[MODELLING OF CROSS BORDER AUCTIONS]

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Overview

In recent years, auction schemes for the allocation of support for renewable electricity sources (RES) have been advancing rapidly across Europe. Auctions have succeeded to bring down support levels and increased planning capability for RES deployment and state budgets. They can either be organised by one Member State opening its national auction to bidders from other countries, or as a jointly conducted auction by two or more Member States. Designing cross-border auctions is (far) more complex than designing national auctions and requires detailed analysis of all involved electricity systems and market environments.
According to the recast of the RES directive Member States (European Commission, 2016) will be required to partially open their in prior purely national support schemes to installations in other countries, done in the case of auctions by implementing cross-border auctions. It is our objective to present a quantitative assessment of this requirement.

In this paper, we will propose a methodology of how to model cross border auctions within our energy system model Green-X. The research and accompanied policy questions call for a model being capable to incorporate RES policy design in a detailed manner. TU Wien's Green-X model is perfectly capable of doing so thanks to its detailed representation of various energy policy instruments. In the course of the AURES[1] project the model has been extended to allow for an enhanced representation of design options in the case of auction schemes. This is however limited a pre-defined geographical entity – i.e. a Member State as default or the European Union as a multinational unit. A partial market opening with or without physical import/export of the produced electricity, or other flexible forms of cross-border RES cooperation call for an extension of the policy representation within Green-X.
Regarding the design options we intend to incorporate:

- Different type of cross-border opening (e.g. unilaterally or mutually opened auctions, joint auctions between two countries, cluster auctions with several Member States, European auctions accessible to all Member States)
- Varying auction design options (e.g. auction type, pricing rule, qualification requirements, penalties) and their role in cross-border auctions
- Relevant framework conditions (e.g. site and resource availability, permitting and grid access requirements, financial framework conditions, etc.)
- Options to share the costs and benefits of cooperation for the involved countries
- Other issues to be reflected in the cooperation agreement

Implementing all these design options in a suitable manner within our model is a challenge thanks to the complex interactions between instruments and markets at distinct geographical entities. We are building on lessons learnt from implementing multi-national biomass feedstock trade and accompanying policy options to safeguard sustainability (where various trade restrictions and design specifics for sustainability requirements had to be taken into account). We can also count here on experiences from implementing other forms of multinational policy approaches, e.g. virtual RES trade by means of Guarantee of Origin (GoO) Trade with partial or full market opening – that has popped up in the policy debate in the past.

[1] AURES II is a Horizon 2020 project, which succeeds AURES, ref. http://auresproject.eu/. We gratefully acknowledge the intellectual and financial support provided by the Horizon 2020 programme, operated by the European Commission, Executive Agency for Small and Medium Enterprises

Methods

This work will build and expand on our previous development of the Green-X [2]model. Green-X is a specialized energy system model focused on renewable energy in the areas of electricity, heat and traffic. It allows for a sound analysis of investments into RES, RES developments and related impacts on costs (additional generation cost), expenditures (support and capital expenditures) and benefits (fossil fuel and CO_2 avoidance). It includes a detailed implementation of European energy policy instruments, i.e. the dedicated support schemes for RES with particular emphasis on details concerning auction design. Thus, it allows for a detailed simulation of the market diffusion of mature and emerging renewable energy technologies, while taking into account current political framework conditions.

While currently we can depict auctions for renewable support within single countries, we will expand our modelling capabilities for cross border auctions.

Results

We will present work that is carried out within the AURES project.[3] As of today, December 2018, the project is just ongoing for one month. In consequence, there are no results yet, at the moment of submitting this abstract. However, as most of our modelling work within the AURES II project requires the ability to model cross border auctions and given the expected timeline of our project, we can ensure that results will available for the 41st IAEE international conference Groningen in June 2018.

The results will focus on our methodology on how to depict cross border auctions within our energy system model and present its application to the EU 28.

Conclusions

With the expansion of our specialised energy system model Green-X we will be able to model cross border auctions for RES-support within Europe. By that, we will draw conclusions regarding their related impacts – i.e. on the geographical distribution of RES installations as well as on accompanying economic effects.

References

European Commission, Brussels, 30.11.2016, COM(2016) 767 final 2016/0382 (COD); „Proposal for a DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on the promotion of the use of energy from renewable sources (recast)“

[2] For further information on the model, see www.green-x.at