Overview of German Network Charges and Saving potential for C&I Customers

1. Network Charges are Increasing
2. Energy Bill Pricing Principles
3. Three Consumption Profiles and Possibilities for Saving at C&I sites
   - generic
   - electro-intensive
   - atypical
Network charges are increasing

Charging System In Germany:
Industrial consumers pay the grid fees directly to the DSO

Reasons For Increasing Medium Voltage Connection Costs

• Shutdown of all nuclear power plants by 2022
• Shutdown of 20 old large coal and lignite power plants by 2020
• Development of offshore wind plants in the North and the Baltic Sea
• Increase of renewable energies production to 80% of the electricity supply until 2050

100% of TSO and DSO investment costs are allocated to the consumers through network charges

Source: BMWi - Federal Ministry for Economic Affairs and Energy
Big differences in pricing of DSOs

<table>
<thead>
<tr>
<th>Yearly period of use</th>
<th>DSO</th>
<th>&lt; 2 500 h/yr</th>
<th>&gt; = 2 500 h/yr</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Price of energy</strong></td>
<td><strong>(Stromverbrauch)</strong> for Medium voltage</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Städtische Betriebswerke Luckenwalde</td>
<td>2,18 €/kWh</td>
<td>1,92 €/kWh</td>
</tr>
<tr>
<td></td>
<td>EW Hindelang</td>
<td>8,63 €/kWh</td>
<td>0,79 €/kWh</td>
</tr>
<tr>
<td><strong>Price of power</strong></td>
<td><strong>(Leistungspreis)</strong> for Medium voltage</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Städtische Betriebswerke Luckenwalde</td>
<td>24,87 €/kW</td>
<td>31,39 €/kW</td>
</tr>
<tr>
<td></td>
<td>EW Hindelang</td>
<td>24,65 €/kW</td>
<td>220,52 €/kW</td>
</tr>
</tbody>
</table>

- DSOs publish pricing in October every year
- > = 2 500 h/yr (MV) results in low energy costs and high network charges

Source: Technische Universität Dresden, Lehrstuhl für Energiewirtschaft 2015
### Opportunities for lower grid connection cost

#### 3 savings opportunities with batteries

<table>
<thead>
<tr>
<th>1. Generic</th>
<th>Reduction of the highest 15-minute demand peak/year (in kW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Electro-intensive</td>
<td>Sites consuming more than 10 GWh/year Increase of the period of use to over 7000h /year</td>
</tr>
<tr>
<td>3. Atypical</td>
<td>Reduction of the max. demand during DSO’s peak load periods (Hochlastzeitfenster)</td>
</tr>
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</table>

#### Composition of energy bill

- **Fees, taxes** 53%
- **Electricity** 22%
- **Network charges** 25%

![Composition of energy bill chart](chart.png)
Network costs depend on power consumption and peak load
- Remote controlled meters
- Load measurement averaged over 15-minute intervals
- Network charges priced according to the power consumed during the highest 15-minute intervals peak
- Calendar year: 1/1 – 31/12
- Monthly invoices

The battery will charge during low load periods and discharge during high load periods
Electro-intensive case - StromNEV §19 (2) sentence 1

**Savings criteria**

- min. 7000 usage hours per year
- +10 GWh power consumption

\[ \text{yearly period of use [h]} = \frac{\text{yearly energy consumption [kWh]}}{\text{peak load in one year [kW]}} \]

<table>
<thead>
<tr>
<th>min. use hours per year</th>
<th>% of network charge</th>
</tr>
</thead>
<tbody>
<tr>
<td>7,000 h</td>
<td>20%</td>
</tr>
<tr>
<td>7,500 h</td>
<td>15%</td>
</tr>
<tr>
<td>8,000 h</td>
<td>10%</td>
</tr>
</tbody>
</table>

**Principals**

- Authorization given by the BNetzA for a 5-year period

- Real savings calculated case by case by the DSO based on the fictional "physical path": from the consumers connection point to the closest generation plant according to BNetzA methodology

- The DSO sends the discount after the end of the year once the real yearly use hours are checked
Principals

- DSOs publish peak load periods (Hochlastzeitfenster) for the year to come, before the 31/10 of the previous year

- Peak load periods are valid on working days only and have a maximum duration of 10 hours per day

- Peak load periods are defined by each DSO according to a BNetzA methodology DSO

⇒ Peak load periods avoid congestions on the DSO network

Savings criteria

- Site’s maximal load demand during system peak load periods has to be 20% lower than during the rest of the year (medium voltage)