ISGAN WG 9: FLEXIBILITY MARKETS

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OVERVIEW

- We are ISGAN Working Group 9 on Flexibility Markets and our scope covers collaborative activities of all aspects of market design for power system flexibility.
- In POW 2022/23 we covered the following Tasks

Number	Title	Task Leader
1	End-Use Flexibility Characterization and Grid Utilization	Canada
2	Consumer focused flexibility	Norway
3	Interoperable markets	UK
4	Operational planning	Austria

RESOURCES AVAILABLE AND NEEDED

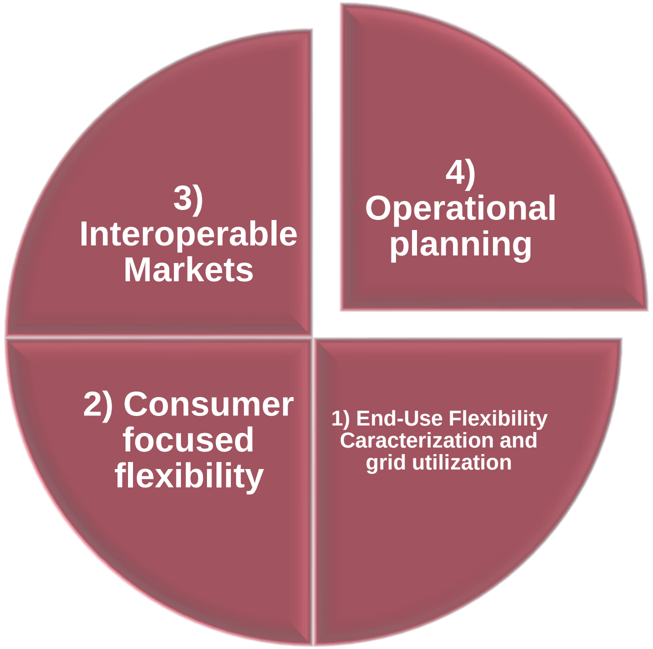
Australia		Austria	
Belgium		Canada	
China		Denmark	
The European Commission		Finland	
France		Germany	
India		Ireland	
Italy		Israel	
Japan		Korea	
Mexico (inactive)		The Netherlands	
Norway		Russian Federation	
Singapore		South Africa	
Spain		Sweden	
Switzerland		The United States of America	
United Kingdom			

Active participation

Low participation

PROJECT AND METHODS USED

- International Smart Grid Action Network technology collaboration platform (ISGAN TCP) Working Group 9: **Flexibility Markets**
- *Partner Countries:* Austria, Belgium, Canada, India, Japan, Korea, Norway, Sweden, Switzerland, United Kingdom



Four Tasks of Working Group 9

Methods:

- **Survey among partners** (India, Korea, Canada, Austria) concerning general market design, flexibility market design, flexibility services for system operators
  - ➢ Country report: „Characterization of the Electric Energy System in view of Flexibility Usage"
- **Stakeholder questionnaire** to be directed at TSOs, DSOs, aggregators/flexibility service providers, consumer associations concerning operational planning and future flexibility:
  - EEM Paper
  - Report will follow

ELECTRICITY AND FLEXIBILITY MARKET DESIGN

Austria

- **Goals**:
  - 100% renewable electricity supply by 2030
  - Economy-wide carbon neutrality by 2040
- Utilities are **unbundled:**
  - Operation and grid ownership *are separated (stakeholder-wise) from* electricity supply
- Main suppliers of (conventional) flexibility:
  - Conventional power plants (hydro, gas, CHP)
  - Also, some large industry sites provide balancing reserve; renewables only with backup allowed
- Other concepts where flexibility is involved:
  - **Energy communities**
  - **Interruptible tariffs**
  - **Variable tariffs (market driven)**

Canada

- **Goals**:
  - 100% net zero electricity by 2035
  - Economy-wide net-zero by 2050
- Both **vertically integrated (8/10 provinces) and unbundled utilities (2/10 provinces):**
  - One stakeholder is responsible for generation, transmission, system operation, distribution and retail *vertically integrated utility (VIU)*
- Main suppliers of flexibility:
  - conventional hydro and natural gas fired plants
  - Peak shaving programs are commonly available to industrial customers
- Other concepts where flexibility is involved:
  - **Time-of-use rates** are available to customers in some provinces
  - **Industrial Conservation Initiative**: With over 500 kW peak demand, which allows them to pay their share of Global Adjustment (GA1) costs based on their load coincident with the top five 12-month system peaks.

MAIN BARRIERS FOR USING DISTRIBUTED FLEXIBILITY

The main barriers for using distributed small-scale flexibility are perceived similarly in all countries.

Roles and responsibilities need to be further clarified in all countries

Canada

- ***Visibility*** is required but economically limited
- Missing ***real-time information*** on the distribution grid topology
- Calculation of required flex loads is difficult
- **Customer awareness** and willingness to participate is perceived from some as a large bottleneck.
- ***Minimum bid sizes***
- Locational restricitions for aggregation
- **Economic barriers** for the onboarding of small assets, since a high effort for changes in operation, organisation and IT-infrastructure is required
- At the moment, use of flexibility is not a compelling cost-benefit scenario

Austria

- Lack of ***visibility*** of assets and observability in the low voltage distribution grid
- Lack of ***real-time information*** and forecasts
- Demanding verification process
- ***Minimum bid sizes***
- **Lack of TSO-DSO interaction**/ communication
- Limited georeferenced data
- ***Over-dimensioning*** of newly built (distribution) grids is still a viable solution
- Higher concurrency factors through flexibility activation of other stakeholders are perceived as threat

IMPACT OF DISTRIBUTED FLEXIBILITY

Grid topology plays a very important role in the use of local flexibilities

For Europe:

- The **grid topology** plays a very important role in the use of local flexibilities through the general behavior of the grid.
- **Optimizing self-consumption** does not really influence the grid.
- Flexibility is not considered in DSOs' long-term planning. Although the use of flexibility as an add on to network reinforcements has high potential, it may still be considered as too unreliable for current planning.

For Canada:

- Capacity reinforcement is a main consideration
- Stack security of supply (regionally/provincially – this is to be further elaborated based on these different sized grids)

Optimizing self-consumption does not really influence the grid → most important are few critical hours per year

For both:

- The most important task of the DSO is to cope with the most critical hours per year.
- Peak will remain a challenge everywhere
- Currently there is not sufficient data available to have a good overview between grid reinforcement and use of flexibility in the low voltage grid

TECHNOLOGY AND INFRASTRUCTURE FOR MEASUREMENT AND VERIFICATION

Backend systems (distributed energy resources management system, cloud systems, energy management systems) need to be developed and improved for the new computational requirements of small-scale flexibility

Canada:

- Main equipment for verification of flexibility provision in Canada are **smart meters,**
- Often **insufficient time interval reporting** for shorter flexibility events (e.g. frequency regulation).
- **Different capabilities of Smart Meters**.
- Measurement equipment (like smart meters) that is used for verification in Canada **needs to be approved**, which none of the home equipment currently is.
- One method used in Canada to verify flexibility provision is to create an average **baseline** from metering data, and then **look for noticeable changes in consumption.**
- Companies are able to use smart meter data to de-aggregate consumption of different types of equipment.

Austria:

- With an increase in small-scale assets, **M&V concepts will need to be adapted accordingly**
- System operators state that **new market roles** in the context of measurement data may be emerging.

In Europe, platforms need to evolve (e.g. equigy), that enable easier data transfer and data handling via online access, contrary to classic Supervisory Control and Data Acquisition (SCADA) systems.

CONCLUSION AND OUTLOOK

- Three sub-categories of main barriers:
  - **1) Technical barriers** (lack of visibility of assets and observability in low voltage grids, different need for design of flexibility market in the distribution grid due to grid topology, usability of current measurement devices etc.)
  - **2) Consumer engagement** (making them aware of their flexibility, introducing incentivisation schemes in order to increase customer's willingness to participate in flexibility markets)
  - **3) Regulatory barriers** (SOs from both countries agree that further development of regulatory framework is required)

Design of European and non-European electricity markets, and therefore the issues that the countries face, differ significantly. Therefore it is difficult to propose a one-fits-all solution for the successful implementation of flexibility markets.

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TOMORROW TODAY

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