FlexPlan

Web consultation – Technology: flexibility resources

The European commission objectives in terms of energy for the next decades are challenging. According to the "policy framework for climate and energy" looking ahead to 2030, Europe should be able to comply with the following targets:

- at least, 40% cuts in greenhouse emissions (from levels of 1990),
- at least, 32% share of renewable energy in final energy consumption,
- at least, 32,5% improvement in energy efficiency.

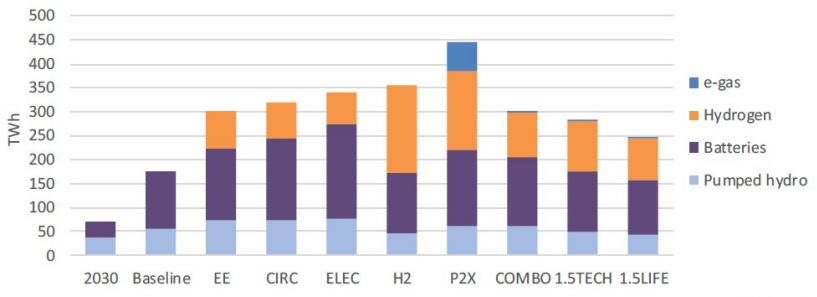
Looking at 2050, in the strategic long-term vision presented in the document "A clean planet for all", the EC analysed 8 possible pathways to limit the increase of the world's average temperature by 1.5 C (to avoid further disasters). In that vision:

- energy import dependence will be reduced from 50% to 20%,
- electricity production will increase 2.5 times to meet demand,
- 80% - 100% cuts in greenhouse emissions (from levels of 1990),
- at least, 80% share of renewable energy.

The strategy considers 7 vectors to achieve these goals:

1. energy efficiency,
2. deployment of renewables,
3. clean, safe and connected mobility,
4. competitive industry and circular economy,
5. infrastructure and Interconnections,
6. bio-economy and neutral carbon sinks,
7. carbon capture and storage (CCS).

In relationship to flexibility, the strategy says that the "integration of variable wind and solar energy requires flexibility of the rest of the system. Such flexibility includes fast reacting generation sources on the supply side, storage or demand response". The figure below shows the expected storage deployment at 2050 according to the 8 scenarios outlined in the document "A clean planet for all".



Source: PRIMES.

One big percentage of flexibility will be based on Distributed Energy Resources (DER), including storage based on electric-electrochemical devices (batteries, fuel cells, supercapacitors…) and Demand Response, which may, in turn, also make use of storage (e.g. behind the meter installations, electric vehicles…).

We can consider the deployment of flexibility resources in two different frames: in regulated and in market based environments presenting different contexts and problematics:

- **Regulated context**: transmission and distribution operators can make use of storage and demand response strategies as an alternative to plan building new lines to support the operation of the network. Two perspectives might be considered:
    - **DSO/TSO carry out investments:** because transmission and distribution are regulated businesses, these investments need to be eligible to be compensated, and currently this is not the case in many occasions. Therefore, network expansion is their preferred strategy to deal with demand increase. A better definition of the costs associated to the deployment of these technologies and a TOTEX based approach, in contrast to the current CAPEX driver, may help to make them eligible by regulation. In this way, other aspects, such as reduction of dispatching costs, environmental impact, investment deferral, reduction of installation time… could be considered too.
    - **Other actors are required to make the investments**: System Operators may demand some mandatory level of flexibility to renewable energy producers or end-customers, or a limitation of the variability or deviation in energy production. This would imply to improve technology (e.g. new controls in power converters) and/or to make use of storage to meet regulatory requirements.
- **Market context**: in this case, the use of flexibility resources is driven by the profitability of the installation owner in an open market environment. For example: power plants sell services to the network to obtain higher incomes, power plants sell more production at higher prices, end-customers take advantage of the variability of prices, etc.

Some storage applications will not necessarily be DER, for example, power to x (hydrogen, gas) or thermal storage systems will presumably be linked to big size power plants. In addition, flexibility can come also from the use of electric and power electronics based devices such as Phase Shifting Transfomers (PST), HVDC lines, FACTS…

Considering all this, it is somehow obvious that flexibility resources will have to be considered as a support to power system planning processes in the near future, but many **uncertainties** still exist about how this should be done.