

Demand Side Flexibility— A Grid User centric view



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Current Situation: Context

- The changes in the electricity generation landscape **inevitably** trigger changes in the Grid-user behavior
 - These cannot be controlled, only influenced
- **All** Grid-users are more or less flexible in their electricity consumption and depending on the stimulus they receive, will modify their behavior
 - Towards more or less consumption
 - Energy efficiency
 - Shift away from fossil fuels for heating and transport
 - Towards more or less flexibility
 - Storage
 - Micro grids

Demand Side Flexibility: Old & New

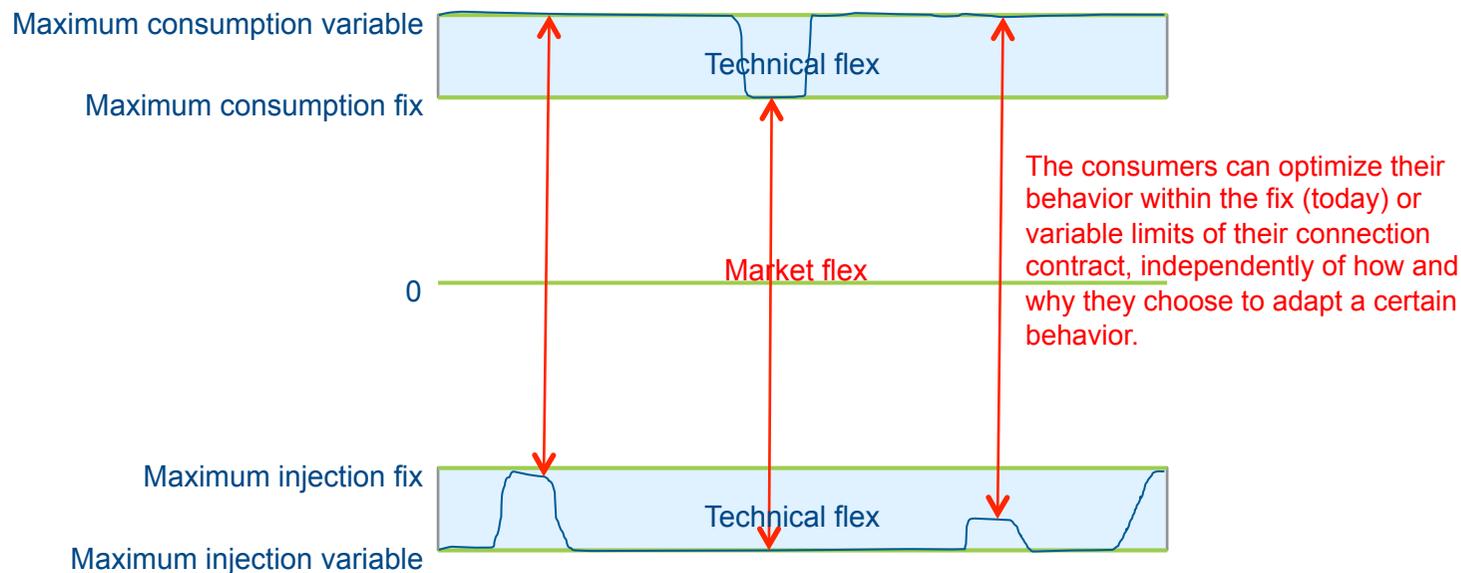
- Day/night and exclusive night tariffs are the “oldest” form of DSF
 - Good solution to the optimization problem of the traditional generation mix
- A new generation mix requires new solutions
 - Variable pricing, a.k.a. ToU pricing
 - The modern version of day/night tariffs
 - By subjecting the Grid Users to variable, real-time prices you provide them with an incentive to adapt their behavior and optimize asset utilization
 - But at the same time you subject them to the associated financial risks variable prices imply
 - Demand Response (DR)
 - The introduction since 2010 of new market players, Flexibility Service Providers, a.k.a. Aggregators that develop a way for Grid Users to take advantage of their available flexibility without having to increase their financial risks
 - The FSP remunerates the Grid User for the right to manage its demand (within acceptable boundaries) and sells this flexibility in the market

Impacts of DSF on the network

- There is strong consensus that DSF will be an important contributor to an efficient electricity market in the years to come.
- But what is the impact on the network?
 - DSF is seen by most as an important part of the future network management approach
 - DSF is seen by some as a potential issue for network security
- Old situation
 - Generation & Network constraints were strongly correlated
 - One solution could solve both problems: Network congestion and Market balance
- New situation
 - Market & Network constraints are still correlated but not in all cases
 - 2 solutions need to co-exist: **Technical-Flex** and **Market-Flex**

Demand Side Flexibility: T-Flex versus M-Flex

- T-Flex: The right and technical means for the Grid Operator to limit the network use of Grid Users to resolve network constraints
- M-Flex: The possibility for Grid Users to optimize their behavior within the limits of their connection contracts based on the offers of the markets



The DGO has the right and technical means to limit injection and in future possibly also consumption to share the limited connection capacity of the network in a fair and techno-commercially optimal way

-> Active Network Management

M-Flex: Why do we need new players?

- To offer new products
 - Possibility to dissociate demand flexibility from electricity supply
 - Possibility to uncouple optimization and financial risk
- To offer more innovation
 - New players have been the drivers of these changes
 - New players have invested heavily in R&D to come-up with robust customer friendly solutions
- To offer more competition
 - More competition will benefit the Grid Users
 - More competition will benefit the whole market

Demand Response: Added value

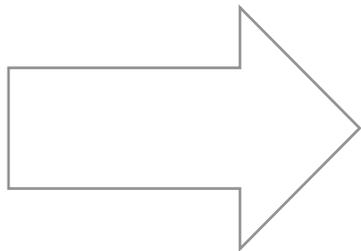
- The added value of aggregators lies in the tasks they execute:
 - Identify -> There are still many sources to be found!
 - Contract -> Convincing Grid Users is not easy!
 - Connect -> Scalable, economical and robust ICT is required
 - Monitor -> you get what you measure
 - Monetize -> Sharing the benefits is key to unlock the potential of DR
- The aggregators focus on the processes behind the meter to translate operations into flexible power, this is a different business to the sales of energy that is focused on what happens before the meter
- DR brings value to wholesale markets **today**, and can also bring value to solve congestion issues.
 - More liquidity in the auxiliary reserve markets
 - More options for BRPs to balance their portfolio's
 - Alternative to the curtailment of local production

Challenge: Transfer of energy

- Demand Response leads to transfer of energy
 - The energy that is not consumed (Negawatts) but has been sourced needs to be transferred to the buyer of the flexibility (The TSO, a BRP or the DSO)
- This transfer of energy must be managed such that
 - It allows new players to enter the market and offer alternatives to the Grid Users
 - It provides existing players with a fair remuneration for the energy they sourced
 - The whole process remains simple and understandable for the Grid Users

Challenge: Confidentiality

- Suppliers/ BRPs and FSPs are potential competitors
 - They offer different products, but these products compete with each other, cf. ToU pricing versus DR
- On the other hand each role in the market should have the information they need to fulfill their task
- Last but not least the transfer of energy (depending on the chosen modalities) will require commercially sensitive data



There is the need for an neutral & trusted third party to facilitate the market and guarantee confidential treatment of commercially sensitive data*

CEER advice on market arrangements for DSF (26/6/2014): "In In order to facilitate a level playing field **an independent party should facilitate the administration of the different exchanges (energy, information, financial) between the commercial parties."*

Challenge: Non-discriminatory use of T-Flex

- A change towards a more active management of the limited network capacity is unavoidable
 - The old copperplate approach is unaffordable for society
 - Active Network Management is one of the main keys to achieve a sustainable energy system guaranteeing security of supply at an affordable cost
- But it must be implemented in a non-discriminatory way
 - Fair to all Grid Users
 - Fair to all market players