

Resource Adequacy in Competitive Electricity Markets

by

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The definition of resource adequacy is “*the ability of the electric system to supply the aggregate electrical demand and energy requirements of the customers at all times, taking into account scheduled and reasonably expected unscheduled outages of system elements.*” Resource adequacy is a function of the supply and demand resources of the system. In recent years, investments in new generating facilities in many jurisdictions have not kept up with load growth. Moreover, the existing electricity markets have not matured to the level of incorporating demand-side response as effective players in establishing supply-demand market equilibriums. There are several reasons for this lack of new additions, such as absence of incentives for investment, rapidly changing rules and severe environmental restrictions. The lack of adequate resources adversely impacts the economic growth of a region. The lack of demand response is due to both the existing policies and the way electricity markets have been implemented around the world. It is in society’s best interests to ensure that a system’s resource adequacy is maintained at all times.

In the vertically integrated utility structure era, the decisions concerning resource adequacy were centrally made and implemented. Regulators approved the target reliability indices and the utility engineers developed plans to attain them with the objective of minimizing total costs. One of the justifications for introducing competition in the electricity industry was that competitive markets are generally more efficient than tightly regulated monopolies. However, the salient characteristics of electricity generation, transmission and distribution, the lack of real-time metering, and the societal need for electric energy may require an explicit consideration of the resource adequacy problem in the design of competitive electricity markets. This is unlike the situation for any other traded commodity. Moreover, recent events in electricity markets such as the Midwest price spike in June 1998 and the California electricity crisis in 2000 – 2001,

have brought to prominence the critical importance of the resource adequacy issue. The Federal Energy Regulatory Commission has explicitly recognized the need to address the issue in its Standard Market Design initiative. The issue of resource adequacy appears to have played an important role in the nation-wide blackout in Italy in Fall 2003.

In this presentation, we discuss some of the different approaches taken in various markets around the world. We assess the results obtained through the implemented approaches. One of the popular approaches is the introduction of "capacity payments", as incentives for investors in the generation sector to provide the funds for the financing for new capacity resources. We analyze the approaches implemented in the electricity market design of several jurisdictions and construct a conceptual framework for the assessment of resource adequacy issues. In particular, we introduce appropriate metrics for the resource adequacy problem. We also discuss a number of challenges in the area of resource adequacy and the research questions under investigation.