3rd PAC Modellers' Exchange Workshop

Protocol

Date: Thursday, 30 January 2020, 10:00-16:00,
Location: EEB office, Rue des Deux Églises 14-16, 1000 Bruxelles, Belgium
19 participants from research institutes, grid operators, NGOs, consultancies and think tanks.

Holger Loew, RGI - Initial thoughts and comments

- The purpose of the third Modellers' Exchange Workshop was presented by Holger Loew of RGI. The focus was on how to understand and model flexibility in the system. We expect to see multiple flexible devices at all voltage levels, it is therefore important to understand the flexibility these devices can provide if they are optimised in a system based on very high shares of RES.
- The workshop looked at a top down view of how to potentially model these resources on a continental/national scale (Artelys) as well as a better understanding of how experimental distribution network operation are handling and using flexibility options for their grid and how to offer flex to the TSO in the real world with a bottom up view (innogy SA)
- The desired outcome was for participants to gain a better understanding and share priorities for future work and research by comparing both top down and bottom up approach.

Tobias Bossman, Artelys - Power system Flexibility – The METIS approach to identify needs and solutions

- Tobias Bossman of Artelys presented the company's current suite of modelling products under the Artleys Crystal Supergird brand.
- It was explained that the difference between Supergrid and METIS (the EU Commission modelling tool) is the software used by Artelys, METIS could be described as a "subdivision" of the Supergrid which is specially calibrated towards the scenarios from EU COM (the LTS scenarios which are properties of COM with special properties also owned by COM)
- Q - EEB - what is the main difference of METIS to the PRIMES suite which is also used by the EU COM?

  - Artleys answered that the main difference is that in METIS hourly dispatch is modelled throughout the entire year, this is the main difference to PRIMES (which works with typical days).
- It was then stated that the main advantage of METIS is that the JRC (joint research council of the EU COM) can actually use this tool – he sees that people understand a lot better what the implications of changing assumptions are because they can put their hands on the model. There was hope this model could also be a platform for NECPs (National Energy and Climate Plans)
- The presentation then moved on to discuss how the Artelys models examines flexibility. In the METIS study (S11) run by the EU COM the methodology to understand flexibility was done in three steps:

1. **Assessing flexibility needs**
   - The daily flexibility needs are estimated with **the difference between the residual load and its daily average**
   - Similar calculations can be realised to calculate weekly and annual flexibility needs. Drivers of needs:
     - Daily flex needs are (primarily) driven by high solar PV penetration
     - Weekly flex needs are (primarily) driven by high wind penetration
     - Annual flex needs driven by seasonal variation in PV power production and demand but can be reduced by increasing shares of wind over time
   - Q - Terna – how do you optimise further into the future, 2025-2030 for example? ANS - This is being done by the pathways – you have to see how to optimise the asset development, so you don't get stranded assets.
   - Q - innogy – are out talking about just demand balancing or are other grid services (voltage control etc.) included? ANS - This is on market related flexibility needs. But for grid aspects - METIS 2 tries to look at the grid level. The market optimisation results need to match up with the grid constraints – ANS - This is not taken into account.
2. **Flexibility solutions**
   - Next step in the study is to characterise what **can fill the residual load and supply the flexibility?**
   - The portfolio of potential flexibility solutions is characterised by a set of parameters, including: Investment costs, Operation and maintenance costs, Fuel costs, Activation costs/start-up costs, CO2intensity, Efficiency, Storage discharge times / max. load shifting duration, Potential availability throughout the year, Technical constraints: minimum stable generation, ramping rates, minimum off-time, availability Potentially, environmental constraints.
   - Q - EEB - if/how environmental constraints are considered in these parameters (impact of climate change on supply/demand etc.)

- ANS - Response that for the climatic impacts there is not historical data. Which makes the impact hard to model, although they do try and model hydro constraints – Historic weather data used was 10 years for RES generation and 30 years for demand.

- Q - RGI – Asked if new tech like CSP is considered as a flex solution? –
  - ANS - depends case by case decision whether they believe something will be technically viable.
- Q – RGI - How are conventional units allocated in the model? ANS – No pure unit commitment model is used, rather units are aggregated (e.g. gas plants) into age clusters

3. **Optimisation of flexibility portfolios**
   - The presentation moved on to the final phase of the study process to measure the various contributions of certain technologies to flexibility needs. This was done by:
     - Step A –Computing the daily flexibility needs based on the net demand
     - Step B –Computing the residual daily flexibility needs based on the net demand –technology X generation profile
     - Calculating difference between the two quantities gives the contribution of technology X to flexibility needs.
   - To provide some findings - Arelys presented results from their S1 study done for EU COM. The study focussed on 2050. 3 example results were given from 3 countries across three timeframes
     - Daily – Italy – Interconnections are the main supplier of flex, as well as batteries and hydro. P-2-x limited
     - Weekly – UK - Interconnections aswell biggest provider – as well as conventional units PHS, Nuclear as well as electrolysis.
     - Yearly – France - Conventional units. Nuclear and gas to power as well as interconnectors biggest provider

- Questions followed on these results:
  - Q – EEB – Do you prevent that power2x is not powered by fossil ANS: Yes
  - Q – Is rooftop PV considered? ANS: Yes - but on aggregate as PV as a whole.
  - Q – RGI – Isn't demand response as a more major supplier to flexibility – has this not been underrepresented? ANS – High uncertainty for DSR potential of industrial as well as residential consumers. It depends on the will of consumers – Energy efficiency will bring down the potential further.Belief from RGI that there is still more potential from Dif consumers are given advanced warning and are fairly remunerated.
  - A criticism from Tom Brown was that you leave generation planning to PRIMES and plan flexibility separately – RES can enable RES, so you

should not base yourself on primes as things like solar costs are changing so fast

- The session ended with Mr Bossman presenting the main conclusions from their work with METIS on flexibility so far.
    - The importance e of timescales for flex needs
        - Power demand and variable RES are the drivers
    - That no one size fits all
    - Importance of holistic modelling of national contexts to determine optimal national flex portfolios

Wiebke Albers, innogy SE – EU-SysFlex: How flexibility will change the behaviour of distribution grids in the real world

- Wiebke Albers of innogy SE gave an overview of the pan-European Horizon 2020 project "EU-SysFlex" of which innogy SE is a consortium partner.
- The project looks to analyse and test opportunities arising from decentralised flexibility resources to serve TSO and DSO needs in three different "demonstrator" countries (Germany, Italy and Finland).
- All three demonstrators have the objective to:
    - Improve TSO/DSO coordination.
    - Provide ancillary services to TSOs from flexibilities connected to distribution network.
    - Investigate how flexibilities connected to the distribution grid can meet the needs of both TSOs and DSOs.
- The demonstrators complement each by using varied resources connected to different voltage levels in order to provide different flexibilities and solve various scarcities by respecting different characteristics of the
- The Germany demonstrator project was presented in more detail
- A number of interesting data management and exchange processes to allow the TSO to be made aware of flexibility available on the DSO grid and to source it across the different demonstrator countries are being tested in the project also.
- Ms Albers wrapped up the presentation with of the ways innogy see how flexibilities will change the behaviour of distribution grids in the real world.

After the presentation a discussion followed:

- There was curiosity to the extent to which the countries and DSO grids chosen are representative of European DSO grids in general and how modellers could be able to generalize about DSO grid behaviour when doing top-down modelling.

- Q - ENTSO-e – Was curious on what innogy see as the future role for the DSO and how the tested TSO/DSO interface tested works? ANS – Innogy broke down the in the following way:

  - The DSO sends the flex potential to the TSO
  - One hour before the DSO sends this and allows him to see the options, he can use day ahead
  - The DSO provides an iterative update in the intraday market process.
- Q – Tom Brown - Can this solve the curtailment issue in Germany? ANS: Hard to say maybe not completely – we did simulations that – How much needed to curtailment – what could the impact be!
- Discussion on markets
  - Currently following a decentralised optimisation approach
  - This is separate from the market design question – this is regulated domain is being tested not the commercial domain - see slide 22
  - This starts in April - We have to follow the current regulation and cannot set up a market in resolutions that do not allow it.
  - How is the price point formed and how does the market work?
    - Flex aggregators is probably the way to do it
    - How to arrange a market what is for the grid and what is the system.
    - Optimising the market
    - Maybe the flex options can send bids
    - Conflict of interest between those that could create congestion - and then offer flex to solve it.
    - Suggestion from Amprion Local congestion management markets

Holger Loew, RGI – Reporting Back from group work and concluding remarks

- The group broke off in to two groups to have discussions on **what should be the priorities for better understanding flexibility potential at both the top down and bottom up approaches in the future**. During the feedback round and the following open discussion, the following questions were seen as a priority to address:
  - What are the different modes of flexibility?
  - What are the capacities from the different technologies?
  - What will the DSO network look like in a system high in distributed flexibility?
  - What will be the various pricing strategies of operators of flexibility in the market?
  - In terms of better modelling of distribution grids we should form 10 reference DSO grid networks that represent the range of DSO grid typologies and which can be used for the transmission system models.
- For the next Modellers workshop the following topics were suggested:
  - Mobility in general
  - Buildings and heating
  - Industrial demand