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Economic zones for future complex power systems

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Abstract This paper examines the economics of the electricity market out to 2050. We propose a flexible zoning concept, built up around economic and technical layers, in networks of the order of hundreds of thousands or millions of nodes. The Economic Layer runs auctions to determine the electricity to be delivered and prices. The Economic Layer delivers suggestions after a fixed ordering, starting with suppliers and demands that generates the lowest overall system cost, then second-lowest overall network cost etc. These suggestions are delivered to the Technical Layer that checks for feasibility in terms of technical constraints. The first match between the ranked suggestions and non-violation of technical constraints is chosen. We demonstrate why this paper should be considered for future power systems. This paper extends previous work on reactive power exchange by introducing market considerations in zoning mechanisms for active power exchanges. We are also exhibit the potential for much higher price resolution in distribution networks via our concept of economic zoning.

Keywords future power systems, zones of control, auctions

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