



# TradeRES

New Markets Design & Models for  
100% Renewable Power Systems

# NEWSLETTER

# #5

## TradeRES 5<sup>th</sup> semester achievements

Here we present the TradeRES newsletter, in which we introduce the recordings of our two webinars, several publications produced, and events made from February to July 2022. The last section is an original interview with a researcher focusing on the project topics.

## Webinars

We are glad to share the recordings of our two webinars regarding TradeRES tools. The webinars occurred on July 12 and July 19, via zoom.

The first webinar presented AMIRIS and Backbone (12-07-2022), with Christoph Schimeczek (DLR) and Nelli Putkonen (VTT) respectively.

Simulations with agent-based model AMIRIS enable the investigation of the influence of political framework conditions on the behaviour and profitability of energy market actors, considering different marketing paths, as well as the quantification of the influence of uncertainties and micro-economic decision aspects of individual actors on energy markets. Backbone is a flexible, bottom-up, open-source energy system modelling

tool, that can be used for both invest optimization and operational planning.

The GAMS-based tool allows for modelling of highly variable and multi-sectoral energy systems at different scales - from local to continental. With a 6-year history of active development, Backbone is rich in both features and adaptability.

[Click here to see the youtube webinar.](#)

The second webinar presented MASCEM and RESTrade (19-07-2022) tools by Gabriel Santos (ISEP) and Hugo Algarvio (LNEG) respectively.

The Multi-Agent Simulator for Competitive Electricity Markets (MASCEM) is a modelling and simulation tool designed to study complex restructured electricity market operations by modelling the complex dynamic market players, including their interactions and the collection of medium/long-term data and experience, to support participants in making decisions based on to their characteristics and goals.

The Multi-agent Trading of Renewable Energy Sources (RESTrade) includes different models, including the traditional power and energy balancing markets, and an upgraded version of them. It supports traditional dispatchable power plants, variable renewables, and demand actors to participate in system balancing. Additionally, it uses both marginal pricing theory and pay-as-bid schemes to define prices in these markets. [Click here to see the webinar.](#)





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## Tutorials

1. AMIRIS: Click here to see the youtube video
2. MASCEM: Click here to see the youtube video
3. RESTrade: Click here to see the youtube video

## Dissemination

### Journals

1. Laurens de Vries, Ingrid Sanchez Jimenez, "Market signals as adequacy indicators for future flexible power systems, Oxford Open Energy, February 2022.
2. Silke Johanndeiter, André Lust und Clemens Cremer, "Ist das europäische Strommarktdesign geeignet für ein 100% erneuerbares Energiesystem?", Energiewirtschaftliche Tagesfragen, April 2022.
3. Ana Rita Silva, Ana Estanqueiro, "Hybrid Power Plants: Technical-Economic Evaluation and Contributions for Optimal Design", Energies, 15, April 2022.
4. Dawei Qiu, Tianyi Chen, Goran Strbac, Shengrong Bu, "Coordination for Multi-Energy Microgrids Using Multi-Agent Reinforcement Learning," in IEEE Transactions on Industrial Informatics, April 2022.
5. Ana Rita Silva, Hugo M. I. Pousinho, Ana Estanqueiro, "A Multistage Stochastic Approach for the Optimal Bidding of Variable Renewable Energy in the Day-Ahead, Intraday and Balancing Markets", Energy (Elsevier), May 2022.
6. Hugo Algarvio, "Multi-step optimization of the purchasing options of power retailers to feed their portfolios of consumers", International Journal of Electrical Power & Energy Systems, 142, May 2022.
7. Dharmesh Dabhi, Kartik Pandya, Joao Soares, Fernando Lezama, Zita Vale, "Cross Entropy Covariance Matrix Adaptation Evolution Strategy for Solving the Bi-Level Bidding Optimization Problem in Local Energy Markets", Energies, June 2022.

### Conferences

1. Johannes Kochems, Christoph Schimeczek, "Der Einfluss von Stromtarifmodellen auf Lastmanagementpotenziale", Symposium Energieinnovation, 16-18 February, 2022.
2. Hugo Algarvio, António Couto, Joaquim Duque, Ana Estanqueiro, Rui Pestana, João Esteves, Cao Yang, "Increase cross-border capacity to reduce market splitting of day-ahead electricity markets – A dynamic line rating approach", 2022 IEEE/PES Transmission and Distribution Conference and Exposition (T&D), New Orleans, USA, 25-28 April, 2022.

More details at: <https://traderes.eu/papers>

### Deliverables

- D2.2 - A description of improvements in the system optimization models used in the TradeRES project - link
- D4.2 - New actor types in electricity market simulation models - link
- D6.2 - User guide for TradeRES models and tools - link
- D6.3 - Tutorial and webinar edited material - link

## Events

We participated in EnInnov 2022 and IEEE/PES (T&D) 2022.

In April we got the opportunity to meet physically in our internal workshop in Frankfurt.





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## Interview

**Q: Who is Fernando Lezama?**

Fernando Lezama received the M.Sc. degree (with Honors) in Electronic Engineering (2011) and a Ph.D. in ICTs (2014), both from the Monterrey Institute of Technology and Higher Education (ITESM), Mexico. Since August 2017, Dr. Lezama has been a researcher at GECAD-Polytechnic of Porto, where he contributes to applying computational intelligence (CI) in the energy domain under various problems. Dr. Lezama has published over 80 articles in intelligent systems, energy conferences, and SCI journals. He is Co-Chair of the IEEE CIS Task Force 3 on CI in the Energy Domain (appointed as Chair from 2019 to 2021). He is also involved in the organization of Special Sessions, Workshops, and Competitions, to promote the use of CI as a solver of complex problems in power and energy systems.

**Q: In your opinion, how far is Europe from achieving 100% of its generation by renewable sources? How are electricity markets affected by such a reality?**

I believe that Europe is on the right path towards a more sustainable and clean energy grid, yet, several challenges beyond technical ones need to be addressed before having 100% renewable generation. In any case, new electricity market structures will rise from the increasing penetration of renewables at different levels of the energy chain. The electricity markets will possibly suffer a radical transformation to consider all this new local and distributed generation, that upon that, has the characteristic of being dependent on weather conditions adding a degree of uncertainty that was not taken into account before. In this regard, these efforts from other sectors, such as those included in TradeRES, could play a crucial role in achieving the

targets required by Europe and the world.

**Q: Do you believe that increasing renewable-based generation could help mitigate the current energy crisis in Europe?**

Definitely, however, this energy transition cannot be achieved overnight since each country in the European Union plays with particular rules and socio-technical capabilities. Therefore, studies and analyses in this regard should be made to deeply understand the effect of high penetration of renewables in different regions and under different cultural contexts before pushing the energy transition globally.

**Q: What should be the next steps for local energy communities to become a reality?**

Regarding infrastructure and regulation, I think the most developed countries should lead the implementation of energy communities. This is because, as I previously mentioned, the transition towards 100% renewable-based generation should consider the societal, technical, and political context of the countries where that is happening. This context drastically varies from location to location in the EU.

**Q: Are consumers ready to shift to the LEC and LEM reality? Will they be willing to change their behavior for the benefit of energy efficiency and energy cost reduction?**

This, again, also depends on the context in which the transition is intended to happen. However, I firmly believe that by providing the right incentives, not just economical but also environmental and social ones, the end-users will find the value of modifying their behavior towards more sustainable energy consumption and sharing. This, in turn,



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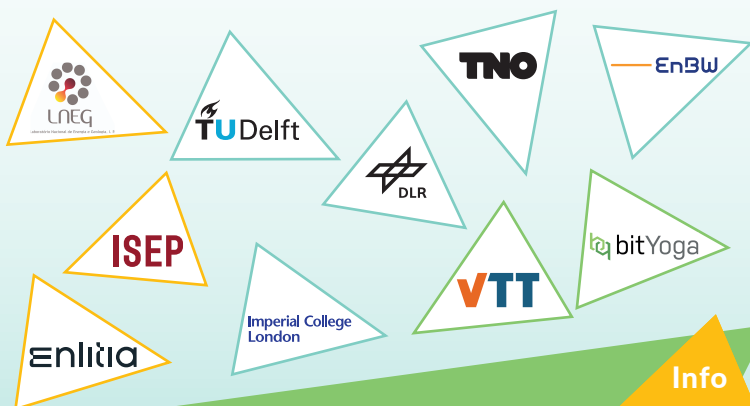
contributes to the energy transition required in the world. That is why projects such as TradeRES are crucial to determining how to design market structures and incentives that put end-users benefits at the center of the action.

**Q: How can the TradeRES solution incentivize and provide different players (e.g., DSOs, producers, retailers, consumers, prosumers, etc.) with adequate tools for EM participation?**

The dissemination and communication activities of the project play a key role in achieving the goals set by TradeRES. The involved project participants must find an easy-to-understand way of transmitting the technical achievements of the project. This seems obvious, yet it is really hard to achieve, even more so when complex systems, such as the new marketplaces studied in TradeRES, require understanding stakeholders at different technical levels interacting in the same system. A huge deal of coordination and communication between partners with different technical and theoretical levels is expected, yet, TradeRES team is integrated by a multidisciplinary group of people with different characteristics and working in different sectors, so that the required solutions will be found.

**Q: In which direction should investments be made to accomplish the EU's 2030 and 2050 energy & climate targets?**

This is a complex question that requires a critical analysis of different factors, not only technical but also social and environmental. What I could argue, in my humble opinion, is that rather than trying to give you a recommendation (which undoubtedly will lack nuances that escape my understanding), I would support the efforts of the EU's support projects, such as TradeRES. TradeRES and similar projects under the Horizon 2020 programs and similar initiatives represent vital investments to achieve EU plans. Apart from this, local government and stakeholders should develop the proper infrastructure to support technological maturity toward more efficient and sustainable energy systems. Finally, the involvement of end-user in a more active role, adopting green energy sources for instance, will be also crucial, not only to take advantage of the flexibility they might provide, but also to support different initiatives from society, clearly showing the path towards a green energy transition.



Info

The TradeRES project will develop and test innovative electricity market designs that can meet society's needs of a (near) 100% renewable power system. The market design will be tested in a sophisticated simulation environment in which real-world characteristics such as actors' limited foresight into the future and risk aversion are included.



<https://traderes.eu>  
[info@TradeRES.eu](mailto:info@TradeRES.eu)

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1 February 2020

**End date**  
31 January 2024

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