

D8.4, June 2022

Policy brief on the **model-based assessment of financing aspects of RES auctions**

A brief illustration of the impacts of
identified changes in RES financing conditions



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1 Introduction

This policy brief informs on the modelling works undertaken to illustrate the impacts of recent changes in RES financing conditions across Europe. Within the AURES II project a detailed survey has been undertaken concerning the cost of capital for renewable energy projects as described in Roth et al. (2021). This brief model-based assessment complements the above, aiming to showcase the impacts of related changes in RES financing on RES support and on the future market uptake of renewables.

Below we start with a brief summary of key outcomes and findings of the detailed survey undertaken. Next to that we inform on the steps taken to incorporate the financing data into our modelling, describe the approach taken for the impact indication and, finally, present the outcomes of our modelling works.



2 Brief summary of the survey of renewable energy financing conditions in Europe.

The AURES II report on renewable energy financing conditions in Europe (cf. Roth et al., 2021) was framed within the discussions on the costs of capital for renewable energy projects and the implementation of auctions for renewable energy sources in Europe. The report includes qualitative and quantitative insights intended to contribute to a better understanding of renewable energy financing and energy and climate policy in the EU. Concerning the approach taken and the observed changes in RES financing conditions Roth et al. (2021) states:

"Several interviews were conducted between September 2019 and April 2020 and the results show that there is still a considerable gap between EU Member States regarding their Weighted Average Cost of Capital (WACC) for wind and PV projects, where some countries as Germany and Denmark present low WACC values and countries as Greece and Latvia have instead higher costs of capital. However, compared to 2014 levels, most of EU countries reduced their WACC dramatically, which is a positive sign for a further deployment of RE projects. The analyses showed that multiple reasons are behind the observed WACC decreased. Not only lower interest rates, technology improvements and lower country risks explain the downward trend, but other surprising reasons are also part of the picture. Interviewed experts pointed out to three phenomena. First, capital is not only raised from EU sources, but it is also flowing from international sources, such as North America and Asia markets, which could generate spill over effects in EU countries where the costs of capital are higher than the costs of international investments. Second, the non-standard monetary policy of the European Central Bank after the 2008 crisis has resulted in abundant capital which triggered lower loan fees and increased competition for business cases. Third, new market players, such as energy intensive companies, are under policy and regulatory pressure to green their portfolios and are consequently shifting to RE through, for example, corporate Power Purchase Agreements, which could add more competitive pressure on the market."

Below we illustrate observed changes in RES financing conditions at the example of onshore wind. Here, as stated above, a significant decline in weighted average cost of capital (WACC) was observable when comparing the outcomes of the survey undertaken throughout 2019 to 2020 with a previous one, done in 2014. In this context, Figure 2-1 provides an overview on current (2019) WACC trends for wind onshore projects across MSs whereas Figure 2-2 illustrates the changes in WACC figures over time, i.e. from 2014 to 2019, for the EU and at MS level.

Figure 2-1. Overview on WACC for wind onshore in 2019 (Source: Roth et al., 2021)

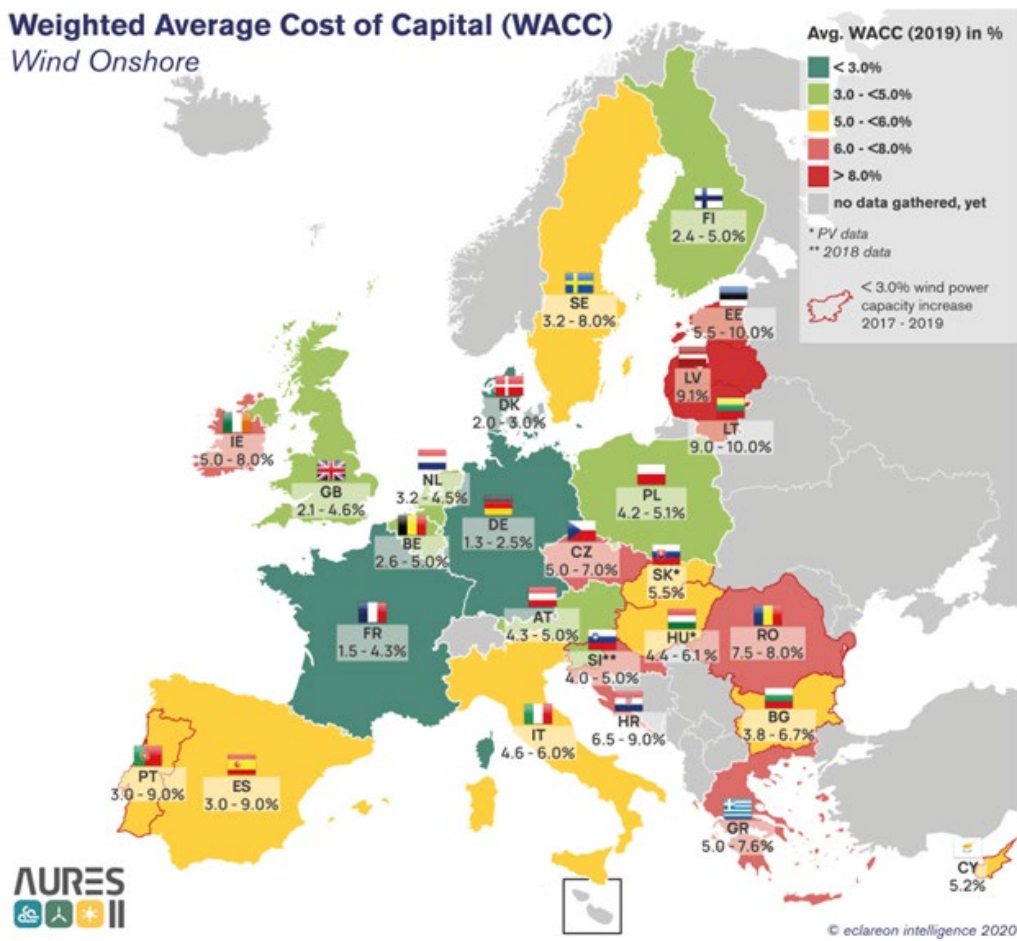
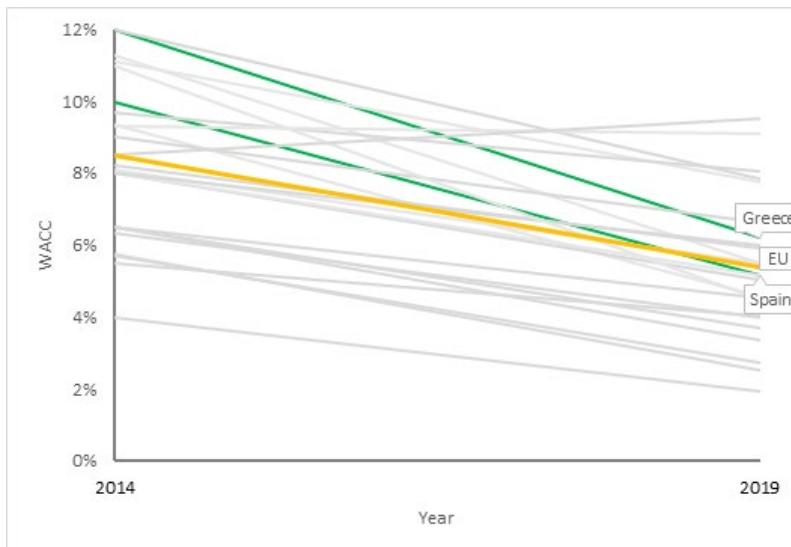


Figure 2-2. WACC historic trend for onshore wind (2014-2019) (Source: Roth et al. (2021))



3 Approach and assumptions taken for this model-based assessment

3.1 The applied model: the RES policy tool Green-X

This analysis builds on modelling works undertaken by use of TU Wien's Green-X model, a specialised energy system model with a sound incorporation of various RES policy approaches and of underlying framework conditions, incl. various aspects related to RES financing.

More precisely, *Green-X* is an energy system model, developed by TU Wien, that offers a detailed representation of the potentials and the related technologies of various renewable energy sources (RES) in Europe and in neighbouring countries, including all EU Member States and all Contracting Parties of the Energy Community. It aims at indicating consequences of RES policy choices in a real-world energy policy context. The model simulates technology-specific RES deployment by country on a yearly basis, in the time span up to 2050, taking into account the impact of dedicated support schemes as well as economic and non-economic framework conditions (e.g. regulatory and societal constraints). Moreover, the model allows for an appropriate representation of financing conditions and of the related impact on investor's risk. This, in turn, allows conducting in-depth analyses of future RES deployment and corresponding costs, expenditures and benefits arising from the preconditioned policy choices on country, sector and technology level.

3.2 Concept and assumptions

The modelling concept applied was to build on previous analysis concerning the planned RES uptake within Europe's electricity sector until 2030, specifically the analysis related to European and cross-border RES auctions as presented in Resch et al. (2021).

The approach and assumptions taken is described in further detail below.

- As first preparatory step we then incorporated assessed changes in financing conditions across EU MS's (cf. Roth et al., 2021) into the model's database, using WACC data for wind onshore – a key technology for Europe's electricity supply today and in future. The WACC's identified for wind onshore served to define the country-specific risk and the changes in average cost of capital at EU level. Doing so allowed us to rebuild in the model the outcomes of the WACC survey in accordance with the model's logic.
- For illustrating the impact of identified changes in RES financing conditions we modelled two distinct cases related to financing conditions: One case using the *new WACC data* (in accordance with Roth et al., 2021) and a sort of reference case that built on *prior WACC data* as identified in the DIACORE study during 2014, cf. Held et al. (2014).
- Since prior modelling works within this project have shown that a key parameter that determines the future RES uptake and related costs are electricity market prices, we applied for sensitivity purposes two trend scenarios of future electricity price developments, i.e. a high and low energy price case, as discussed in Resch et al. (2021).

Figure 3-1 complements the above, informing the scenarios defined and related assumptions taken

The outcomes of the modelling undertaken served to showcase the impact of (improved) financing conditions on the financial support needed to finance the required RES uptake from a top-down perspective as shown in the subsequent section of this report.

Figure 3-1. Overview on the applied scenarios definition

- **Policy concept / RES ambition:**

Assessing the feasibility of **planned RES use by 2030** in accordance with **current national planning** (2019/20-edition of National Energy Climate Plans (NECP). We thereby reflect a “European perspective” implying a proactive use of RES cooperation mechanism, serving to allocate RES investments across the whole EU cost effectively.

- **Sensitivity analysis on future wholesale price trends:**

- High price case
- Low price case

- **Two distinct cases on RES financing conditions:**

- **New WACC data**
- **Prior WACC data**
(as reference to illustrate the impact of identified changes)

4 Results and Conclusions

Below we exemplify the impact of identified changes in RES financing conditions across Europe on RES-related support expenditures and corresponding impacts on consumer cost as well as on the expectable RES uptake if current national energy and climate planning is followed.

Figure 4-1. Comparison of average (21-30) support expenditures for RES electricity, expressed in specific terms as premium per MWh electricity consumed (left), and of expected RES shares in gross electricity demand by 2030 (right) according to analysed scenarios (Source: Green- X modelling)

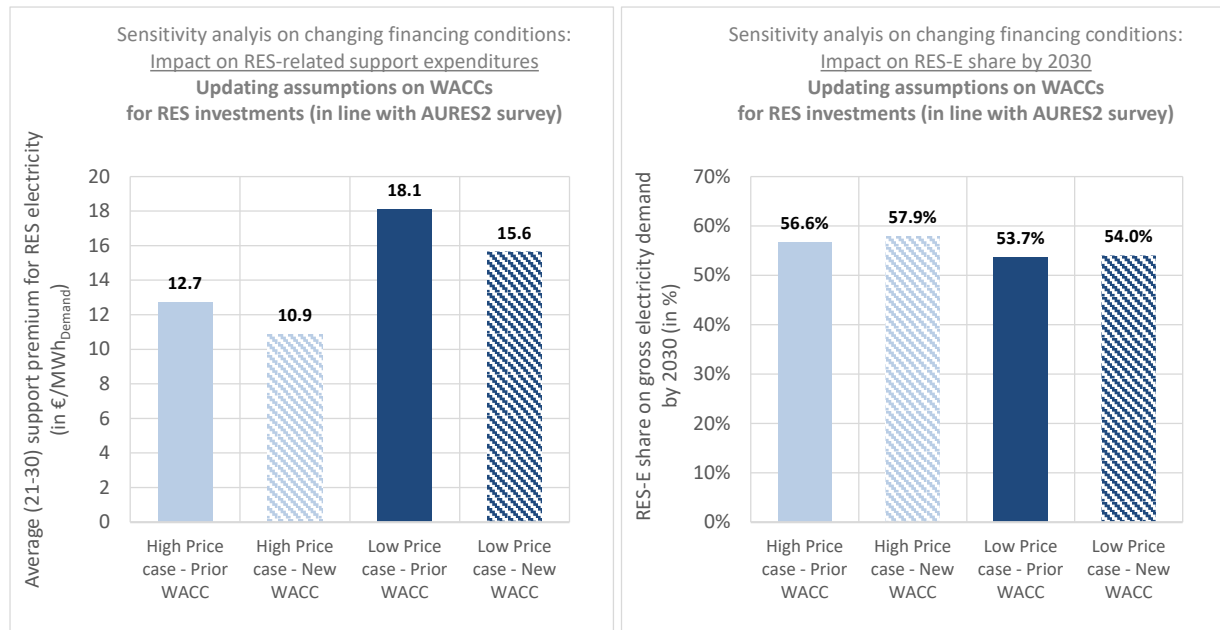
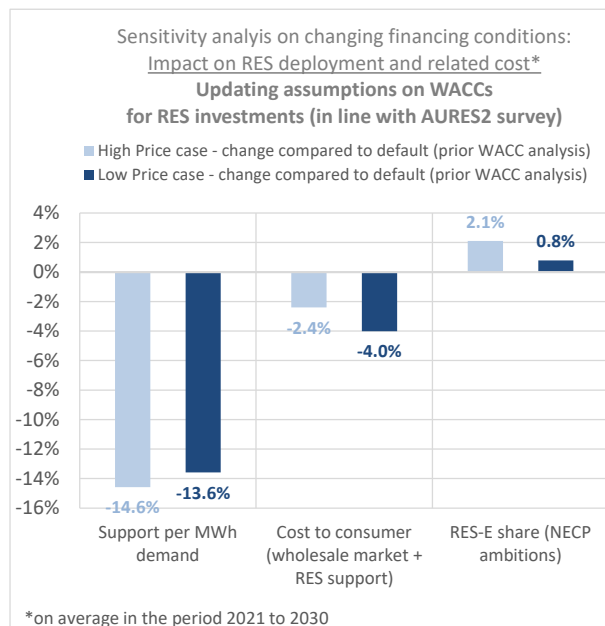


Figure 4-2. Identified changes in RES support expenditures (left), cost-to-consumer (middle) and the stipulated RES uptake (RES-electricity demand shares – right) caused by the change in RES financing conditions (Source: Green- X modelling)



As starting point, Figure 4-1 shows at EU level the impact of new WACC data on the future development of RES-related support expenditures (left) and on the 2030 RES uptake in the electricity sector (right – in accordance with national planning concerning the underlying RES ambition). Next to that, Figure 4-2 summarises identified changes from using new WACC data (compared to prior WACC data), expressing the changes in percentage points concerning RES support expenditures, RES-related cost-to-consumer¹ and the stipulated RES uptake in the electricity sector by 2030. This is then complemented by Figure 6-24, indicating the price-driven changes in RES-related support expenditures and in cost-to-consumer at EU level on average throughout the whole assessment period 2021 to 2050.

Results of this brief model-based analysis show that the analysed change in financing conditions has a strong impact on RES-related support expenditures – here a decline by 13.6% to 14.6% is observable across the whole assessment period 2021 to 2030. Consumer can benefit from that since the decline of the height of RES-related support payments reduces also their electricity bills. According to our modelling the direct impact on cost-to-consumer is a reduction of these in range of 2.4% to 4%.

Thus, we can conclude that the improvements in financing conditions for RES increase and simplify future RES investments, reduce the cost for consumer and may lead to a further stipulation of future RES deployment.

Final remark: The current crisis across Europe driven by the Russian invasion of the Ukraine may counteract identified recent improvements in financing conditions. Within Europe but also globally an increase in interest rates is currently discussed and, thus, can be expected in the near to mid future, as a reaction to the political and economic crisis and as a way to combat inflation.

¹ Our comparison of cost impacts on electricity consumer does however not provide the “full picture” since network charges as well as energy-related or general taxes are not taken into consideration. This would however not add value to the scope of our analysis where we aim to assess impacts from electricity market developments and RES-related support requirements, and the overall consequences of these from a consumer perspective.

5 References

- Held et al. (2014). Final report of the DIACORE project. A report compiled within the Intelligent Energy Europe project DIACORE.
- Resch, Gustav, Geipel, Jasper (2021). Policy brief on the model-based assessment of European and Cross-border RES auctions. A report compiled within the AURES II project, accessible at www.ares2project.eu
- Roth Agustin et al. (2021). Renewable energy financing conditions in Europe: a survey and impact analysis. A report compiled within the AURES II project, D5.2, April 2021. Accessible at: <http://ares2project.eu/2021/06/29/renewable-energy-financing-conditions-in-europe-survey-and-impact-analysis/>

Policy brief on the Future of RES auctions in a changing electricity system
(Horizon 2020 project AURES II, D8.3)

AURES II is a European research project on auction designs for renewable energy support (RES) in the EU Member States.

The general objective of the project is to promote an effective use and efficient implementation of auctions for RES to improve the performance of electricity from renewable energy sources in Europe.

www.aures2project.eu

