D4.2 Quantification of the expected impacts coming from evolutions of RES support schemes and demand flexibility - Intermediate report -

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EXECUTIVE SUMMARY

Introduction

The Work Package 4 (WP4) of the Market4RES project aims at quantifying the impacts of different market architecture options, assuming as an input the generation fleet expected for 2020[1]. The tool used to quantify the impacts of market architecture options is the OPTIMATE prototype simulation platform[2].

The purpose of the present report D4.2 is to present intermediate results of the studies performed with the OPTIMATE tool within the WP4 of Market4RES. Two main studies are being performed:

- Impact on short-term market outcomes of the foreseen evolution in RES support schemes (SS) from Feed-in-Tariffs (FiT) to Price Premium (PP),
- Impact on short-term market outcomes of the development of demand flexibility.

The final report of the studies (deliverable D4.3) is foreseen to be completed in the first quarter of 2016.

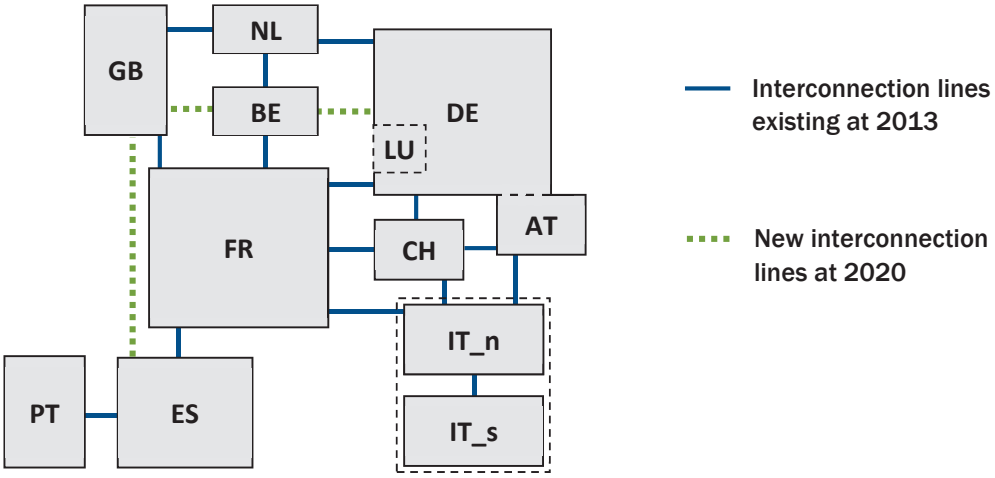
Scenarios underlying the studies

These studies are based on detailed specifications gathered in D4.1 "Specifications of the most adequate options for flexibility markets and RES support schemes to be studied in a cross-border context" [1]. In particular, the above-mentioned market architecture options are studied and compared on the basis of different scenarios, in order to assess the sensitivity of the impacts of each option with regard to the main features of the power system (installed generation capacities, demand level, network capacities, etc.). Therefore, three scenarios are considered within the studies:

- The 2013 scenario, also called reference scenario, mimics the current situation of the power system.
- The 2020 standard scenario mimics the situation of the power system, which can reasonably be expected at 2020. It is based on official publications such as the National Renewable Energy Action Plans (NREAPs) [3], ENTSO-E's Ten-Year Network Development Plan (TYNDP) 2014 [4], ENTSO-E's Scenario Outlook and Adequacy Forecast (SO&AF) 2014-2030 [5], etc.
- The alternative 2020 scenario RES+ is derived from the 2020 standard scenario. RES+ mimics a situation in which RES capacities replace some thermal capacities, the latter being both more flexible, and more costly through an increased CO_2 cost.

[1] It therefore lies in the first Work Stream of the Market4RES project, while the second Work Stream focuses on post 2020 analyses. For more information see www.market4res.eu/.
[2] More information can be found on the OPTIMATE website www.optimate-platform.eu/.

The studies are run over a six-month period allowing to grasp the main seasonal effects (February to July) and a geographical scope covering 11 countries as depicted here below[3].



Configuration of the studies

The following hypotheses have been considered for the study about RES support schemes:

- We have considered that all units built between 2013 and 2020 are subject to a Price Premium (while in real life some will continue to be granted with a Feed-in-Tariff or a similar scheme);
- It has also been assumed that the Feed-in-Tariff contracts for the units already present in the 2013 scenario do not evolve, neither in volume (no consideration of the possible decommissioning of RES units nor of the possible end of some FiT contracts) nor in price (no indexation scheme to the current FiT);
- Price premium at 2020 have been assessed by difference between the levelized costs of electricity (LCOE) at 2020 for each technology, as considered by the IEA, and the average market price at 2020 as calculated by OPTIMATE, considering also an acceptable profit for RES producers.

Regarding demand flexibility development, it is modelled as follows within OPTIMATE:

- A flexible proportion of demand can be voluntarily shed when prices reach a certain level;
- No demand shift is modelled, which means that if peak load is shed, there is no compensation by an increase in electricity consumption during off-peak hours.

[3] See [1] for details about the cross-border lines considered at 2020.

Two variants have been considered:

- "Mid" variant: in this case, 5% of the load is shed when prices reach the 95th centile (in other words, during the 5% of the hours covered by the simulation with the highest prices);
- "High" variant: in this case, 10% of the load is shed when prices reach the 90th centile (in other words, during the 10% of the hours covered by the simulation with the highest prices).

Since no demand shift is modelled, the results of this study will have to be considered with caution.

The market architecture options under study are combined with the different scenarios as follows:

Studies	#	Scenarios	RES SS	Demand flexibility
Default cases	1	2013	None	Low
	2	2020 standard	None	Low
	3	2020 RES+	None	Low
Study on RES support schemes	4	2013	Current RES SS (FiT and/or PP)	Low
	5	2020 standard	Current RES SS (FiT and/or PP) for old, PP for new units	Low
	6	2020 RES+	Current SS (FiT and/or PP) for old, PP for new units	Low
Study on demand flexibility	7a	2013	None	Mid
	7b	2013	None	High
	8a	2020 standard	None	Mid
	8b	2020 standard	None	High
	9a	2020 RES+	None	Mid
	9b	2020 RES+	None	High

Main findings of the studies (intermediate results)

The impact of the evolution in RES support schemes and of the development of demand flexibility are assessed upon five families of indicators:

- Generation mix,
- Costs and profits,

- Market prices,
- Sustainability,
- Cross-border market integration.

Study about the evolution of RES support schemes

Generation mix

- RES support schemes have very little impact on the generation mix: even if support schemes impact the way renewable generation is offered on the market, they hardly have an impact on the merit order curve, and, consequently, on the generation mix.
- However, there is a more significant impact of support schemes on wind and solar generation in Portugal and Spain. This is because these two countries combine the following features: repeated situations with "negative residual load" (generation from non-dispatchable sources high enough to cover the domestic load), and limited cross-border capacities.

Costs and profits

- Within all scenarios, the total RES subsidies outweigh the thermal generation costs incurred in the 11 countries by several billions of euros over the 6-month period despite the gradual move from Feed-in-Tariffs (FiT) to Price Premium (PP).
- Feed-in-Tariffs would remain a major source of revenues for solar producers at 2020.

Market prices

- RES support schemes are responsible for a growing occurrence of negative prices between 2013 and 2020.

Sustainability

- RES support schemes in general and the gradual move from FiT to PP in particular have little impact on the sustainability indicators (CO_2 emissions and share of RES).

Cross-border market integration

- RES support schemes in general and the gradual move from FiT to PP in particular have little impact on cross-border flows, except at the borders of the Iberian Peninsula.
- RES support schemes foreseen at 2020 will cause a major increase in the congestion revenue at the borders of the Iberian Peninsula.

All the analyses foreseen within the WP4 of Market4RES have not been carried out yet. This intermediate report D4.2 will therefore be complemented by further analyses, which will result in the final report D4.3.