Power Market Study 2025

...in 10 years this will be a different place

Munich, May 2015
Power Market Study 2025

The traditional business model for utilities is gone, let’s talk about how to build the future

1. **Current Situation**

   Technological, social and most of all regulatory influences changed the utilities industry over the last 10 years for good, resulting in significant challenges in terms of market valuation, profits and returns for utilities.

2. **Key Issues**

   Key issues exist in three areas: In generation, over-capacity eliminates spreads; in distribution, increasing geographical disparity exists between generation and demand; in consumption, new segments with diverse behaviors and needs arise besides the “traditional” consumers.

3. **Implications**

   To respond to these challenges, utilities need to fix current business, invest in intelligent and commercially optimized demand/supply balancing solutions, become more customer centric and reposition for new business models.
Market Phases

Within the last 10 years, regulation has changed the German Utilities market for good

2005-2009

Market Liberalization
- National Energy Act, 2005
- Transformation of negotiated into regulated third party access

Unbundling
- Regulation-induced separation of utilities’ generation and sale operations from transmission networks as of 2007
- Creation of separated legal and informational entities

Upcoming Competition
- End of price authorization in 2007
- Increasing competition through new market players without own power plans or supplier networks
- Steady decline in number of customers served by four largest German energy companies

2009-2014

Nuclear Phase-Out
- Start of nuclear plant decommissioning in reaction to the Fukushima accident in 2011

Renewables Push
- Renewable Energy Act empowered installation of 80 GW renewable capacity (as of 2014) with power production of 157.3 TWh (ca. 25%)

Ownership Unbundling ITOs
- Regulation-induced application of non-discriminatory measures by ITOs (legally independent transmission subsidiaries)

First Smart Initiatives
- Evolving linkage of generation, grids, storage and consumption to adjust towards the variable nature of renewable energies

Flexible Energy System
- Introduction of decentralized storage capacity
- Increasing usage of micro-generation
- Real-time demand & supply management

Smart Network Technology
- Introduction of smart metering
- Big data analytics
- Smart consumer devices
- Machine to machine communication

Digital Customer Engagement
- Gamification, proliferation of social media
- Voice analytics
- Proliferation of digital channels

>2014

Ownership Unbundling ITOs
- Regulation-induced application of non-discriminatory measures by ITOs (legally independent transmission subsidiaries)

First Smart Initiatives
- Evolving linkage of generation, grids, storage and consumption to adjust towards the variable nature of renewable energies

Source: Federal Ministry of Economics and Technology (BMWi), BDEW, Deloitte Analysis

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Situation of Utilities

As a result, the sector is faced with low valuations, profits and returns

- Utility shares significantly under-performed between 2009-2014
- While DAX value increased by approx. 90%, value of major utilities decreased by the same amount
- EBIT decline consistently over the last 3 years after Fukushima
- Outlook until 2018 shows only stabilization on low level without uptake
- Return collapsed even though capital employed reduced
- Major Utilities are nearly back to where they started 10 years ago

Source: ICIS, Company Annual Reports, EEA, SETIS, IEA, DECC, EPA, IEA, COSPP, Primary Interview s, Transparency Market Research
Market Valuation

Major German Utilities have been significantly underperforming over the last 3-4 years

**Impact**

- Utilities are in trouble, share performance is significantly underperforming against other sectors (~98% performance difference)

- Decreasing wholesale prices result in performance issues

- “Marginal cost-zero” economics for renewables create flat supply and lower wholesale prices, reducing producers’ rent for good

- Fixed cost/capex cannot be earned back via markets

- While European Utilities stagnate, performance of German Utilities compared to their European peers is even more drastically eroded influenced by the “Energiewende”

- Overall utility business is shifting to higher granularity around decentralized solutions and services, larger player are not well positioned for innovative, smaller business models

**Share Price Development**

Source: Bloomberg; STOXX® Europe 600 Utilities
Profitability
Lower value is driven by relative and absolute profit expectations

Impact
- Profitability has decreased significantly over the last 3 years
- Outlook indicates no significant improvement
- If so, utilities are facing structural underperformance – this might lead to
  - EBIT not sufficient to cover depreciation
  - Required investments in new business models will not be taken
  - Lower profitability negatively impacts dynamic gearing ratio (net debt/EBITDA) with further consequences for capital market rating

Profit KPIs

<table>
<thead>
<tr>
<th></th>
<th>RWE</th>
<th>E.ON</th>
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<tbody>
<tr>
<td>EBITDA/Revenue</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td>9.3</td>
<td>10.8</td>
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<tr>
<td>2013</td>
<td>7.9</td>
<td>9.2</td>
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<td>2014</td>
<td>7.1</td>
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<tr>
<td>2015f</td>
<td>6.2</td>
<td>7.5</td>
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<td>2016f</td>
<td>6.0</td>
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<td>2017f</td>
<td>6.2</td>
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<td>2018f</td>
<td>6.0</td>
<td>1.7</td>
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<thead>
<tr>
<th></th>
<th>RWE</th>
<th>E.ON</th>
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<tbody>
<tr>
<td>EBIT/Revenue</td>
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<td></td>
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<tr>
<td>2012</td>
<td>18%</td>
<td>8%</td>
</tr>
<tr>
<td>2013</td>
<td>15%</td>
<td>8%</td>
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<td>2014</td>
<td>13%</td>
<td>8%</td>
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<td>2015f</td>
<td>12%</td>
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<td>2018f</td>
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<td>7%</td>
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Source: Annual reports E.ON and RWE; www.finanzen.net/schaetzungen/RWE; www.finanzen.net/schaetzungen/E.ON

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Returns

Accordingly, utilities today operate in a low return environment without investment signals

Impact

- International growth strategies from the early 2000s completely eroded and failed to add value in the long run (e.g. RWE Essent, E.ON's Italian and Spanish acquisitions)
- Overall shift from asset-based to cash-flow based returns
- Since 2006, returns on capital have been decreasing constantly caused by market liberalization
- In terms of capital employed, RWE and E.ON are nearly back to where they started from in 2002
- ROCE values close to the WACC (~7,5%) highlight the loss in competitiveness and limited room for investments / capital acquisition

Source: Annual reports E.ON (Note: Capital employed in continuing operations; annual average; ROACE from 2010 onwards) and RWE
Key Issues
This structural under-performance is driven by three problem areas

**GENERATION PROBLEM**

- **Generation dilemma:**
  Over-capacity shock eliminating spreads
- “Marginal cost-zero” economics: renewables flat supply, reducing producers’ rent for good
- Fixed cost/capex cannot be earned back via today’s EOM markets
- Value is moving upstream, i.e. goes to equipment manufacturers

**DISTRIBUTION PROBLEM**

- **Distribution dilemma:**
  Significant imbalance of generation and consumption locations
- Generation location choice not a function of distribution cost anymore as unbundling pared with subsidies are creating local supply imbalances
- Resulting local supply/demand imbalances need fixing using three levers:
  - Moving demand to new supply by price differentials
  - Invest in infrastructure to transport
  - Flexible demand/storage solutions

**CONSUMER PROBLEM**

- **Consumer dilemma:**
  More technology choices than customer needs, customer requires energy manager to find right solutions
- Utilities currently focus on solution side rather than customer needs
- Churn is less a consequence of price, but rather lack of individual services, e.g. advise on self supply, energy efficiency
- New segmentation needed into a) Commodity Buyers b) Power Users/Prosumers
- Granularity in business models increasing, often with start-up character with focus on agile, flexible, cost efficient products and services
The Generation Issue I

Massive growth of renewable production is crowding out traditional conventional generation and increases the need for flexibility.

Crowding out traditional generation

- Significant decrease of the available capacity of conventional power plants due to shut-downs of coal and nuclear plants between 2005 and 2014
- Further lignite & coal power plants need potentially to be shut-down based on recent comments from the German Minister of Economy & Energy (Sigmar Gabriel, May 2014)

⇒ Increasing risk for security of supply

Increases need for flexibility

- Overall decrease of the remaining energy demand due to an increase in renewable production
- However, there are still situations with a high peak demand (e.g. in the winter w/o any renewable production)
- At the same time, an increase of market situations with a low remaining energy demand require a high level of generation flexibility

⇒ Flexible asset management necessary
The Generation Issue II
Markets expect continuously low power prices as drivers are not revised

Wholesale power prices declined significantly by approx. 30% between 2010 and 2014, mainly driven by:
- Considerable decrease in coal prices due to overcapacities caused by shale gas exploration
- Ongoing massive development of renewables generation capacities (more than 20 GW of PV since 2010)
- In 2025 renewables will be accounted for 40-50% of overall power generation
- Stagnant or rather slightly declining power demand
- Significant fall of CO₂ prices

… taken this into account power prices will not recover to 2011 level

Source: BDEW Slide Deck, Erneuerbare Energien und das EEG: Zahlen, Fakten, Grafiken 2013, Forecast 2012 of the TSOs, Federal Ministry of Economics and Technology (BMWi), Deloitte Analysis
The Generation Issue III

Capex and Opex cannot be earned back ... utilities are burning money with stranded assets and need to react

- Efficient gas power plants required for balancing are not competitive in today’s energy market environment
- Low emission certificate prices support the “dirty” power production (especially from lignite plants)
- Future impact:
  - Investments in renewable production capacities will worsen a cost-efficient security of supply situation
  - Current generation spreads leads to almost no incentives for new power plant investments
  - Reliable and cost-efficient energy supply in Germany after nuclear exit requires fossil generation

Market observations & comments

Generation Spread Coal/ CDS (Efficiency: 46%)

Generation Spread Gas/ CSS (Efficiency: 50%)

Generation Spread Lignite/ CLS (Efficiency: 42%)

Generation Spread Nuclear (incl. Nuclear Tax)

Source: EEX

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The Generation Issue IV

A rising CO\textsubscript{2} price is a fundamental uncertainty to the sector with prospective winners and losers

- **Price parity between lignite and gas assumed at 30 €/t CO\textsubscript{2}
- Regulation pushes towards lignite and hard coal exit
- Reformation of ETS system targets a clean energy ecosystem with renewables plus gas generation

**Winners:**
- Low-carbon emission generation (Renewables, Gas, CHP, Nuclear)
- Low carbon emission consumption via Energy Efficiency technologies (Smart Building, Smart Home, eMobility, Insulation)

**Losers:**
- High Carbon Emission generation, e.g. lignite-fired turbines
- High-carbon emission consumption (combustion engines)

**Scenario 30 €/t CO\textsubscript{2} Pricing**

Source: BDEW Slide Deck, Erneuerbare Energien und das EEG: Zahlen, Fakten, Grafiken 2013, Forecast 2012 of the TSOs, Federal Ministry of Economics and Technology (BMWi), Deloitte Analysis
Generation Consequences

A capacity market will not solve the issues of utilities, consequent integration of conventional and renewable generation is key

1. INDUSTRY CONSOLIDATION OF FOSSIL FUEL GENERATION
   - Portfolio review
   - Players stuck with stranded assets
   - Further concentration especially in fragmented markets

2. RUNNING FOR CASH
   - Only incremental investments in existing assets for operational excellence
   - Focus on high availability and maximum of run-time hours

3. INVESTMENT IN FLEXIBILITY
   - Flexibility within generation portfolio needs to be increased until storage solutions will cover volatility issues
   - But focus on short payback period investment of any cash investment
The Distribution Issue I

Lack of transport capacity is a significant cost factor for utilities in times of over supply of renewable energy

### Demand Response Solutions

- Instead of balancing supply and demand by adjusting fossil power generation, demand response solutions strive to adequately vary the consumption levels of end users.
- Estimates of demand response potential in Germany range from 1.5 GW on the demand side to 3.5 GW for negative residual loads.
- The biggest challenge for demand response solutions currently consists in finding a working business model. First concepts are mainly based on flexible tariffs for industrial clients who can directly influence large capacities.
- For example, some manufacturing clients have decided to change their work rhythms or to switch to generators during peak times and reduce the required electricity to a minimum.
- Innovative demand response solutions including the use of smart technologies especially for private households are not yet in place on a large scale in Germany, however, a significant market growth segment within the next years.

### Market events with a negative EEX spot price

- # hours with price < 0 €/MWh
- average price (in €/MWh)
- low est price (in €/MWh)

### Redispetch Incidents (number of hours per year)

- Source: EEX, Bundesnetzagentur
The Distribution Issue II

Without infrastructure investments the most likely scenario will be different power price zones within Germany

Possible split of the German market (2023)

Two price zone model benefits and drawbacks

- Current price model assumes the country acts like a “copper plate”, making it easy to transport electricity
- In reality, missing grids combined with electricity surplus in the north and deficit in the south creates bottlenecks
- To counteract these bottlenecks different price zones could be implemented to adjust demand and generation with the electricity price, similar to Nordic countries

Benefits
- Power plant dispatch more reasonable, no costly Redispatch required
- Reduced intervention by higher entities
- Supply and demand adjust themselves on regional basis
- Reduced Grid extension necessity

Drawbacks
- Political counter current
- Decreased competition due to regional markets
- Relocating the problem to other industries (e.g. road/train transportation system)
- Electricity price dependent on investment decisions of different players

Source: BDEW; 50Hertz; Deloitte Analysis
The Distribution Issue III

To avoid 2 price zones, planned transmission projects reduce imbalance

**Generation imbalance & major transmission projects**

- 4 co-current flow corridors
- Length: 2,100 km
- Power: 10 GW

**Current Situation**

- To compensate for the nuclear power phase out and the disability of the German south to generate wind power, north-south power lines have to be build
- Disagreements between political parties and Citizens intervention causing 15 of 24 transmission projects an anticipated time delay between 1-5 years
- In July 2014, the federal government reported that since 2009, only about 400 km were built by the total of 1,877 km planned power lines
- In total, the grid expansion plan approved in 2014 includes 2,800 km grid optimization for the existing infrastructure and 2,650 km of new transmission lines until 2023

Source: Electricity Grid Development Plan BNetzA
The Distribution Issue IV

To reduce transmission requirements storage solutions may help, but timing will be too late

Current Situation

- New storage technologies need to prove their bankability to obtain commercial project finance
  - Biggest hurdle in their market roll out is the financing of a first commercial-scale plant
  - R&D support in the form of grants or risk sharing
- Established storage technologies often need targeted support to achieve scale and reduce cost through continued technology improvements
  - Support schemes vary by regulatory context: Feed-in-Tariffs used to be favorite in Europe
- German policy makers seek to reduce Feed-in tariff support
  - Alternative support schemes such as Renewable Standard Portfolios (RSP) or effective CO₂ prices could be a solution
  - Educating regulators about technologies will be key to success

Market maturity levels for storage technologies

- Non-bankable technologies
  - R&D support schemes
  - Hurdle: Construction and operation of first commercial-scale plant
- Proven technologies
  - Targeted FIT, ETS, RSP
  - Challenge: compete with substitutes on cost

Note: FIT: Feed-in Tariff; ETS: Emission Trading Scheme; RSP: Renewable Standard Portfolio
Source: Deloitte Analysis
The Distribution Issue V

Alternatively micro-grids are an option for balancing, but will take time as well and are more likely a mid- to long-term solution

**Outlook**

- Commercial role of the **aggregator** responsible for the ex-ante optimization of supply and demand portfolio, e.g. through
  - Virtual Power Plant and Demand Response,
  - Load Management/ Peak Shaving,
  - Cumulated market integration of renewables etc.

- Load will be balanced on micro-grid level by **allocators** based on results and prognoses of aggregators, decentralized generation/consumption units and DSO input

- Optimization needs to be backed by a **smart communications** infrastructure set on top of today’s metering infrastructure

- A fragmented setup enables the seamless integration of innovative assets, e.g. electric cars
Transmission Consequences

Only increasing high-voltage transmission capacity is not solving all issues, smarter solutions need to be installed on all grid levels.

1 ▶ SHORT TERM SOLUTION:
- Add transmission capacity on TSO level and balance of unequal generation and demand patterns across Germany from off-shore generation (North) to consumption (Centre/South).
- Invest in interconnectors to allow for additional flexibility for balancing regional fluctuations.

2 ▶ MIDDLE TERM SOLUTION:
- Invest in better forecasting solutions and smart infrastructure to balance supply and demand real-time on DSO and micro-grid level.
- Invest in smart micro-grid balancing solutions, e.g. decentralized CHP generation capacity and demand response mechanisms.

3 ▶ LONG TERM SOLUTION:
- Invest in R&D for storage solutions on all grid levels (TSO and DSO) as well as end-consumer solutions for different solutions regarding storage duration and storage capacity.
The Consumer Issue I

Beside this, the consumer needs and business changes significantly

Increasing self-supply by Prosumers

- Double digit growth of distributed energy production challenges central utility capacities
- Interplay of growing self-supply, increased storage deployment and energy efficiency reduce demand for residual energy supply from utilities
- Prosumers demand for service partners instead of pure energy delivery

Customer engagement on the rise

- Traditional commodities serve basic customer needs with limited differentiation
- Customers want to decrease energy consumption and become “green” – higher engagement with product variety and new market entries apart from traditional utilities
The Consumer Issue II
Consumers are increasingly expecting new energy-related, non-commodity products and services

**Private consumers’ expectations**
- New expectations related to website/mobile offerings – e.g. detailed insights into own energy consumption; personalized advice on saving potentials; consumption notifications
- Emergence of more diversified customer segments and increasing interest in individualized product/service offerings – e.g. Smart Home solutions with additional security or comfort packages
- Interest in provision of information on energy-related products/services, e.g. during purchase of domestic appliances

**Small/medium-sized enterprises’ (SME) expectations**
- Interest in SME-specific services with tariff models tailored to business needs (e.g. reduced daytime tariff)
- Interest in new energy-related products and services, e.g. energy efficiency products (energy efficient cooling systems, isolation); installation and maintenance services for energy systems (PV systems, heating); energy consultancy services
- High interest in self-generation opportunities (PV system, wind turbine, etc.)

Source: Trend study on energy consumers (2013), Deloitte Analysis

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The Consumer Issue III

Digital customer experience is not a future scenario but already state-of-the-art customer experience in most industries.

**Digitization of the customer experience**

- **Smart applications**
  - Monitoring and controlling of light, heat, cold, and electricity in homes and buildings by every preferred device of the customer. TMT companies enter energy business through digital infrastructure and service offerings and increase competition.

- **Online-mobile-shift**
  - Becoming a single point of contact between businesses and clients, mobile internet changes customer buying habits. Comprehensive omni-channel offering of products and services is required. Risk of losing customers due to poor mobile service integration.

- **User experience**
  - UX is crucial for customer acquisition. Utilities need to understand how their clients live and work and which needs and problems they face. The digital "look and feel" differentiates service offerings. Hence, utilities face the challenge of increased customer interaction.

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The Consumer Issue III

Current innovation drivers come from outside the industry, utilities need to position themselves to play a role in new businesses

*Micro-CHP Value Chain*

<table>
<thead>
<tr>
<th></th>
<th>R&amp;D</th>
<th>Production</th>
<th>Sales</th>
<th>Installation/ Maintenance</th>
<th>Operation</th>
<th>After sales</th>
<th>Financing</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dynamic</strong></td>
<td>Low dynamic based on high initial investments</td>
<td>High dynamic – automotive, heating system and technology companies enter segment</td>
<td>High dynamic – energy efficiency start-ups and international utilities enter segment</td>
<td>Low dynamic amongst established installation companies</td>
<td>High dynamic – trading companies and utilities enter market segment</td>
<td>Low dynamic – local presence required</td>
<td>High dynamic – utilities, producers, banks enter segment</td>
</tr>
<tr>
<td><strong>Substitutes</strong></td>
<td><strong>Power</strong>: utility contracts, PV, conventional CHP</td>
<td><strong>Heat</strong>: utility contracts, heat pump, conventional boiler (gas, oil, etc.), conventional CHP</td>
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<tr>
<td><strong>Success Factors</strong></td>
<td>Time to market, technical merits, innovation capabilities</td>
<td>Brand, technical merits, bankability, guarantees</td>
<td>Existing customer base, partner network, sales channel mix</td>
<td>Local presence, reputation</td>
<td>Trading capabilities, technical endowment</td>
<td>Local presence, reputation, distribution network spare parts</td>
<td>Financial power, margin expectations</td>
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<tr>
<td><strong>Value Pools</strong></td>
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<tr>
<td></td>
<td>Cost</td>
<td>30-35%</td>
<td>9-11%</td>
<td>8-10%</td>
<td>8-10%</td>
<td>15-20%</td>
<td>10-20%</td>
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<td>Margin</td>
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Consumer Consequences

Utilities have to respond by de-averaging products and service to apply to individual needs

1. CUSTOMER INSIGHT GENERATION
   - Understand consumer behaviors and customer needs based on customer analytics (e.g. shift from pure consumers to prosumers with different expectations)
   - Identify profitable products and segments

2. DE-COMMODITIZATION
   - Develop micro-segment strategies and tailor products and services accordingly
   - Increase customer experience via multi-channel approach
   - Move away from commodity provider to solution provider (e.g. energy manager)

3. NEW POSITIONING
   - Drive innovation and engage in new business models
   - Move away from traditional vertical integration and find clear positioning along new value chains
The Utility of the Future?

There is no “one fits all” solution; implications for utilities depend on chosen strategy and vary between options.

**Strategic Options of Corporate Level**

<table>
<thead>
<tr>
<th>Option A:</th>
<th>Smart, decentralized Utility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option B:</td>
<td>Clustering of regulated assets (Infrastructure Service Provider)</td>
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<tr>
<td>Example:</td>
<td>Stromnetz Hamburg GmbH</td>
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<tr>
<td>Option C:</td>
<td>Consolidation of traditional utility (Focus on centralized generation)</td>
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<tr>
<td>Example:</td>
<td>Uniper</td>
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<td>Option D:</td>
<td>Transformation to customer centricity (Value-added service offering)</td>
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<tr>
<td>Example:</td>
<td>new E.ON</td>
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<tr>
<td>Option E:</td>
<td>Turn-around (Enter new markets)</td>
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<tr>
<td>Example:</td>
<td>Kelag</td>
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</tbody>
</table>
Where to Play?
For each preferred option a strategy needs to be defined per business area
What to Do?

Accordingly, potential business models for each business area need to be defined, evaluated and implemented.

<table>
<thead>
<tr>
<th>S&amp;T</th>
<th>T&amp;D grids</th>
<th>B2C</th>
<th>B2B</th>
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</thead>
<tbody>
<tr>
<td>1. Flexibilization of the generation portfolios</td>
<td>1. Remote monitoring and control of grid facilities</td>
<td>1. Distributed generation systems, e.g. PV, CHP, etc.</td>
<td>1. Sale of distributed generation and storage systems</td>
</tr>
<tr>
<td>2. Expansion and marketing of renewable energies</td>
<td>2. Automation of load balancing</td>
<td>2. Distributed power, heat and cooling storage systems</td>
<td>2. Contracting</td>
</tr>
<tr>
<td>3. Expansion of storage systems</td>
<td>3. Load management via Smart Meter data</td>
<td>3. Provision and operation of eMobility infrastructure</td>
<td>3. Electric vehicle fleet and fleet management</td>
</tr>
<tr>
<td>7. Marketing of storage capacities</td>
<td>7. Smart public lighting</td>
<td>7. Sale of product bundles (energy and TelCo)</td>
<td>7. Energy benchmarking across sites</td>
</tr>
<tr>
<td>8. Trading of distributed commodities (e.g. H₂)</td>
<td>8. Integrator for converging grids from power to traffic</td>
<td>8. Smart Home solutions</td>
<td>8. Financing, insurance, residual current delivery</td>
</tr>
</tbody>
</table>
How to Win?

To do so, a Target Operating Model incl. products/services, capabilities and organization has to be defined.

### Key operating model design considerations

<table>
<thead>
<tr>
<th>Products/Services</th>
<th>Capabilities</th>
<th>Organization</th>
<th>Locations</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1 Customer segments</strong></td>
<td>- Who are the targeted customer groups and what are their needs?</td>
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<tr>
<td><strong>2 Products/services</strong></td>
<td>- What products/services will be provided (e.g. traditional services; new, non-commodity products and services)?</td>
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</tr>
<tr>
<td><strong>3 Channels</strong></td>
<td>- What channels will the products/services be delivered through (e.g. partner network, call center, etc.)</td>
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<tr>
<td><strong>4 Processes</strong></td>
<td>- What processes, functions and activities are required and how will they interact (e.g. strategy, service mgmt., customer mgmt., system mgmt.)</td>
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<tr>
<td><strong>5 Information</strong></td>
<td>- What information &amp; metrics will be used to measure organizational and process effectiveness</td>
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<tr>
<td><strong>6 People</strong></td>
<td>- What capabilities are required to support the functional model? - How will these be delivered (in house, third party, outsourced, etc.)?</td>
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<tr>
<td><strong>7 Technology</strong></td>
<td>- What enabling technologies will be needed to deliver services effectively and drive efficiencies?</td>
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<tr>
<td><strong>8 Organization</strong></td>
<td>- In which organizational structure will functions and services be delivered? - What roles/responsibilities are required to bring the structure to life?</td>
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</tr>
<tr>
<td><strong>9 Locations</strong></td>
<td>- In which locations will the functions be delivered?</td>
<td></td>
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</tbody>
</table>

**Products/services**
- New ways of creating a personalized and emotionally connected customer experience
- New products/services “beyond the meter”

**Capabilities**
- New technologies, processes and capabilities allowing closer customer interactions and use of available plant/grid/customer data to drive insight and act in real-time

**Organization**
- Organization which is geared for instant, 24h, multi-channel response to reactive or proactive customer contact
- Clear customer engagement strategy to ensure fully customer-centric organization
How a future utility might look like?

In future environment classical value chain organizations will transform into integrated data driven organizations

Key operating model design considerations

<table>
<thead>
<tr>
<th>Currently</th>
<th>Traditional business areas</th>
<th>New business areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generation</td>
<td>Trading</td>
<td>T&amp;D</td>
</tr>
</tbody>
</table>

Implications

- Traditional and new business areas have to be integrated in the tension between centralized and distributed generation
- Data management and analysis are at the core of the future operating model \(\text{(consideration of regulatory requirements!)}\)
- Focus of the new organization designs will be on operations; investment-related activities will be spun off into an “Asset Management” division
- Additional division for development and offering of value-added services, also for third parties
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