LOCAL ELECTRICITY MARKETS IN THE EU AND IN CHINA

HELENA UHDE, CEEP-BIT
HELENA.UHDE@BIT.EDU.CN; @GREEN_BRIEF
LET’S TALK ABOUT ELECTRICITY

Fig. 1: Power Socket. Vectors: Freepik.com
TRADITIONAL ELECTRICITY SYSTEM

- Generation, Transmission and Distribution often in the hand of a few state-owned enterprises
- Unidirectional power flow
- Hierarchical organised
- Passive consumers

Fig. 2: Traditional (centralized) Electricity system. Vectors: Freepik.com
NEW ACTORS MAKE THE SYSTEM MORE COMPLEX

• Electricity system is changing → Unbundling processes
• Increasing share of intermittent renewables
• Increasingly behind-the-meter distributed energy sources

Fig. 3. Renewable electricity capacity additions, 2009-2019. Source: IEA (2020)
LOCAL ELECTRICITY MARKETS (LEM)

- A market-based way to manage distribution systems
- Electricity exchange platform on the distribution level of the grid
- between interconnected participants, such as small-scale energy generators, consumers and prosumers
- Software for data/financial transaction, not physical exchange of electricity.

Fig. 4: Simplified depiction of a local electricity market (LEM)
Fig. 5. Timeline of total publications. Data: Web of Science.
**LEM IN THE REGULATION**

- The term “local electricity markets” is **not used** in the regulation of the EU and China.
- Other terms are used that allow for similar concepts:

  **EU**
  - 2018/2001/EC directive, Clean Energy Package for all Europeans:
    - Renewable energy community
    - Citizens energy community
    - Active consumer
    - Renewable-self consumer

  **CHINA**
  - Outline of the pilot program for distributed power generation market trading, Distributed Generation Management Measures:
    - Distributed energy owner
    - Trading pilots for distributed power generation
<table>
<thead>
<tr>
<th>Name of policy</th>
<th>Key point for LEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>96/92/EC</td>
<td>introduction of a single European electricity market; common rules for the internal electricity market;</td>
</tr>
<tr>
<td>2003/54/EC</td>
<td>unbundling of distribution and transmission systems, transparent electricity prices</td>
</tr>
<tr>
<td>2009/72/EC</td>
<td>further unbundling of legal ownership of network operation from generation and suppliers; consumer rights for free choice of supplier; cross-border trading in the EU</td>
</tr>
</tbody>
</table>
| Clean energy for all Europeans package, 2019 | “Active Consumers”, Art. 15 Internal Market Directive (IMDII)  
“Renewables Self-Consumers”, Art. 21 Renewable Energy Directive (REDII) |

Table 1: Local electricity market policies by the EU.
## LEM POLICIES IN CHINA

### Table 1
LEM policies by the central government.

<table>
<thead>
<tr>
<th>Year</th>
<th>Name of Policy</th>
<th>Government body</th>
<th>Key point for LEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>Deepening Reform of the Power Sector / “Document No. 9” [2]</td>
<td>CCCPC, State Council</td>
<td>An increased use of market mechanisms and the implementation of demand-response is promised</td>
</tr>
<tr>
<td>2016</td>
<td>Guiding Opinions on Promoting the Development of “Internet +” Smart Energy [53]</td>
<td>NDRC</td>
<td>Strategic outline for the implementation of the “energy internet”, promotion of market trading for individual user and DER</td>
</tr>
<tr>
<td>2017</td>
<td>Announcement of the first batch of “Energy Internet” demonstration projects [50]</td>
<td>NEA</td>
<td>List of 55 energy internet pilot projects, including market pilots</td>
</tr>
<tr>
<td>2017</td>
<td>Outline of the pilot program for distributed power generation market trading [4]</td>
<td>NEA</td>
<td>Presentation of pilot-program on DER-trading: 1) direct trade, 2) entrusted sales, 3) sales to grid</td>
</tr>
<tr>
<td>2018</td>
<td>Distributed Generation Management Measures [3]</td>
<td>NEA</td>
<td>Law draft to introduce local energy markets (for discussion)</td>
</tr>
<tr>
<td>2019</td>
<td>List of the distributed power generation market-oriented trading pilots 2019 [51]</td>
<td>NEA, NDRC</td>
<td>List of 26 chosen pilot sides for distributed energy trading</td>
</tr>
</tbody>
</table>

### Table 2: Local electricity market policies by the Chinese government. Source: Uhde/Malima (2020)
## LOCAL ELECTRICITY MARKET PILOTS

<table>
<thead>
<tr>
<th>EU</th>
<th>CHINA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Participants</strong></td>
<td>Renewable self-consumers, individually or through aggregator</td>
</tr>
<tr>
<td><strong>Market mechanisms</strong></td>
<td>Sell through renewables power purchase agreements, electricity suppliers and peer-to-peer trading arrangements</td>
</tr>
<tr>
<td><strong>Pilot projects</strong></td>
<td>Many projects with different objectives, e.g. EMPOWER, P2P Smart Test, EcoGrid, NOBEL</td>
</tr>
<tr>
<td><strong>Project developer</strong></td>
<td>Cooperation of different stakeholders, often universities as driving force; cooperation of academia with industry partners, usually with government support</td>
</tr>
</tbody>
</table>

Table 3.: Comparison of “local electricity market” concepts in the EU and China.
EU-CHINA CONNECTIVITY

• With an increasing share of intermittent renewables, system flexibility is a key issue both in China and in the EU;
• Efficient market mechanisms enable the integration of demand-side resources, promote innovation and support investments in energy resources close to where it is consumed;
• Exchange on the management of distribution grids can accelerate mutual learning and enable the deployment of flexible resources;
• Local involvement is important to ensure that all stakeholders are represented;
SOURCES


Source of vectors: https://www.freepik.com
HELENA UHDE
CENTER OF ENERGY AND ENVIRONMENTAL POLICY RESEARCH,
BEIJING INSTITUTE OF TECHNOLOGY
HELENA.UHDE@BIT.EDU.CN
TWITTER: @GREEN_BRIEF