



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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TSO-DSO interaction to increase flexibility and improve interoperability in real time reserve management: the view of the SmartNet project

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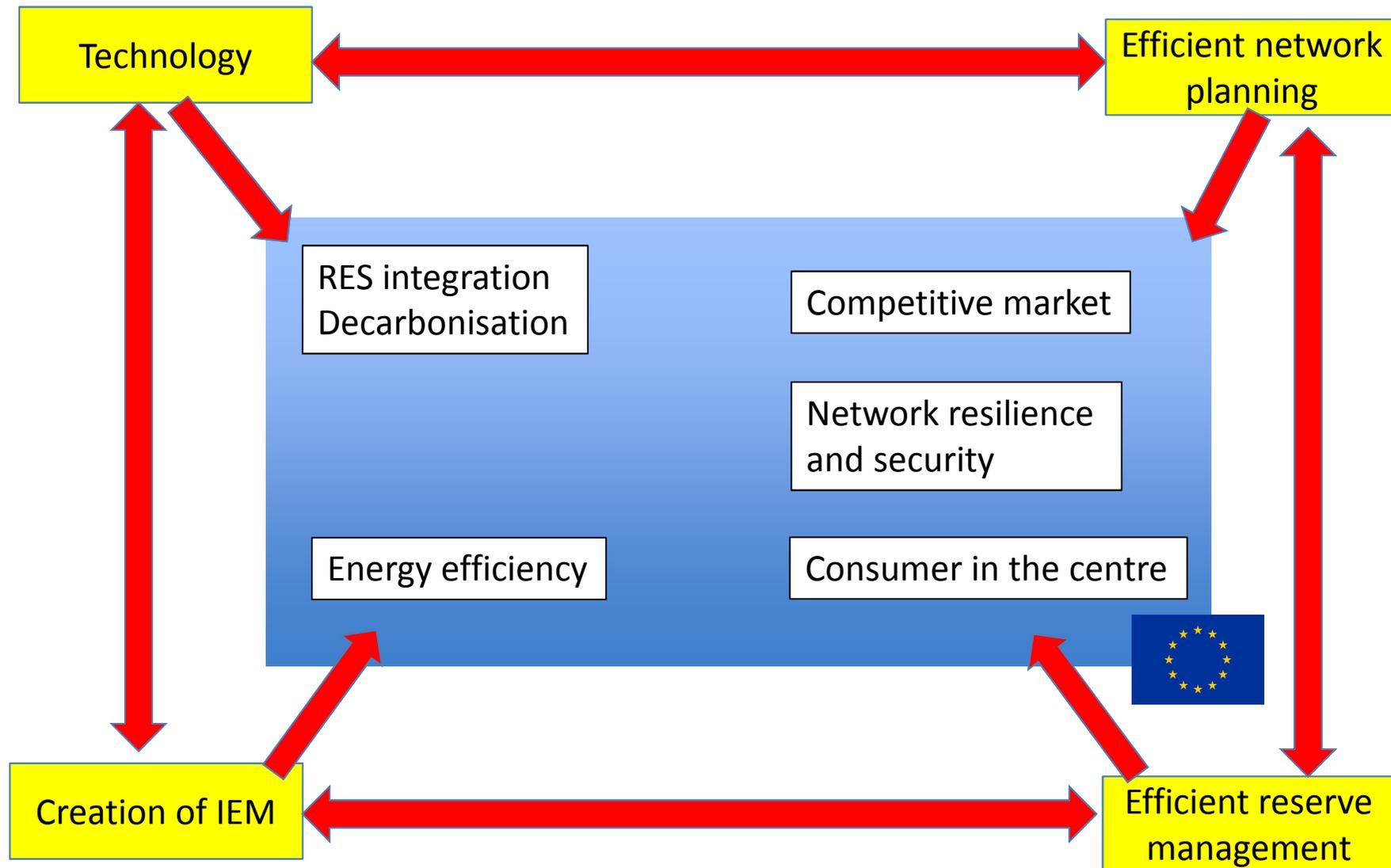


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Agenda

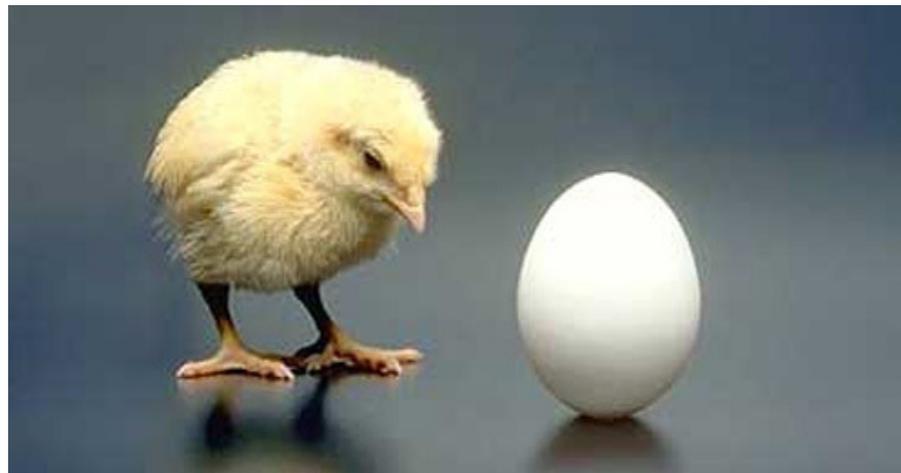
- Why do we need an “intelligent grid”
- Where should “intelligence” stay
- Why investigating TSO-DSO interaction?
- Some information on the project SmartNet

Why do we need an “intelligent grid”



Where should “intelligence” stay

- **Intelligence can't be “sheer” technological development!** Technology should stay at the service of the network and be finalized to system improvement for the benefit of the customers.
- **Necessity to conjugate system benefits with investment costs: need for CBA and regulatory action (economic signals)**
- Intelligence should stay mainly in formulating the most efficient pathways to pursuit the goals fixed for the long term. Needs for operation changes should stimulate search for best ICT solutions, not vice-versa.



Why investigating TSO-DSO interaction?

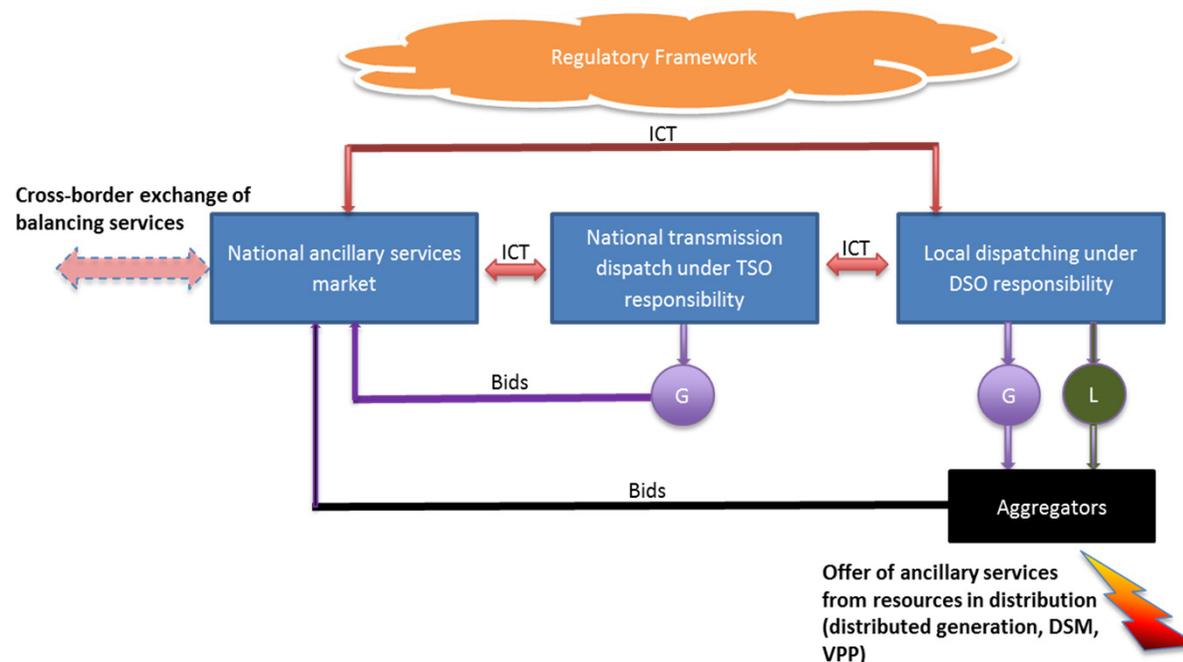


- In the future, distributed generation could be managed together with demand response and storage connected to distribution grids for providing services to the whole power system.
- Getting AS markets more efficient and enlarging the basis for AS purchase could make the system more resilient and reduce need for local reserve to compensate RES
- Operation of these Distributed Energy Resources (DERs) requires coordinated interfacing between TSOs and DSOs for efficient transmission and distribution grid management.
- DSOs, could EITHER play the role of an active subject activating DERs for the provision of local services (e.g. voltage support, congestion management) OR they could operate as facilitators for the provision of services for the whole system, being balancing markets still in TSO hands.
- An in-depth revision of AS market architectures is key for efficiency improvement
- ICT requirement should also be investigated
- Coupling between AS markets is the ultimate goal fixed in the NCEB by ENTSO-E for the long term.

The SmartNet project

<http://SmartNet-Project.eu>

- The project SmartNet aims at comparing different **architectures for optimized interaction between TSOs and DSOs** in managing the purchase of ancillary services from subjects located in distribution.
- An *ad hoc* simulation platform is built (physical network, market and ICT) around **three national cases** (Italy, Denmark, Spain); a **CBA** is performed to assess which TSO-DSO coordination scheme is optimal for the three countries. The simulation platform is then implemented in a **full replica lab** to test performance of real controller devices.
- **Three physical pilots** are also developed to demonstrate capability to monitoring and control distribution by the TSO and flexibility services that can be offered by distribution (thermal inertia of indoor swimming pools, distributed storage of radio-base stations).



Pros and cons of different coordination schemes

Coordination scheme	Description	Scheme
Centralized market	TSO clears AS market with DER resources from distribution for solving imbalance on transmission. DSO solves local congestion extra market.	<p>Coordination scheme A</p> <p>← Status quo+</p>
Local market	DSO acquires local resources for congestion management and aggregates unused ones for balancing market (managed by TSO).	<p>Coordination scheme B</p> <p>← Increased role for DSO</p>
Shared responsibility	TSO and DSO responsible for balancing in their own area. Agreed flow at the interface.	<p>Coordination scheme C</p> <p>← DSO-TSO parity</p>
Common market	TSO and DSO independently buy resources on a global market managed by an independent subject. Market coupling could reduce computational complexity.	<p>Coordination scheme D</p> <p>← Most flexible solution</p>
Integrated flexible market	Common AS market that can be also exploited by commercial subjects (CMP) to rebalance positions (extended intraday). TSO and DSO might exchange or resell to CMP unused resources	<p>Coordination scheme E</p> <p>← Interesting but critical</p>

SmartNet



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Thank You

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