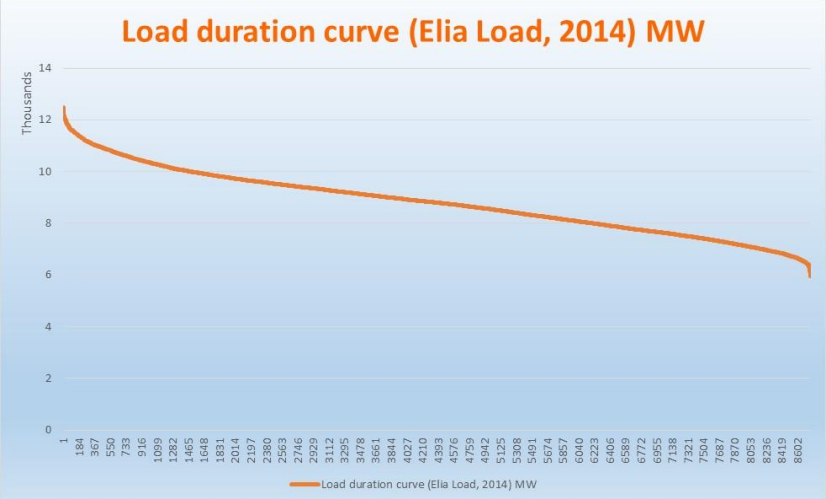
Position on Demand Side Flexibility (Electricity)

30 May 2016

Description

After the liberalization of the electricity market, the context of the electricity system changed from a regulated and centrally controlled and planned system to free competition between market parties, both incumbents and new entrants, also across borders. The increase in competition stemming from a liberalised market leads to increased market price volatility, but should also bring more efficiency to the system, by improving dispatching and lowering the reserve capacity margin significantly compared to a regulated system, which in its turn should lower the total cost of the electricity system. Moreover, the rapid increase of intermittent renewable generation capacity in the electricity system increases price volatility and thus requires more flexibility from other sources (generation, load and storage). Flexibility in general but demand side flexibility in specific (as will be argued below) is a very interesting instrument for the electricity system to cope with the last few 100(s) of peak MWs of the load duration curve, which will only be solicited for a very limited number of hours (e.g. 383 MW for 10 hours in Belgium in 2014), and this at the most efficient cost for the system.



These few hours of peak demand should not necessarily be covered by big central production units (which is usually the case in regulated systems), which would be idle, on the one hand, not being necessarily profitable and on the other hand driving to an oversized generation park and transportation lines. More flexible solutions should solve the issue of the last MWs of the load duration curve and do so at a much lower systemic cost. Flexibility can take the following forms:

- Flexible generation
- Demand Side Management, and this in all market segments (e.g. residential, offices, services industry, distribution, industrial consumers, …)
- Storage

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In a competitive market, a permanent trade-off will take place between available flexibility and the need for investments in additional generation and transmission capacity. The latter will only take place if the price signal strongly indicates imminent or increasing scarcity and the need for such capacity. Until that point, the flexibility inherently existing in the system will contribute to balance between generation and load to the extent to which the market design encourages participation of all available resources in a cost effective way. The flexibility of industrial consumers varies significantly between sectors and processes.

The recent evolution of an increasing introduction of (often subsidized) intermittent renewable energy sources such as wind and photovoltaic has had a profound impact on the system. Indeed, this new generation capacity, though large in installed base, is neither reliable nor flexible nor predictable in all timeframes, and as such does not help the adequacy issue addressed above. Furthermore, it aggravates the need for flexibility from all other market parties, leading to a higher total cost of the electricity system and its real-time operations.

In this position paper, we focus on the flexibility that industrial end users can offer. Most storage solutions are currently not yet economically viable or scaled to an appropriate level and are not addressed here. Flexible generation (often carbon-intensive and locally polluting, both problems avoided by demand-reduction) is also not addressed in this position paper.

For IFIEC Europe, **Demand Side Flexibility or Demand Side Response (DSR)** is an essential element in covering the last MWs of peak demand at the lowest possible system cost and needs to be further developed. For such development of demand side flexibility, the following elements are key:

- Demand response must always be on a **voluntary basis** and must always be fairly **remunerated**; if not, this would imply an enforced curtailment of load, which would destroy economic value and damage the reliability of Europe as an investment-worthy industrial region. Large industrial consumers indeed contribute largely to grid stability (stable and predictable baseload consumption) and can by the nature and volume of their activities provide the low-hanging fruits for demand response.
- Moreover, Demand Response, especially from industrial consumers, cannot be a structural solution to issues of system adequacy and capacity shortages, as the first objective of the industry is to produce goods. The potential of Demand Side Flexibility can be increased but only to a certain point and always at a progressively accelerating investment cost.
- This requires not only remuneration, but also a stable regulatory framework. A special attention should be given to industrial self-generation plants, which can reduce the net offtake of the grids by increasing their production. These can be emergency generators, used for stopping processes in an orderly shutdown in case of an emergency, but can also be very high efficiency (and thus less carbon-intensive) cogeneration units. In both cases they can be very useful tools for solving temporary adequacy issues.
- IFIEC Europe also disagrees with the suggestion that in future energy systems with high intermittent generation penetration, load must always follow supply. This pre-supposes

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that storage will not develop rapidly enough to smooth the balance between demand and supply, that household appliance control becomes universal, and is simply not compatible with the industrial investments on the ground in Europe. To enforce this would fatally undermine industrial activities that still survive in Europe, and accelerate the leakage of jobs and carbon-dioxide emissions.

As described above, demand side flexibility is interesting in a market environment as a cost efficient solution to solve issues of generation adequacy for a limited number of hours. In countries where specific system adequacy issues that have arisen over the course of the last years (such as Belgium, GB, France, …), demand side flexibility has seen progress on many levels. The appearance of new market roles as aggregators and other flexibility service providers, plus the more active involvement of suppliers/BRPs as well as an increased demand for flexibility products from system operators have had a positive effect on the development of this segment.

However, several obstacles and barriers currently still exist, hampering the development of the full potential of the demand side flexibility available within the electricity system. These barriers include:

- **Commercial and legal constraints**: The ownership of the load flexibility is not always clear (transfer of energy), many market players with flexibility within their consumption patterns and production cycles have no incentive to make this available as they have no exposure to market prices (either because of fixed-price or non-flexible contracts, or because of lack of adequate meters such as hourly measured or smart meters), legal stipulations can exclude certain types of flexibility (e.g. definition of demand response excluding participation of emergency generators to certain demand response products as they do not reduce consumption)
- **System constraints**: The minimum size, duration, frequency, notification period, and other technical constraints of demand side response varies between sectors and industrial processes, and products are sometimes not compatible with the technical and safety constraints
- **Grid codes and tariffs**: Grid codes and tariffs should not penalize demand side flexibility participation (e.g. related to the rebound effect, where grid tariffs can penalize industrial consumers who want to catch up with production loss after activation of their flexibility or who offer increased demand in times of surplus electricity)
- **Transparency**: Consumers wishing to participate in the market should have access to essential information (e.g. real-time metering data), while at the same time transparency on products and selection outcomes can still significantly be improved. Current practices are usually designed for generators, not for demand side participation.

IFIEC Europe wants to emphasize that all load flexibility must be able to find its way to the market or to system operator products to solve the peak adequacy issue at the lowest and most efficient total cost for the electricity system, and this either directly or through the intermediation of Flexibility Service Providers (FSPs). IFIEC welcomes the initiatives from new market roles as

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aggregators and FSPs to enable all interested parties with flexibility to market and valorise their flexibility as often consumers would not be able to fulfil existing DSR product requirements alone; nevertheless, IFIEC remains a strong proponent of allowing direct participation by parties with demand side flexibility to the market in order for the flexible industrial company to get the maximum benefit of his flexibility. Ownership of the flexibility resides with the end consumer, who should be able to market his flexibility without barriers imposed by system operators, balancing responsible parties and other market actors that limit his access to the market.

Industrial demand response can take many forms, with longer or shorter activation and response lead times and can be activated for longer or shorter periods. IFIEC keeps pleading for opening up as many balancing products as technically possible to participation from Demand Response by removing technical and tariff barriers

Demand Side Flexibility presents substantial potential in all different timeframes and Products should thus be designed to allow Demand Side Flexibility to reach its full potential in to all timeframes:

1. The timeframe up until day-ahead market clearing, where Demand Response is part of the demand curve (increasing its elasticity) and thus integrated within the market price signal;
2. Regulated products outside of the market, (e.g. Strategic Reserves that are called upon by the TSO based on economical or technical triggers). A bidladder (for example for strategic reserves) should be put in place to allow all available flexibility at any point in time to contribute to system adequacy;
3. The Intraday and Balancing timeframe, incorporating primary, secondary and tertiary reserves, where Demand Response can be delivered by very flexible production processes that can react on short time notice, going from a few hours to within a quarter or even a few seconds.

Objectives of IFIEC Europe

For IFIEC Europe, all load flexibility must be able to find its way to the market or to system operator products, and this either directly or through the intermediation of Flexibility Service Providers. The increasing share of intermittent generation will make the power system balancing more costly and increase the need for flexibility. All sources of flexibility will bring down the balancing and adequacy cost of the system. The goal is to solve the adequacy issue at the lowest and most efficient total cost for the electricity system. Participation in demand side flexibility must be voluntary and remunerated with a fair compensation, covering the increased costs and risks taken by the flexibility providers. Demand side flexibility cannot provide a structural solution for generation adequacy and cannot replace investment in generation capacity whenever shortages become structural rather than punctual. Under no circumstance can IFIEC Europe accept a market design which forces the industrial consumer to adapt his off-take to the availability of (intermittent) energy sources.

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