Market4RES project: main findings and recommendations

Part I: Introduction

(1) The purpose of this document

Market4RES is a European project (IEE, 2.4 M €, 2014-2016, http://market4res.eu/) dealing with the further development of European electricity markets and RES support schemes pre and post 2020. During the project we have:

- carried out a diagnosis of the roadmap for pan-European market integration (the so-called Target Model), and its implementation status
- identified and characterized the most promising modifications to the design of markets
- quantified impacts of a set of policies and fundamental market developments
- facilitated the dialogue among the relevant stakeholders

With this document we present our main findings and conclusions. It is a draft version since **we intend to improve the final recommendations with your feedback.**
Your comments will be discussed during the next project events (http://market4res.eu/events/future-events/).

Part II: Background

(2) Initially, markets were not fit for RES

Traditionally, the RES shares in electricity generation were low in many countries. Thus, the markets were not designed with RES-specific characteristics in mind. Because of their variable output and flexibility to reduce it on short notice, combined with a lack of transparency in operation and curtailment rules, renewables were often the first to be curtailed at times of excess supply in real time operation.

(3) Europe's policy for promoting integration of RES-E technologies has been a success story

Replacing fossil fuel consumption with renewable energy is important for combating global warming, and for reducing dependency of imported energy. With the RES-E directives in 2001 and 2009 targets were set for increasing the share of renewables in energy consumption. Also, renewable generation was given priority dispatch so that the energy produced was guaranteed to reach the market, and not being curtailed. Many countries provided a guaranteed income per MWh produced through feed-in tariffs. As a result of increased income and reduced risk, there has been considerable investments

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in renewable electricity. In the period 2001 – 2015, the installed capacity in wind-power increased from 17 to 141 GW. In 2015, about 30 % of the electricity produced in the EU came from renewables.

Part III: Support mechanisms for RES

(4) This is not the time to stop supporting RES

A more ambitious environmental policy is needed to limit global warming and avoid considerable future mitigation costs. Such a policy will involve reducing the number of emission permits or similar measures to increase the cost of emitting greenhouse gases. This will then lead to higher costs for fossil-fuel power generation, and higher electricity prices. Then the share of renewable power generation will increase even without any support mechanisms. However, at today's prices for emission permits, support for RES is still needed not to jeopardize the ongoing transition towards a future sustainable energy system in Europe.

(5) However, it is time to reconsider the design of support schemes

In the early phases of liberalisation, implemented policy instruments for supporting RES were fit for the promotion of RES-technologies. However, due to the large penetration levels that have been achieved, the volatility of electricity prices has increased, firm capacities having large difficulties to recover its investment costs, and considerable financial support is being provided to RES generation. Hence, the design of RES support schemes must be considered carefully again.

(6) RES support schemes designs

The best-suited support scheme for RES generation depends on market penetration/maturity, and on whether electricity markets are set up to fit for RES generation characteristics. It is also important to take into account risks for investors. A higher risk lead to higher costs and need for higher support levels for capital-intensive technologies such as wind and solar power. To reduce the total costs for the system, support schemes should be designed to not interfere with short-term price signals to RES generation.

Supported volume

The supported volume for a given RES producer is determined by the amount that can be produced, account taken for availability of capacity as well as weather conditions. Thus, it should not be based on the actual generation. For wind and solar power this means that a voluntary reduction in output because of negative prices or provision of

negative balancing energy in real time, will not have any impact on the volume supported. In this way interference with short-term price signals is avoided.

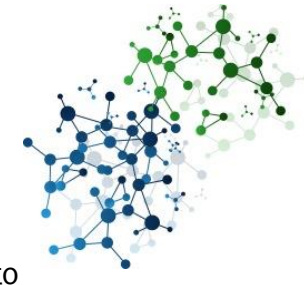
Floating price premium
We recommend a floating price premium. In this system, a price premium (€/MWh) is provided on the top of electricity prices for the supported volume. The level of the premium is adjusted e.g. every 1-3 years so that the total price for RES generation (i.e. electricity price plus price premium) is in accordance with the result of a preceding tender process. This system gives lower risk for investors than a fixed price premium on top of electricity prices.

Tenders
The level of support should be the outcome of a competitive market process (tender). In the tender, investors bid the total price (electricity price plus support per MWh) they need. Technology-specific tenders should be allowed, and small players should be exempted because of the transaction costs associated with a tendering process (they could get an administratively set support instead, or in accordance with the outcome of the tendering process). However, pre-qualification criteria should be project-related rather than bidder-specific to allow small players' participation.

Part IV: Making markets fit for RES

(7) Keep up the momentum in the harmonization of markets for electric energy
Considerable achievements have been made in recent years in integrating day-ahead markets in Europe. This has been part of a process led by the Commission with important roles for European associations for regulators (ACER) and system operators (ENTSO-E) in developing regulations to be adopted by the EU. To facilitate further integration of renewables and reduce costs for society, the focus should be put on implementing integrated and well-functioning intra-day markets with gate-closure times that are close to real time, and with access to cross-border transmission capacity. A combination of continuous trading and some organized intra-day auctions to increase liquidity is recommended, also by considering reservation of cross-border transmission capacity in several market timeframes.

(8) RES-friendly environment for electricity balancing is needed
The network code for electricity balancing has good intentions with respect to RES. However, the concrete regulations to implement are, to a large extent, left open to be specified later. Netting of imbalances is a central element in making markets fit for RES integration. Markets for ancillary services should be open to RES generation and



demand resources. Balancing products should be specified with this in mind to allow utilization of RES-based resources when they can provide such services cost-efficiently.

Part V: Other design elements of electricity markets

(9) A careful approach regarding capacity markets

Several countries have already implemented capacity markets; some are in the process of implementing them, while others are debating introducing them. Such markets can improve security of supply by providing incentives to build new generation units, maintain existing units, and develop demand side flexibility. However, over-investment in firm capacity in separate national markets should be avoided, and it should be mandatory to allow the use of cross-border interconnection capacity to contract firm capacity in third systems. In addition, if capacity markets are implemented, we recommend that they have the following specific characteristics:

- the product should be a financial option with a high strike price to avoid interference with short term markets; it should have a firmness requirement associated
- a penalty for non-delivery should be applied
- demand for this product should be in the form of a price-quantity curve, i.e. the final price paid for it should affect the quantity contracted (to reduce strategic bidding).

(10) Consumers need to be exposed to prices

Variations in the output from renewable generation can at least partly be balanced by adapting electricity consumption. Higher shares of RES generation result in an increase in the value of demand response, both in day-ahead energy markets and in providing real-time flexibility. Exposing consumers to prices should activate some of them, and improve the efficiency of markets. To achieve this, the automatic metering of electricity consumption needs to be implemented. In order to utilize demand flexibility for real-time balancing, more advanced control of this demand is needed. We recommend further focusing on metering of electricity consumption, and exposing consumers to prices. Cost-benefit assessments of demand-side management schemes need to take into account the long-term learning effects in markets, for technology, and for the utilization of price variability.

Part VI: Process & deliverables

(11) Further process

Whereas the above-mentioned findings and conclusions are based on the work carried out in the Market4RES project, they are still a *draft*. Final messages to policy makers will be further developed based on your precious feedback, which will be discussed at the stakeholder event in Brussels on 17 June 2016. Thus, we ask for a **written response by e-mail** (or in an attachment to your e-mail) **to** market4res@sintef.no **by 10th June 2016**.

(12) Market4RES deliverables

Please visit http://market4res.eu/results/reports/ for all the Market4RES reports.