SmartNet

Smart TSO-DSO interaction schemes, market architectures and ICT Solutions for the integration of ancillary services from demand side management and distributed generation

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Project conclusions, exploitation and impact

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Agenda

- A few project conclusive remarks

- What will remain after the project finishes (impact assessment and exploitation)

Coordination Schemes comparison: the juice (1/2)

- **Technical reasons advise to continue centralizing balancing responsibility to TSOs.**
- **Local services and, in particular, congestion management could be shared, instead (coherently with what stated in the EC package: *Clean Energy for All Europeans*).**

- **Shallow or deep distribution constraints management?**
  - Traditional TSO-centric schemes could stay optimal if distribution networks don't show significant congestion not unlikely in near-future scenarios, since distribution grid planning was (and still is) affected by the fit-and-forget reinforcements policy. Abandoning the fit-and-forget policy is presently disfavoured by the current regulation, remunerating DSO for investments in grid elements (CAPEX) rather than in intelligence (OPEX).
  - More advanced centralized schemes incorporating distribution constraints show higher economic performances but their performance could be undermined by big forecasting errors: it is important that the gate closure is shifted as much as possible toward real time, market clearing frequency is increased and forecasting techniques are improved.

Coordination Schemes comparison: the juice (2/2)

- **Local or centralized schemes**
  - Decentralized schemes are usually less efficient than centralized ones because of the two-step optimization process and of some consequent undue rigidities (e.g. imposing flow at the TSO-DSO interface in CS-C).
  - Scarcity of liquidity and potential impact of local market power (not investigated in SmartNet), along with extra constraints introduced to avoid counteracting actions between local congestion market and balancing market (e.g. increasing system imbalance while solving local congestion) furthermore negatively affect economic efficiency of decentralized schemes.
  - Local congestion markets should have a "reasonable" size and guarantee a sufficient number of actors are in competition in order to prevent scarcity of liquidity and exercise of local market power. Small DSOs could need to pool-up.

- **Market products**
  - Ensuring level playing field in the participation of distributed resources (especially industrial loads) to the tertiary market means to be able to incorporate into the market new products taking into account some peculiarities of such resources

Some conclusive remarks

- Provided:
  - the regulation helps to abandon the fit-and-forget (oversizing) planning policy in Distribution,
  - forecasting errors are coped with,

  CS-D (integrated TSO-DSO scheme) could show its superiority over CS-A. However, due to complexity reasons, the "depth" cannot be pushed till single LV nodes.

  For them, a methodology foreseeing a real time estimation of the Capability Curve (see experience of Pilot A) could be profitably employed.

  However, providing observability of the distribution grids implies new important investments by the system. As during the first years the entity of such investments could be higher than the advantages, proper regulatory incentivisation could help considerably.

- Applying strict time specification (4 seconds for control) to machines that were not put into service for this can generate problems of slow response (Pilot A). ICT readiness and response should also be tested (Pilot B). In case, it could be important to find a role for the new flexibility taking into account inherent limitations. Taking this in mind could call to restructure current reserves procurement modalities.

Impact Assessment

- **Deliverable D7.7** provides a view on the implementation "issues" for the 4 Coordination Schemes and the 3 project Pilots:
  - pros/cons,
  - technical issues/barriers
  - possible regulatory enablers
  - regulatory recommendations.

- **Deliverable D6.3** provides regulatory guidelines for regulators and policymakers

TSO-DSO Coordination Schemes		
CS-A: Centralized AS market model		
Key Impact	**Enablers**	**Recommendations**
▪ Implies DSOs' investment in network reinforcement (fit-and-forget policy) and/or in ICT (monitoring) ▪ The most cost-efficient scheme in case of low congestion in distribution networks (Danish case)	▪ Regulatory framework should be modified to incentivize DSOs' remuneration to give more importance to investment in ICT (TOTEX) rather than in grid reinforcement (CAPEX) ▪ Local network planning should cover the whole distribution network, in coordination with the transmission network	▪ The most aligned with current policy and likely an optimal scheme in the very near-future scenarios ▪ Less efficient in future case of increasing flexible resources at distribution with more local congestions
CS-B: Local AS market model		
Key Impact	**Enablers**	**Recommendations**
▪ DSOs have more options to solve grid congestion ▪ Possibly beneficial in rare cases of severe congestion at transmission level by preventing high prices to spread between distribution and transmission systems ▪ As a two-step market, less efficient economically and technically, with risk of causing more imbalance at transmission level ▪ Risk of scarcity/illiquidity of resources and market power exercise ▪ Need for detailed and complete network models for each local distribution network ▪ Implies DSOs' investment in ICT ▪ Implies TSO-DSO market compatibility issues *e.g.* minimum bid size, clearing frequencies, market timing	▪ TSOs could be allowed to revoke an accepted bid at distribution level (as in Italy) to avoid global imbalance ▪ Local market perimeter could be enlarged to allow small DSOs to group together and operate a single local market ▪ More flexibility resources could be incentivized to participate by introducing new market products of resources with lower flexibility (a trade-off evaluation needed between ICT cost and liquidity benefit) ▪ DSOs' remuneration should be incentivized to give more importance to investment in ICT (TOTEX) rather than in grid reinforcement (CAPEX) ▪ A form of common TSO-DSO sequenced market could be implemented to harmonize the market setups, in particular the bidding procedures	▪ CS-B performs well in case of high congestions in distribution networks (Italian case) ▪ Poorer economic performance unless the suggested enablers are extensively implemented
CS-C: Shared balancing responsibility model		
Key Impact	**Enablers**	**Recommendations**
▪ DSOs have more options to solve grid congestions ▪ Possibly beneficial in rare cases of severe congestion at transmission level by preventing high prices to spread between distribution and transmission systems	▪ Flexibility margins should be introduced in the fixed power exchange profile as in cross border exchanges between countries ▪ Local market perimeter could be enlarged to allow small DSOs to group together and operate a single	▪ CS-C is in contrast with the common vision embraced by the European Commission and TSO-DSO associations, and thus should be avoided

What will remain after the light is turned off

- A comprehensive SW platform already run on three national cases, but which could be used to study further cases whenever of interest for the European stakeholders.
- A new methodology to compare CS on the basis of an objective CBA
- Very detailed benchmark scenarios at 2030 for Italy, Denmark and Spain
- Three national pilots which could be seen by Regulators as a starting point for national Sandboxes.
- An in-depth analysis of the simulation results, which brought to the formulation of a set of regulatory guidelines as a final view of the project targeted to Regulators and Institutions.

All main SmartNet achievements are summarized in a booklet available on the SmartNet web site.

Post-project Exploitation

- **Deliverable D7.6** appraises the possibilities to further exploit the "products" of the SmartNet project.

- Five macro-products are assessed:
  - The simulation platform,
  - ICT and architectures for each of the three project pilots,
  - The ICT Platform assessed in the WP3 of the project.

- **Particularly worth of mentioning, the results of the Pilot A (Italian Pilot), publicly declared as of national interest by the Italian Regulator ARERA during the final SmartNet workshop (Arona). ARERA is presently financing national sandboxes ex deliberation 300/2017/R/EEL to promote access to the market to non-programmable resources and distributed generation. Presently, the only active pilots are about non-remunerated ancillary services (voltage regulation) and resources aggregation for the ancillary services market MSD (mFRR and RR products). The results by Pilot A are attentively scrutinized by ARERA as complementary to the ones obtained with the national sandboxes and a follow up at national level is not excluded.**

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Thank You

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