New opportunities for municipal utilities: Changes, Challenges and Chances as a result of liberalization

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Berlin, 2nd June 2016
Agenda

- Liberalization
- Decentralization
- Digitalization
Source: 1) www.flyingafargo.wordpress.com; 2) www.horse-today.de; 3) www.teslamotors.com
Megatrends in the energy industry – challenges for municipal utilities

- **Liberalization**
  - Competition within the industry
  - Change of ownership

- **Decentralization**
  - Innovative technologies
  - Changing customer needs

- **Digitalization**
  - Energy incumbents
  - Non-Energy incumbents
  - Start-ups
    - IoT

- **Pressure to change**
  - 1998
  - 2005
  - today
  - 2025
1. Unbundling of grid from wholesale/retail has produced a functionally organised value chain back then (simplified).

2. Liberalization did create an additional level in the value chain – wholesale – a link between generation (supply) and retail (demand).

3. Companies had to reposition themselves in the newly organised value chain.

4. The fight for parts of the value chain is in full swing,
   + both for positioning along the value chain,
   + and within the individual levels of the value chain.
Deutsch-französisches Büro für erneuerbare Energien

Source: 1) www.apple.com; 2) www.freepik.com; 3) www.trianel.com
Megatrend 2: Decentralization driven by the crowd

- Private Individuals: 35%
- Project Firms: 14%
- The “Big Four” Power Providers: 5%
- Other Power Providers: 7%
- Investment Funds / Banks: 13%
- Industry: 14%
- Farmers: 11%
- Others: 1%

Source: trend:research / Leuphana, excl. pump storage, wind offshore, geothermal, biogenic waste (2013)
Some would say it is quite challenging ... or in other words „The worst crises of all time“

Source: OnVista (2015)
Challenges for German utilities: Nuclear phase-out, Off-Shore, Mid-day Peak

Gradual phase out of nuclear plants¹

<table>
<thead>
<tr>
<th>Year</th>
<th>German electricity supply (TWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>20,489</td>
</tr>
<tr>
<td>2011</td>
<td>17,936 (-8,552)</td>
</tr>
<tr>
<td>2012</td>
<td>12,846 (-5,090)</td>
</tr>
<tr>
<td>2013</td>
<td>8,107 (-4,739)</td>
</tr>
<tr>
<td>2014</td>
<td>6,949 (-1,158)</td>
</tr>
<tr>
<td>2015</td>
<td>5,000 (-1,949)</td>
</tr>
<tr>
<td>2016</td>
<td>3,524 (-1,476)</td>
</tr>
<tr>
<td>2017</td>
<td>2,270 (-1,254)</td>
</tr>
<tr>
<td>2018</td>
<td>1,352 (-1,918)</td>
</tr>
<tr>
<td>2019</td>
<td>1,015 (-337)</td>
</tr>
<tr>
<td>2020</td>
<td>903 (-112)</td>
</tr>
<tr>
<td>2021</td>
<td>800 (-103)</td>
</tr>
<tr>
<td>2022</td>
<td>700 (-100)</td>
</tr>
<tr>
<td>2023</td>
<td>600 (-100)</td>
</tr>
</tbody>
</table>

23% of German electricity supply (2010)

Technical challenges of off shore wind new build²

Decentralized renewables reducing mid-day peak of wholesale prices³

What does “decentral” even mean?

Grid interventions of TenneT

Number of grid interventions / on how many days per year

Start of nuclear phase-out

Source: TenneT (2015); *January – June 2015
Deutsch-französisches Büro für erneuerbare Energien

Source: www.karrierebibel.de
Megatrend 3: Digitalization
Chances for utilities – Which direction to choose?

Source: Burger/Weinmann (2015)
Digitalization – What does it look like?

Source: Burger/Weinmann (2014)
Let me try to wrap it up…
Digital transformation is happening right now

**Increasing decentralization**
- Expansion of decentralized renewable energies and CHP
- New technologies (Smart-Meter, E-Mobility)
- Increasing complexity of wholesale markets
- Demand response management
- Changing customer needs to individual services with flexible products and systems (decentralized energy management)

**Digitalization, the next big step**
- Digital networking of decentralized generation units (VPP, balancing energy pools)
- Intelligent control technologies
- Digital processes and trading systems
- Big Data Management & IT-Security
- Platforms
- Blockchain

What are the chances for municipal utilities from these megatrends?
Chances for municipal utilities from these megatrends

The market as it is

+ The bulk of decentral (renewable) power plants are owned by groups of individuals (47 %) rather than traditional utilities (12 %).
+ The individuals who own the plants are usually non energy experts.
+ There are millions of small, decentralized energy plants, which need to be connected, operated and controlled to avoid brown- and blackouts within the grid.

Chances for municipal utilities

+ Manage, connect and dispatch large number of decentralized (renewable) power plants.
+ Develop and market further services such as:
  - Forecasting of power generation from wind and PV plants
  - Balance group management
  - Energy trading
  - Invoicing

In a new energy world, municipal utilities need to become digital utilities to face the future challenges.
Our chance: Virtual Smart Platform

Energy markets + Assumption of market roles through client ability
Weather + Flexibility provider in local markets
Power grid + Use of system functions (Optimization, forecasts...)
Customer requests
Heat
Electromobility

Municipal Utilities / Customers

Trianel

Virtual Smart Platform

Energy markets: Municipal Utilities / Customers
Weather: Trianel
Power grid: Trianel
Customer requests: Trianel
Heat: Trianel
Electromobility: Trianel

+ Aggregator
+ Market access
+ Optimization of Flexibility through Big Data
+ Open source Platform operator /-developer

Households (Prosumer) + CHP Switchable loads Backup systems Wind power Hydropower Photovoltaics Biogas

For more info about Trianel in France: www.trianel.fr
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Backup
Significant increase of decentralized energy production and digital networking of generation units opens new business opportunities

**Energy system trajectory**

**Drivers**

- **Technological**
  - Learning curves of existing technologies, e.g. grid parity PV, heat pumps micro CHP
  - Progress of ICT\(^1\)
  - New technologies, e.g. smart meters, e-vehicles

- **Regulatory**
  - Avoiding negative externalities due to climate change, security of supply
  - Trade off between transmissions lines and decentralized systems

- **Empowerment**
  - Rio 1992: Local Agenda 21
  - From consumer to prosumer

Source: Burger/Weinmann (2013); 1) Information and communication technology