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Among distributed energy resources (DER), generation from renewables (e.g., solar, wind) is highly variable and unpredictable (uncertain). Hence, by increasing the level of renewable DER penetration, the level of uncertainty power systems also increases. To ensure the reliable operation of power systems in the presence of a high level of uncertainty in the generation, the appropriate resources and tools (e.g., load shaping, energy storages, etc.) should be provided for hedging the risks imposed by this type of uncertainty. Therefore, for different levels of renewable DER penetration, the short and long-term benefits and costs (tangible and intangible) facing all the stakeholders (utilities, customers, society) should be identified and assessed.

DER integration poses several non-technical challenges among them :

Regulatory challenges include unclear interconnection procedures and processes, compensation to the utilities for interconnecting DERs. In many places interconnection costs are not clearly defined and also it is not clear who will pay for interconnection, this leads to utilities either incurring high costs to integrate DERs or they transfer costs to DER developer hence making projects unviable.

Business Model – Compensating right value of DERs is a key issue in the DER integration. Net metering which provides full value compensation often viewed as overcompensation for intermittent DERs. Because utilities are still required to provide all ancillary services to integrate and operate with DERs. Similarly lack of proper compensation for different DERs do not provide market signal for the adoption of DERs. For example. storage system which can be very valuable from a capacity as well as ancillary services point of view, often don't get all compensation in current market regulation.

To decide about the implementation of a DERMS system, the benefit/cost analysis should be performed. Usually the benefits depend on local network situations and utilities current operations.

Here, the term "benefit" represents an impact (of a DERMS) that has value to a utility, customers, regulators, or society in general. To measure their magnitude, benefits should be quantified if possible. In addition, to enable comparison, benefits may be expressed in monetary terms.

For DERMS systems, there are the following fundamental categories of benefits:

- **Economic** – reduced costs, or increased production at the same cost, that result from improved utility system efficiency and asset utilization
- **Reliability and power quality** – reduction in interruptions and power quality events
- Environmental – reduced impacts of climate change and effects on human health and ecosystems due to pollution
- **Security and safety** – improved energy security (i.e., reduced oil dependence); increased cyber security; and reductions in injuries, loss of life and property damage