

# Innovations in electricity networks

Abstract for a paper to be presented at the  
Workshop on Applied Infrastructure Research  
October 11, 2003, Berlin, Germany

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## Abstract:

This paper addresses the incentives for innovations in electricity networks and the resulting future efficient network structures under the condition of competitive electricity markets. Challenges for the transition from the current network system to possible more efficient structures are considered. This paper focuses on distribution networks.

The main drivers for innovations include the following aspects:

- Mismatch between the technical and economic governance structures of liberalized electricity markets, including centralized versus decentralized allocation systems.
- Changing market characteristics, for example with respect to product differentiation and the persistence of market failures in networks.
- Increasing support for sustainable energy systems and its impacts on the kind of energy production, and the need for integration between networks, electricity production and consumption.
- Technological innovations, especially in the fields of ICT technology and power electronics.

The micro grid concept will be presented as a possibly more efficient network structure as compared to the present large-scale systems. The main features of micro grids are summarized and compared with the above-mentioned drivers for innovations. Besides, it is also analyzed to what degree such innovative networks structures support public service obligations including security of supply, reliability and affordability.

It will be concluded that micro grids offer interesting perspectives for the development of technically and economically more efficient future energy systems. However, the persistence of the traditional structures might be stronger than the need for change. Thus, there are fundamental challenges for industry and regulation.