

International Energy Systems in Transition  
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**Abstract**

**Title: Reliable, Economical and Eco-friendly Energy Transition Solutions Based on Hybrid Dynamic Simulation**

**Feng Xue**

**Deputy General Manager, Power System Stability Control Company, NARI Group Corporation  
Nanjing, China**

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**Abstract**

It has been a global trend to establish reliable, economical, eco-friendly energy systems. Energy transition should ensure energy security, promote economic and social development, and protect the environmental sustainability. This fundamental requirement has to be met by optimizing the energy structure based on the technical, economic and environmental characteristics of all kinds of energy sources in different stages of energy transition. Electric power is a major consumer of fossil fuels and most efficient carrier for clean energy sources. The role of a hub bridge between primary energy and end-use energy during the energy transition process will be analyzed.

China is the world's largest producer and consumer of energy, especially heavily polluting coal, which makes it to be the world's largest carbon dioxide emitter. The global energy transition needs the contribution of China. The profound revolution that China's energy and electric power industries experiencing are introduced, including 'energy revolution' proposed by central government, clean energy investment by traditional energy producer and new market participants, the construction and commercial operation of ultra-high voltage power grid, the electric market reform, and the running regional carbon markets and expected national market in 2017.

The predicaments that China's energy revolution suffering will be analyzed, including the excess capacity of coal production, coal-fired power plants and new energy stations, serious wind and solar power curtailment caused by limited transmission capacity and inflexible power system dispatch rules.

The efficiency of energy markets strongly depend on the decisions made by the participants, especially the policy makers of governments and strategic maker of energy enterprises. The lack of risk quantitative analysis for these participants is one of the important causes of predicaments above. Experimental economics could reflect participants' "bounded rationality" characteristic through humans' participating in experiments. However, the scale of experiment is limited due to the difficulty to have enough qualified human participants. Hence, NARI Group Corporation has developed a hybrid dynamic simulation methodology. It only needs a small group of humans to represent the special decision makers, who can interact with large numbers of multi-agents that represent other secondary decision makers. The methodology can overcome the scale limitations and meanwhile maintain the merits of experimental economics. NARI's effort to provide reliable, economical and eco-friendly energy transition solutions for policy makers of governments and strategic maker of energy enterprises based on the proposed hybrid dynamic simulation will be introduced.