and IT licenses). The major advantage, however, resides in the limited investment requirements while enabling a more customer-friendly and analytic-based frontend (see figure 7).

Fig. 7 – Approaches to address customer expectations

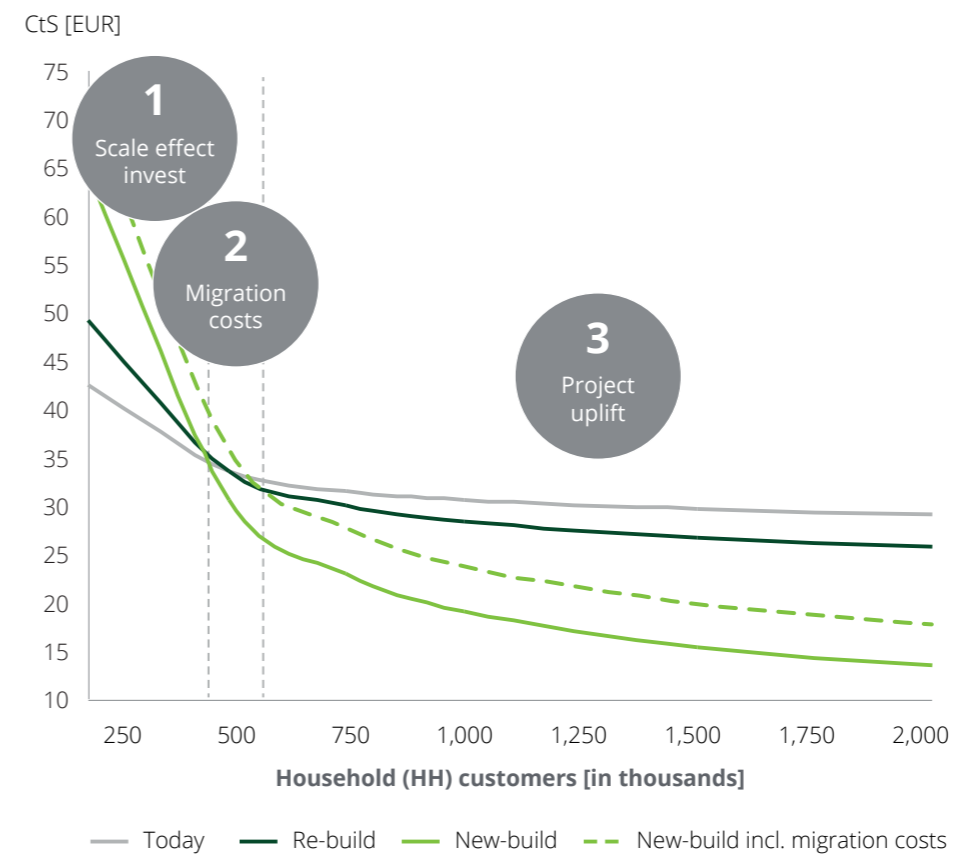


Cost implications

A Monitor Deloitte cost analysis indicated that new-build results in significantly lower costs – even though these are only becoming effective as of larger numbers. German utilities below 400,000 household customers are lacking scale for own new-build initiatives. Therefore, small utilities should cooperate and bundle their digital back- and frontends to also achieve competitive CtS (Cost-to-Serve) levels in the near future. Depending on migration costs

to shift existing customer groups towards a digital-only operating model, utilities with over half a million household customers might benefit from new technologies and processes outside existing structures. The Cost-to-Serve analysis shows that for large utilities with over a million household customers it is prudent to pursue a digital pure play model to achieve all-in CtS of 10 EUR per household or even lower (see figure 8).

Fig. 8 – Cost-to-Serve analysis



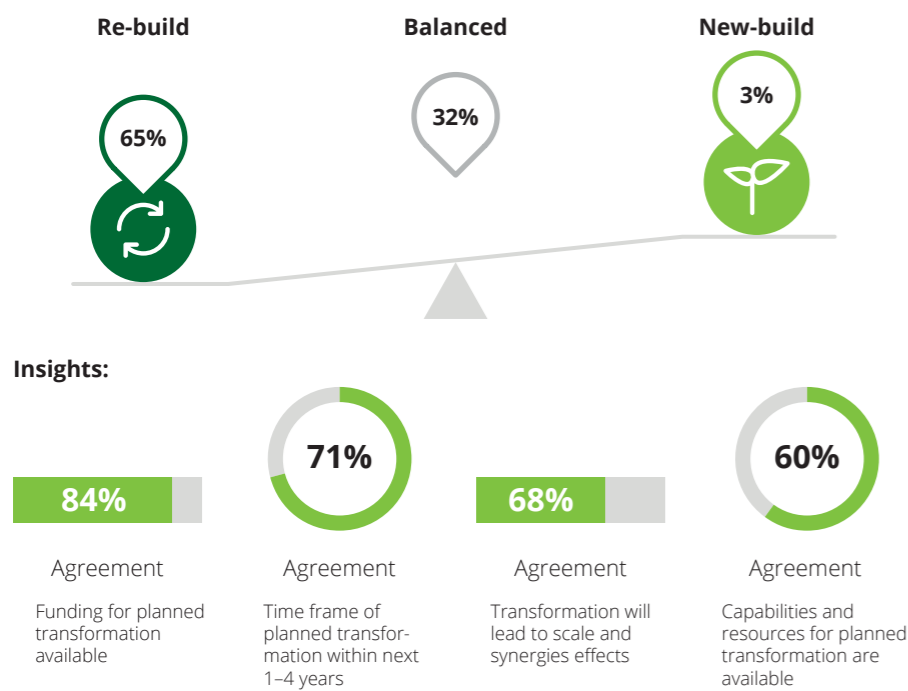
Note: CtS = Cost-to-Serve; HH customers: <10,000 kWh/a (one metering point per customer); incl. project costs; for average companies, deviations possible

Market reality

Together with the NRW regional association of the German Association of Energy and Water Industries (BDEW), Monitor Deloitte has asked energy utilities whether the companies are planning to pursue a re- or a new-build. The results are based on an online-survey conducted among more than 30 utilities in December 2017 / January 2018. Although new-build offers many advantages, the survey has shown that re-build currently seems to be the preferred option amongst German utilities (65%). Only 3% of German utilities currently prefer new-build for single system stacks, such as smart meter data systems. 32% are uncertain regarding re-build or

new-build and might try to use existing systems to cope with new customer demands. As regards the implementation of the planned transformation, 84% of respondent utilities ensured sufficient funding for upcoming re- and new-build initiatives, of which 71% will take place within the next four years. Around three thirds of respondents see the planned transformation as a means for scale and synergy effects, where a joint digital backend or platform unlocks the full potential. However, 40% of surveyed companies stated a lack of required capabilities and/or resources. Therefore, external expertise will be required.

Fig. 9 – Dominance of re-build



Implications – What does this mean for utilities?

These new developments within the power market lead to strategic, structural, and organizational implications for utilities.

Strategic implications

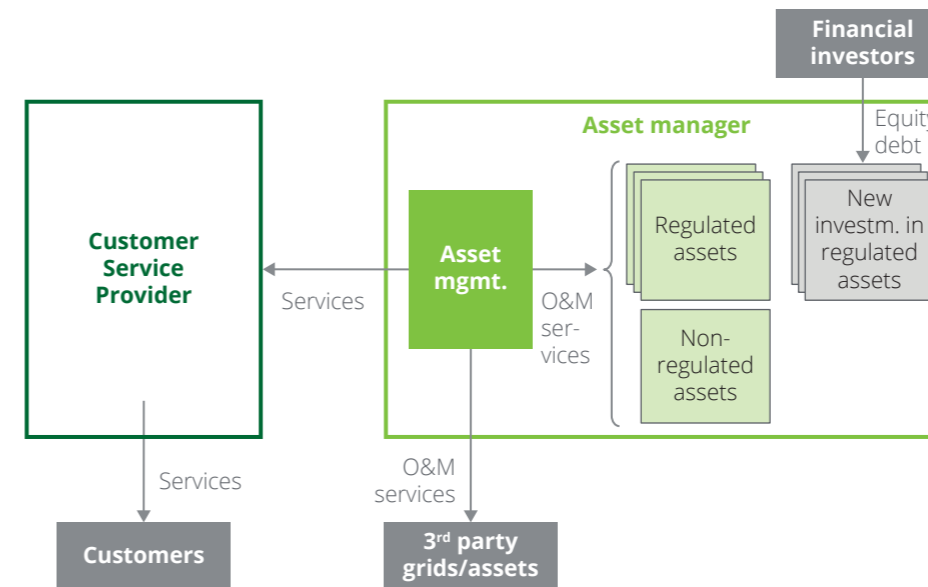
The changing market realities result in different strategic implications per value chain segment. In generation, utilities must build long-term scale by combining conventional and renewable assets. In distribution, innovation investment must be unlocked to propel end-customer solutions, while adapting the investor base to improve capital efficiency. Finally, integrating commodity and energy-as-a-service businesses into a single solution

competence constitutes a major success factor for the end-customer business. In the future, utilities will strive to even cleaner business models around different market roles (asset-intensive generation with system responsibility; customer-centric solution business to deliver energy). In general, utilities at all levels will have to cope with the stretch between continued cost discipline and agile, quick-to-market decision-making.

Structural implications

In the future, utilities may pursue an asset-light strategy and position themselves as operational and financial Asset Managers (see figure 10).

Fig. 10 – Potential structure for further development



This setup presents essential operational and financial benefits. The asset-light strategy provides a clear structure and focus on new roles, as customer service provision and asset management are separated. The asset management acts as a separate business unit and can focus on acquiring third party customers for operation and maintenance services. Financial benefits arise from additional cash flows from operational asset management services to third parties and from financial asset management services to institutional investors.

Organizational implications

With increasing automation and new technologies, organizational structures and capability requirements will change as well. Therefore, new talents with new skill sets (e.g. data miners, service designers, performance marketers and analysts) and agile approaches are required, e.g. to speed up product development to respond more quickly to changing customer needs).

This also implies changes in leadership and governance as well as in recruiting processes.

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