Are Fixed Charges an Answer to Tariff Design Challenges?

Delegation from Minnesota/Illinois

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Agenda

- Facts and Figures about the German Network
- PV Self-Consumption in Germany
- Conclusions about Network Charges
1 Facts and Figures about the German Networks and its Fees
Residential customers’ retail prices at annual use of 3500 kWh

Source: Agora, BNetzA data 2016, *Agora estimates
Power network costs in Germany

Regulated network revenues in 2017:

- ~ €24 billion paid by consumers only
- Transmission: €6 to 7 billion
- Distribution: €17 to 18 billion

Network costs increased by 25% in 6 years through

- Investments for grid extension
- Dispatch/redispatch - reserves and curtailment
  (Germany has a single bidding zone, no LMP!)

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Grid costs are allocated locally by

4 transmission networks  860 distribution networks
... Resulting in increasing price differences

Grid fees for household in 2015 (at 3500 kWh)

⇒ Rural networks with high RE-penetration and low demand becoming more and more expensive

⇒ Demand in cites far from supply is affected less and is cheaper
June 2017: Federal decision to harmonize transmission fees by 2023

States (Länder): „Differences in transmission fees are an unfair (dis-)advantage to local economy“

Source: 50Hertz, Vereinigung sächsische Wirtschaft
Increasing fixed charges

Due to lack of regulation, distribution networks increased fixed charges over the last couple of years.

Fixed charges for consumers below 100,000 kWh/year (SLP) in Germany

<table>
<thead>
<tr>
<th></th>
<th>2013</th>
<th>2014</th>
<th>2016</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Average fixed charge</td>
<td>14.16</td>
<td>16.44</td>
<td>20.71</td>
<td>€/year</td>
</tr>
<tr>
<td>Max. fixed charge</td>
<td>33.96</td>
<td>36.50</td>
<td>50.00</td>
<td>€/year</td>
</tr>
<tr>
<td>Number of networks without fixed charge</td>
<td>29</td>
<td>24</td>
<td>15</td>
<td>Out of 860 in total</td>
</tr>
</tbody>
</table>

Source: BNetzA Netzentgeltsystematik 2015
Example: Increasing fixed charges = higher bills for low demand

<table>
<thead>
<tr>
<th>Name of Network</th>
<th>Volumetric [€Ct/kWh]</th>
<th>Fixed [€/year]</th>
<th>Metering [€/year]</th>
<th>Total costs at X MWh per year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1,500</td>
</tr>
<tr>
<td>Netze BW</td>
<td>7.5</td>
<td>0.0</td>
<td>9.8</td>
<td>122</td>
</tr>
<tr>
<td>Edis</td>
<td>9.9</td>
<td>58.4</td>
<td>11.6</td>
<td>218</td>
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<tr>
<td>WeserNetz</td>
<td>3.6</td>
<td>58.0</td>
<td>12.0</td>
<td>124</td>
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<tr>
<td>SW Tübingen</td>
<td>3.9</td>
<td>75.0</td>
<td>15.2</td>
<td>148</td>
</tr>
</tbody>
</table>

⇒ In some networks, fixed costs for low demand customers (e.g., apartments) already above 50% of network costs
How do other industries recover fixed costs?
We pay for other “grids” in volumetric prices
German Facts on Rooftop PV and Network Fees
German study on PV self-consumption

Questions

• What are the relevant PV rooftop groups/sectors?
• What will PV and batteries cost?
• What amount of rooftop PV can be expected (2035)?
• What will be the decrease in power taken from the grid?
• What are the effects on network revenues and other customers?
Potential for PV self-consumption is limited, even in commercial and residential sector

- Commercial customers
- Residential customers

Total annual demand of sectors:
- Commercial: 140 TWh / Jahr
- Residential: 130 TWh / Jahr
- Total: 270 TWh / Jahr

Annual demand of relevant sectors:
- Trade and farming: 30 TWh / Jahr
- Single-family homes: 65 TWh / Jahr
- Food retailers and farming: 24 TWh / Jahr
- Total: 95 TWh / Jahr

Potential for PV self-consumption:
- Commercial customers: 24 TWh / Jahr
- Residential customers: 4 TWh / Jahr

* compensating power taken from the grid
PV self-consumption potential for Germany in 2035

- PV self-consumption can be max. 44 TWh/a
  - Incl. 24 TWh for heat demand
  - 20 TWh less power taken from network (600 TWh total)
- 5% reduction of total demand would increase average volumetric network charge for household by max. 1 Ct/kWh
PV self-consumption isn’t a big deal

- German power system is a winter-peaking system (as in most EU states)
- No cost-efficient displacement of winter demand by PV, not even with large roofs or cheap batteries
  - Seasonal storage would be required

⇒ Self-consumption won’t drive the transition or risk cost allocation / network revenues
3 Conclusions About Network Charges
Network charges should minimize future system costs

It looks easy to calculate fixed charges, but how do you consider customers’ appetite?

Just the costs for metering and measuring are fixed for every customer
Are fixed charges a solution?

Rate design needs to address the energy and services all customers use from the network.

A differentiation by costs and benefits for prosumers vs. non-active customers cannot be achieved through fixed charges.
3 principles of rate design

1. A customer should be able to connect to the grid for no more than the cost of connecting to the grid.
2. Customers should pay for grid services in proportion to how much they use the grid and when they use the grid.
3. Customers who supply power to the grid should be fairly compensated for the full value of the power they supply.
About RAP

The Regulatory Assistance Project (RAP)® is an independent, non-partisan, non-governmental organization dedicated to accelerating the transition to a clean, reliable, and efficient energy future.

Learn more about our work at raponline.org

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Resources

- PV Self-Consumption (German)
- Grid Tariffs in 2017 (German)
- Tariff design in Germany (German)
- Designing Tariffs for Distributed Generation Customers
- Smart Rate Design for a Smart Future
- Designing Distributed Generation Tariffs Well
- Time-Varying and Dynamic Rate Design
# Network price components 2017 for residential customers in Germany

<table>
<thead>
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<tr>
<td>Bayernwerk</td>
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<td>Berlin</td>
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