

A MARKET DESIGN FOR DEMOCRATIC AND ENVIRONMENTALLY BENIGN ELECTRICITY SYSTEMS

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Today, in many countries the electricity system is undergoing significant changes. An increasing number of consumers is eager to participate in meeting the electricity they consume. This was supported especially by the emergence of decentrally applicable technologies such as PV, small CHP and accompanying use of battery storage..

The major objective of this paper is to provide insights on getting closer to a democratic and more environmental electricity generation system that includes larger quantities of variable renewable sources..

Our method of approach is based on the principle of coverage of residual load (= difference between final electricity demand and generation provided by non-flexible electricity generation) on an hourly base over a calendar year based on assumed variable RES generation from hydro, wind and solar and the development of the load profile;

The major results are: (i) Of core relevance is a pricing system in an energy-only market where the price signals provide information about scarcity or excess capacities at every point-of-time; (ii) to balance variations in residual load a portfolio of flexibility options is important such as: (i) Battery, pumped hydro and other storage; (ii) Technical demand-side management; (iii) Demand response due to time-of-use pricing. (iii) However, flexible power plants for capacity system adequacy will play a role in every system with and without regulated capacity payments.

The final conclusion of our investigation is, that a fundamental shift in our basic understanding of the structure of the electricity market has to take place. In this new view rather the suppliers or other coordinators of demand and supply are in the core and no longer the power plant operators..