

**Preparation of Abstract for
2014 IERE-GDF SUEZ Brussels Workshop
“Energy at home”**

**Assessing the Flexibility of Power Systems to Manage Variability and
Uncertainty Due to Wind and Solar Power**

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To manage high penetrations of intermittent wind and solar power, power systems require sufficient operational flexibility –the ability to ramp the resources on the system to manage changes in net load (load minus wind and/or solar). This operational flexibility will be needed over multiple time horizons and in both upwards and downwards directions. New planning and assessment methods are needed in order to ensure sufficient flexibility exists to manage variability and uncertainty.

This presentation will describe methods and case studies which have been developed and carried out at EPRI to assess power system flexibility. This relates to the conference theme of “Energy at home” as flexibility in a power system can come from demand and supply side; methods to assess what a system requires are needed for power system planners to understand what resources can provide the required flexibility. These resources can include demand side resources such as demand response, distributed generation, customer sited storage, etc.

Several levels of detail used to assess system flexibility will be described. Level one measures the increased variability and uncertainty on the system due to wind and solar PV, while level two assesses the flexibility of available resources which could be used, whether conventional central generation or distributed resources and demand response. The final level of detail, level three, assesses flexibility adequacy using detailed metrics. These metrics can be thought of as equivalent to resource adequacy type metrics, except instead of focusing on ability to meet peak demand they focus on ability to meet operational flexibility requirements. They are based on post-processing of production simulation or historical scheduling and dispatch. Four new power system metrics will be defined and demonstrated.

The presentation will describe these different methods for assessing system flexibility issues and provide examples. Previous case studies will be described to demonstrate the methods developed at EPRI. The presentation will also outline work currently being done at EPRI to assess the ability of specific customer technologies, e.g. water heaters and pool pumps, to provide flexibility and aid renewable integration.