

Electricity Associations as Market-based Steering Mechanism and Alternative to Fixed Feed-in Tariffs

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Abstract

This paper describes a business model for local electricity supply and demand steering using flexible electricity prices. Therefore it evaluates first the composition of the electricity price. Secondly it estimates the future renewable electricity generation cost. Therefore future renewable electricity generation prime cost are calculated with a combination of historically derived learning rates and global market growth estimations, both derived from literature. Thirdly it evaluates the tax burden on local traded electricity. As result a business model and legal construct which reduces the tax and levy burden on electricity is identified as crucial factor for flexible electricity prices. With electricity associations this paper identifies such a judicial construct. Finally centralised demand steering with smart flexible agents like electric vehicles, dishwasher and washer-dryer is described. This steering allows to synchronize renewable electricity generation from photovoltaic power plants, wind turbines and combined heat and power and the local electricity demand.

1. Introduction

Due to significant technology learning progress reached with subsidized feed-in tariffs on renewable energy generation the contribution of renewable electricity on overall electricity supply reached 23.9%, including 9.3% from wind turbines and 4.7% from photovoltaic. Especially daytime and seasonal peaks of photovoltaic, but also wind turbines have reached challenging levels. Therefore the volatile regenerative energy production makes an expansion of the energy grid necessary.

In the current situation a fixed feed-in tariff is as well criticised as the partial self-supply with electricity from photovoltaic. The president of the “Federal Grid Agency” J. Homan describes the renewable energy generation which is independent of the actual demand and only focused on feed-in tariffs as “produce and forget” philosophy. He claims that the current EEG is lacking a demand steering and leads to non-controllable costs. Furthermore a regulation where additional capacities are installed would be necessary. In general the debate should focus more on the economic viability. Furthermore a new electricity market design should take economic efficiency and the availability of enough assured power into account. [1]

This paper suggests as alternative to grid expansion and high fossil backup capacities regional electricity associations with smart load scheduling. They are expected to result in a better fit between volatile renewable electricity generation and demand. The association construct allows not only temporal but also local price signals. This model is not only environmental but also grid friendly. As indirect subsidies existing options for reduced fees and levies are used. As building blocks of the business model future renewable electricity prices are estimated.

1.1. Future Electricity Generation Cost

The crucial parts of a business models based on renewable electricity are taxes, levies and prime costs. In this part future electricity prices are calculated using experience curves. Therefore a

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