

## How market structures can benefit prosumers and grids

*C1 - POWER SYSTEM DEVELOPMENT & ECONOMICS  
PS 3 / PLANNING UNDER UNCERTAINTY AND WITH CHANGING  
EXTERNAL CONSTRAINTS*

*Question 3.3.3 From international experience, which investments should be prioritised to facilitate different decarbonisation pathways of the energy system while minimizing the risk of stranded assets?*

Gianluigi Migliavacca – Italy (Gianluigi.Migliavacca@rse-web.it)

# Why investments in flexible resources could support grid planning

- RES generation is essential to achieve the EU ambitious decarbonization goals
  - Increasing RES penetration needs to cope with typical RES “variability”
  - This requires to purchase services in real-time markets (balancing) that must adapt their architecture (e.g. reduce gate closure to 5 minutes)
- Flexible sources (storage, DSM) become strategic for local variability compensation
- T&D planning becomes complex and affected by uncertainty
  - new kind of line congestion due to RES: maybe frequent doesn't last long time
  - hence, the deployment of new lines could prove not economically optimal
  - deploying new lines requires a long-time-ahead analysis vs. RES deployment plans: often uncertain frequently changing
  - deploying new lines is delayed by public opposition and by the application of cumbersome formal procedures to evaluate environmental compatibility of new grid lines

# Why investments in flexible resources could support grid planning

- **Flexible sources (often connected to distribution) provide a way to avoid big investments in new lines and strongly reduce the time needed to solve grid congestion** (shorter deployment time, only local permissions of lower economic dimension), thus justified also for frequent not-long-lasting RES congestion. However:
  - Assessing whether a new line or flexibility resources deployment requires:
    - to solve a huge OPF minimizing CAPEX and OPEX for the whole system
    - to coordinate T&D planning, so far disjoint. This could be problematic:
      - due to the huge size of the T&D system
      - due to the fact that T&D SOs need to retain a certain degree of independence and a private management of their relevant data
- **The FlexPlan Horizon 2020 project (<https://flexplan-project.eu/>) realizes a step forward in the grid planning methodology allowing to tackle all the issues mentioned above.**
  - This new methodology, instead of analyzing a new investment at a time vs. status quo, elaborates a set of potentially interesting investments (candidates) and analyses all of them in one shot by determining the combination that minimizes CAPEX + OPEX.
  - The formulation of this problem results in a large MILP, which becomes numerically treatable due to the usage of decomposition techniques (Benders decomposition and decomposition between transmission and distribution planning).

## Some regulatory reflections

- However, the adoption of this new methodology also requires eliminating some regulatory barriers :
  - **Investments in storage and flexibility will remain mostly in the hands of private investors. National Regulatory Authorities should translate the suitability of deploying new storage or flexibility in strategic network locations into opportune incentivization to potential investors.** This complicates the traditional scheme, where System Operators after carrying out planning analyses were the only subject entitled to invest.
  - **considering the support of flexibility to grid planning requires to coordinate transmission grid and distribution grids planning**, yet maintaining the specificities of each and allowing the different system operators not to share private data. The new FlexPlan methodology elaborates a T&D decomposition scheme which could constitute a practical way to implement this.
  - **The new planning methodologies valorising the role for system flexibility must match a new real-time market architecture able to favour bidding from flexible resources.** As these resources are often of small size, not allowed to directly bid in the real-time markets, the regulators should also **pay attention to the new figure of the aggregator**, providing a regulation able to enforce a credible and financially sustainable role for it.

*Thank you for your attention!*