Transatlantic Strategic Dialogue

**Electricity Transitions in Europe and the United States**

Washington DC, 9 & 10 December, 2013

“Energizing” statement for Round Table 3: The Future of the Electric Power Industry

By Robert Werner
Electric utilities on both sides of the Atlantic have undergone major restructuring in the past two decades. On both sides of the Atlantic, vertically integrated companies are losing market shares to private grid operators, locally owned distribution systems, and millions of independent electricity generators.

- What challenges and requirements does the electricity market have to meet?
- Which are today’s and tomorrow’s business opportunities for generation, distribution, and storage?
- What institutional structures does the future energy system call for, and what policies incentivize their creation?
Agenda

1. Types of utilities
2. Challenges for utilities
3. Markets
4. Institutional structures
5. From business opportunities to business models
### Types of utilities in Germany

<table>
<thead>
<tr>
<th>Types</th>
<th>value chain</th>
<th>generation</th>
<th>whole sale</th>
<th>distribution</th>
<th>grid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Big utility (4)</td>
<td></td>
<td>strongly involved, 60-70% of total generation</td>
<td>strongly involved</td>
<td>approx 30% of final customers</td>
<td>E.ON; Vattenfall sold their lines; EnBW keeping theirs, RWE retains 25% share</td>
</tr>
<tr>
<td>Regional utility (Approx. 10-15)</td>
<td></td>
<td>traditionally very little, yet some invest heavily</td>
<td>a little</td>
<td>main job; regionally</td>
<td>some do, main business</td>
</tr>
<tr>
<td>Municipality owned utility (Stadtwerk) (approx. 900, of very different size)</td>
<td>13% altogether</td>
<td>bigger ones do</td>
<td>main job; mostly regionally, some offer nationwide</td>
<td>Most of them own the local distribution grid. Increasing co-operation for O&amp;M</td>
<td></td>
</tr>
<tr>
<td>Alliances of municipality owned utilities (approx. 10)</td>
<td>yes (pooling financial power of utilities)</td>
<td>yes, to pool financial risks for utilities</td>
<td>no</td>
<td>no</td>
<td></td>
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# Types of utilities in Germany

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<td>Pure suppliers</td>
<td>none, or very little</td>
<td>some do; not main business</td>
<td>yes, main business: buy cheap and sell with margin to consumer; nationwide</td>
<td>no</td>
<td></td>
</tr>
<tr>
<td>Green suppliers</td>
<td>increasingly yes</td>
<td>no</td>
<td>yes, offering consumers an additional contribution to energy transition (nationwide)</td>
<td>no</td>
<td></td>
</tr>
<tr>
<td>IPP “professionals”</td>
<td>yes, main business</td>
<td>mainly their generated power</td>
<td>no</td>
<td>no</td>
<td></td>
</tr>
<tr>
<td>IPP “non-professional”</td>
<td>yes, main business</td>
<td>no</td>
<td>some do, but mostly locally and not very professionally</td>
<td>no</td>
<td></td>
</tr>
</tbody>
</table>
Challenges for utilities

The future of the energy business has never been as uncertain as today.
The only thing we know for sure is that nothing will be the same as before.

Four sub-transformations define a frame of uncertainty for the power industry. All of them are the cause and consequence of political decisions.
Changing relationships between energy sources and uses

- Electricity comes to be used in heating and mobility
- Renewables will substitute oil
- Besides CHP, production of power and heat are increasingly intertwined:
  - The case of heating:
    - surplus renewable power used in heating rods, Power-to-Gas
    - heat pumps
  - The case of mobility
    - Impact on urban planning
    - E-bikes

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The failure of the carbon market and international climate negotiations

- How can the carbon price be raised to a sustainable level of above 40-50 €/t?
- How realistic is it that 27 member states of the European Union will agree on such a target?
- How realistic is it that some 186 governments will agree on a 2-degree-target AND on measures to reach it?
Prices at the power exchange have been below today’s before renewables started to grow.

The recent price decline is due to several reasons:

- Overcapacities in generation (esp. older power plants)
- Low carbon prices
- Very low marginal costs of renewable and depreciated nuclear and coal power plants
Reasons for the low prices at the power exchange: Cheap power from old power stations

- Most fossil and nuclear power stations are older than 30 years and completely depreciated.
- Their marginal costs are low in comparison with newer power plants, which have to earn capital costs.
- The power price crisis is partly due to a failure of the pricing mechanism, which is unable to integrate old and new power plants in the merit order in a way that investors can have confidence in long term prices.

Source: Matthes und Ziesing (2008)
How can security of supply be achieved efficiently as wind and solar power expand?

- In the future, wind and solar will provide the biggest share of electricity.
- Managing the intermittency of this power is a technological and economic, but primarily a political challenge:
- Since the liberalization and the subsequent melting of overcapacities, we have yet to define who exactly takes full responsibility for security of supply.
- This problem is realized by almost all European States.
- The discussion about capacity markets is a European one.

Graph: clean energy sourcing 2012
How should renewables be marketed after leaving the support scheme?

- From 2020 onwards, increasing amounts of cheap renewables push into the market.
- Their low cost is good news.
- But nobody knows what the market for them looks like.
- Given that the public paid for them in the first 20 years, one might argue that they should give something back while producing so cheaply.

**Annual amount of formerly EEG-supported renewables capacity leaving the support-scheme**

Source: own calculations
How do market prices and the EEG surcharge add up?

- There is an increasing share of power whose price is not determined by markets.
- In the near future, we will have two price zones: a market driven one and a surcharge.
- Consumer prices are expected to remain roughly the same.
- The total cost of power will decline even further in 2013 and 2014!

Wholesale power prices and EEG surcharge in €ct/kWh

- EEG surcharge
- average forward wholesale price

Source: BDEW, own calculation
Conclusion - The role of markets

• The purpose of markets is to provide their participants with price information to enable informed decisions about short / long term trading / investment.

• The question is, do the price signals generate enough confidence for investors to invest in power stations, storage and flexibility?

• Since 2009, prices in Europe have been so low that almost no investor and no bank will invest in power stations of any technology.

• The sale of EEG-supported renewable power on the power exchange intensifies the problem. But if renewables are kept away from price formation at the power exchange, it is unlikely that price levels will provide a strong enough signal to investors for investment in fossil power plants.

• We are facing a fundamental dysfunctionality of „energy only“-markets with price formation based on marginal cost! Competition exists not so much between „renewable“ and „fossil“ but rather between „old“ and „new“ power plants.

• Consequently we have to devise a market design that integrates old and new power stations (and storage etc.) such that investors take action NOW – bearing in mind that planning and construction of a new power plant will take about 5 (wind) to 15 years (pumped hydro).
Conclusion - The role of regulation

- Since the energy transition is a political target, the design of energy markets has always be policy-driven.

- Further, there is consensus, that security of supply shouldn´t be object of market failure. It would be too risky – technically and politically. Consequently, market mechanism need to be arranged by political actions in order to guarantee.

- Energy markets will always require regulation – irrespective of the circumstances.

- To set the right market design, politics has to answer at least 4 questions:
  1. Level of security of supply?
  2. Pathway for renewables (automatically including a pathway for phasing out coal and possibly gas)?
  3. May the targets be reached earlier than planned?
  4. Dynamics of efficiency?
Institutional set-up

- To manage the answers to the 4 questions, legislations has to create a framework which addresses the following fields:
  1. “Regular” market design: how will old and new installations be traded.
  2. Security of supply: capacity mechanisms.
  3. Combine 1. and 2. for creating an interface between “smart market” and “smart grid”.
  4. Efficient renewables support schemes.
  5. Phase-out scheme for fossil power.
  6. Establishing a tool to enforce efficiency (probably by ignoring the utilities).

- All measures must be set up for the long term to provide reliability, so utilities can invest in new business models.
Business models (BM) in the energy sector

- What do we have in mind when talking about „business models for utilities“?
  - Saving the existing model?
  - Developing new ones?
  - Do both?
  - Develop new ones and phase out the old ones?

- The problem of business models in the energy transition is the transition itself: new – initially less profitable - models replace existing ones that are mature and yield high returns.

- It is a matter of business reality that companies usually try to preserve old business models for as long as possible. Unfortunately, for most leaders it is easier to invest in the preservation the present BM than to develop and implement a new one.

- Further, the company’s (and its stakeholders’) expectation of new business models is that they should be at least as profitable as the existing one. Yet this is rarely the case.
Business modeling is a step-by-step process

- **Overall strategy**
  - How to achieve the long term goals?

- **Business idea**
  - Describes the story of how a service meets the demand of a customer

- **Business model**
  - Describes the detailed mechanism and logical procedure of how the business idea will be turned into profit and sustainable revenue

- **Business plan**
  - Describes the detailed implementation of the business model in terms of short term goals and measures

- **Structure**
  - Describes the legal set-up and the organisational and operational structure

Why does the utility exist?

What’s the story?

Why successful?

What actions does it take?

What’s the best structure?

The most frequent mistakes in this process are the confusion of

- Business idea and business model, and
- Deciding on structures before having a workable business plan.
A successful business model should...

- **... fit to company’s long term goals.**
  - Example: If your business mission is the supply of energy, does for example a step into telecommunication really support this mission? Watch the pitfalls of disruptive innovations!
  - Thus: Does the business model derive directly from the existing core competencies?

- **...reinforce itself in a positive way.**
  - This requires the model to be free of contradictions (Example: Selling as much power as possible and offering energy efficiency services doesn’t go together well). A rampant learning curve is the most important aspect of a business model.

- **...be robust**
  - A business model has to withstand 4 basic threats (according to Pankaj Ghemawat):
    - **Imitation** (Can competitors do the same thing easily in short time?)
    - **Losing value** (Can customers, suppliers or other stakeholders with strong negotiating power grab part of your value-added?)
    - **Carelessness** (within the company; success can cause imprudence)
    - **Substitution of benefits** (Do new products reduce the benefit of existing products/services? Example: a smart meter works automatically and makes the relationship even more anonymous, but maybe the customer enjoys the direct face-to-face contact with her supplier.)
Future business ideas for utilities

Present business models

- Sale of power: operational margin: 5-10%
- Sale of gas: operational margin: 10-15%
- Grid: max 9.27% (regulated value), reality: average 4-6%
- District Heating: the last monopolistic field, data is kept secret. Guess: 10-30%
- Power generation: 5-10% (for RE), 10-25% and beyond (for fossil)
- All other activities of utilities are either pilot projects (with money for research) or paid by marketing unit to improve the company’s image.

New business opportunities?

- Efficiency
- Heating with renewables and local grids
- E-Mobility
- Contracting: efficiency, CHP
- Flexibility (Demand Side Management)
- Smart grid solutions
- Storage
- Operating a grid
- Launch funds for financial participating of the customers
- Services for Prosumers (customers who produce and consume their own energy)
- Offering internet access
- ....
Conclusion on new business models for utilities:

- A business idea is not a business model.
- A business model is successful when it generates sustainable revenue and profit.
- Selling as much energy as possible is the dominating business model for utilities.
- Local utilities’ profits are needed to subsidize other communal tasks (public swimming halls, child care, etc.)
- Hardly any of the business ideas for utilities are close to becoming a business model.
- New business models in the energy sector are likely to threaten the present ones. It takes courage to introduce a new BM with initially low earnings in order to replace a successful one.

- For investments in new BMs, decision-makers need
  - Long term perspective on return on invests in order to develop a story for high earnings
  - A clear signal as to what investments are no-gos (e.g. fossil power)
  - Confidence in a market design that generates prices at a level which guarantees a return on invest

- Professionalize the business:
  - Board of utility: usually members of the City Council with no professional experience in energy. Lack of knowledge reduces willingness to decide and step forward into new BM
  - More flexible organizational structure in order to manage dynamic developments.
Thank you very much for your attention!

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- strategy processes
- public participation schemes for power plants and grids
- energy cooperatives