A Proposed Market for Trading Renewable Energy

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Abstract

World net electricity generation is expected to increase by 84 percent from 19.1 trillion kWh in 2008 to 25.5 trillion kWh in 2020 and 35.2 trillion kWh in 2035. The high fossil fuel prices recorded between 2003 and 2008, combined with concerns about the environmental consequences of greenhouse gas emissions, have renewed interest in the development of alternatives to fossil fuels - specifically, nuclear power and renewable energy sources.

Energy efficiency is one of the most important approaches to reduce electricity consumption in the future. Information and communication technology plays an important role to achieve this target. In particular, Smart Grid can achieve energy efficiency by integrating information technology and interaction between suppliers and customers. The concept of grid market is already created for computing resources.

In this paper, we tried to design a similar market for renewable energy resources and introduce future contracts for this market. At the first, we need to recognize the component of smart network. All components should have this capability to be managed by automation system. We should keep in mind that new technology to deploy smart control and management is required.

By analyzing the incentives of customers to participate in smart network and by studying the structure of distributed energy resources in order to establish a market, there are 5 major restrictions to use renewable energy widely. The analysis of these objectives has indicated that a solution can be a market for trading renewable energy. This market is able to reduce the risk of using external resources which are unknown for the users. The market also has the capacity to provide support and consultancy services in order to help customers to integrate demand response program into their existing IT infrastructure.

Considering that market mechanism is the core of market place, we defined different parameters like start time, unit of duration and unit of trade for optimal functioning of the marketplace. We explained our proposal for market mechanism. Futures contracts could be used in this market place for trading renewable energy resources with small size. By this mechanism, electricity is traded indirectly by the customers. There are certain advantages which make efficient this mechanism and prepare an environment in the market that all participants will be beneficial by trading.