FAST TRANSITIONS, SLOW SOLUTIONS: A FLEXIBILITY TRACKER TO MEASURE PROGRESS

WORKSHOP IEA DSM TASK 17: RESPONSIVE CONSUMERS AND VALUE OF FLEXIBILITY

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WE ALL HAVE AN IDEA OF WHAT ‘FLEXIBILITY’ MEANS AND WHAT OUR END TARGET CAN/SHOULD BE

(Very) Simple: MW in spare generation available

More realistic: MW available for ramping up and down

Questions with increasing shares of VRES: which measure, how much, at which cost, local or regional, only electricity, etc…?

The essence: negligible Loss of Load Expectation
NOW THE ENERGY TRANSITION ACCELERATES

**Norway, Feb 2016:** Draft National Transport Plan, in consultation, aims for only zero-emission vehicles (electric or hydrogen) to be sold from 2025.

**Netherlands, 2017:** Dutch government closes Green Deal regarding zero gas heating for residential buildings.

**Germany, 2014-now:** Large aluminum producer experimenting with pools of molten Al. and adjustable heat exchangers as virtual batteries.

**EC, Aug 2017:** System Operation Guideline, giving a EU legal basis for Regional Security Coordinators.

**TenneT/Energinet, Mar-2017:** Cooperation European Transmission System Operators to develop North Sea Wind Power Hub.

**GB, March 2015:** ITPR sets scene for onshore transmission asset tendering, building on earlier offshore practices.

**BE, 2018:** Energy Pakt looking towards 2030 / 2050 under development.

**Brussels, 2016:** Clean Energy Package pushes for level-playing field for various service providers to compete with assets and conventional players in markets and grid development.

Offshore wind tenders reached new record bids of <60Euro/MWh, down over 50% compared to earlier years.
COST AND REVENUE TRENDS RESONATE

RES LCOE KEEPS DROPPING PAST ANY PROJECTIONS

• Moving to zero (direct) subsidies
• Putting pressure on realisation rates and market diversity
• Putting our market thinking to an extreme test

GRID INFRASTRUCTURE FOLLOWS

• Electricity grids gains, but may face more scrutiny as its relative cost rises
• Gas needs to clarify new value proposition based on sustainable supply and flexibility, if possible
DEMAND IS FINDING EVER NEW OPTIONS

Price

Guarantees of Origin

Unbundled GOs

Green power products

Power Purchase Agreements

Real-time PPA

Balanced PPA

Self-generation

Microgrid

Net-metering

Credibility
IMPACT OF INCREASING SHARES OF VRES
A FLEXIBILITY GAP CALLS FOR NEW FLEXIBILITY OPTIONS

Low VRES
• Flexibility need:
  - Demand variations
  - Supply uncertainty (unit loss)
• Flexibility provision:
  - Supply side (conv. power plants)

High VRES
> Flexibility need:
  - Higher (net) demand variations
  - Supply uncertainty (unit loss)
> Flexibility provision:
  - Lower from supply side (conv. generators displaced by VRES)
HOW DO WE USUALLY TACKLE KEY FLEXIBILITY QUESTIONS?

> Technology

| Available | R&D | Pilots |

Needs

| Adequacy  | System stability | Margins | Socio-economic benefits |

Hurdles & Barriers

| Regulation | (No) incentives | Design | Knowledge & experience | ... |

Actions

| National | Local | Regional cooperation |
The Flexibility Tracker scores countries on 14 flexibility KPIs based on 80 standardized questions.
TOP-DOWN KPI APPROACH
THE TRACKER METHODOLOGY

KPI’s are presented from one to five

Higher score means higher readiness

Scores from one (low readiness) to five (high readiness)

Higher score can mean amongst others:
- Vaster potential
- More substantial application
- Clearer policy incentives
- More concerted RD&D efforts
- Better awareness/action
- ...and any combination thereof

Scope of Flexibility Tracker is important

Flexibility Tracker does not:
- Score today’s or yesterday’s flexibility need
- Indicate an optimal (cost-based) balance of solutions
- Assess scenario-specific (e.g. adequacy) issues

Market barrier
Adverse incentive
SET OF COUNTRY REPORTS

- Fact sheet
- 14 flexibility KPIs and main messages
- Country comparison
- Recommendations for action
Balancing markets

**BE** New products, including strong focus on demand

**DE** Being opened up

**NL** Some still generation-restricted, symmetric
# SET OF COUNTRY REPORTS

## Transmission

<table>
<thead>
<tr>
<th>Country</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BE</strong></td>
<td>Tests of local flexibility, dynamic rating, ...</td>
</tr>
<tr>
<td><strong>DE</strong></td>
<td>Internal restrictions; TSO/DSO interfaces</td>
</tr>
<tr>
<td><strong>NL</strong></td>
<td>High levels of interconnections (existing and planned)</td>
</tr>
</tbody>
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Common challenges

<table>
<thead>
<tr>
<th>Thermal generation</th>
<th>Preparedness for phase-outs; impact of subsidies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small-scale</td>
<td>Bring from R&amp;D pilots to application</td>
</tr>
<tr>
<td>Sector coupling</td>
<td>Linking flexibility of heat/electricity/transport; Power-to-Gas; ...</td>
</tr>
<tr>
<td>Further regional integration</td>
<td>Pool resources</td>
</tr>
</tbody>
</table>
Role of demand?

<table>
<thead>
<tr>
<th>Access</th>
<th>Needs clear(er) roles and responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potential</td>
<td>Can act very local; as well at system level</td>
</tr>
<tr>
<td>Efficiency</td>
<td>Goal of decarbonization</td>
</tr>
<tr>
<td>Energy</td>
<td>Not just electricity</td>
</tr>
</tbody>
</table>
**UNDERSTANDING TRENDS, NEEDS, BEST PRACTICES**

1. **Definition and goal of flexibility**
   - Analysis of entire range of flexibility
     - Supply
     - Demand
     - Grid
     - Storage
     - Markets
   - Analysis in terms of challenges and barriers

2. **Country analysis Flexibility Tracker**
   - Country evaluation and comparison
     - Netherlands
     - Germany
     - Belgium
     - Poland
     - Spain
     - Italy
     - Denmark
     - South Africa
     - India
   - Results in terms of scoring for every category

3. **Recommendations and best practices**
   - Best practices and recommendations
     - Short-term actions
     - Mid-term actions
     - Long-term target
   - Concrete actions for every flexibility category
REFERENCES

More information

Leonardo Energy:
http://www.leonardo-energy.org/

- Flexibility white papers
- Country Reports for Belgium, Germany, The Netherlands, Poland, Spain, Denmark, Italy available
- More in development

Twitter #EnergyFlexibility

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