

**Welcome to**  
**AURES II Regional Workshop 5**  
**23 October 2020**

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*This webinar will be recorded. Only the presentations will be accessible after the webinar and the discussion will be excluded from the recordings. To exercise your privacy rights, you may contact the organizer.*

# AURES II – an overview

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## **AURES II – Auctions for Renewable Energy Support II**

- Supported through Horizon2020 framework
- November 2018 – October 2021
- Coordination: Fraunhofer ISI, Germany
- Consortium: 11 institutions from 6 EU Member States + UK

# AURES II – 11 institutions from 7 European countries



AURES II has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 817619

# AURES II – our objectives

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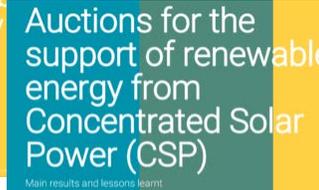
Generate and communicate new insights on the applicability, performance, and effects of **specific auction designs**

Provide **tailor-made policy support** for different types of auction applications

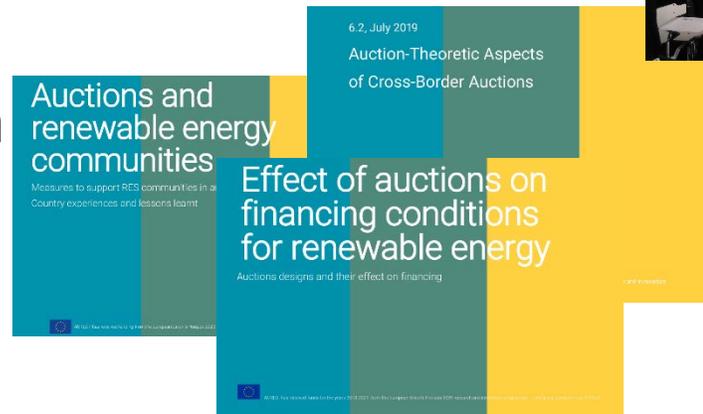
Facilitate **knowledge exchange** between stakeholders

# AURES II – inform the discussion on renewable energy auctions

- 12 country case studies
- AURES II Auction Database
- Policy Briefs
- Reports on current topics
- Research papers
- Stakeholder workshops
- Country case cooperation



Country	Year	Technology	Capacity (MW)	Value (€)	Price (€/MWh)	Notes
Germany	2017	Wind	1000	1000	1000	
Germany	2018	Wind	1000	1000	1000	
Germany	2019	Wind	1000	1000	1000	
Germany	2020	Wind	1000	1000	1000	
Germany	2021	Wind	1000	1000	1000	
Germany	2022	Wind	1000	1000	1000	
Germany	2023	Wind	1000	1000	1000	
Germany	2024	Wind	1000	1000	1000	
Germany	2025	Wind	1000	1000	1000	
Germany	2026	Wind	1000	1000	1000	
Germany	2027	Wind	1000	1000	1000	
Germany	2028	Wind	1000	1000	1000	
Germany	2029	Wind	1000	1000	1000	
Germany	2030	Wind	1000	1000	1000	



# Agenda



Time	Title	Speaker	Institution
10:00-10:05	Welcome	Vasilios Anatolitis /Pablo del Río	AURES II project coordinator Fraunhofer ISI / CSIC
10:05-11:50	Presentations		
	Session 1: The future outlook of renewable energy auctions in Spain	Hugo Lucas Porta	Ministry of Ecological Transition and Demographic Challenge
	Session 2: Lessons learnt from auctions in Spain	Lucía Dólera	APPA
	Session 3: Auctions and the Spanish wind energy value chain.	Heikki Willstedt	AEE
	Session 4: Empirical analysis of the impacts of auctions on the supply chain	Pablo del Río	CSIC
	Session 5: The end of the RES auction? Scenarios for the future of the instrument	Oscar Fitch-Roy	University of Exeter
	Session 6: Cross-border auctions	Felix von Bluecher	Guidehouse/Navigant
	Session 7: Lessons learnt from AURES II case studies	László Szabo	REKK
	Session 8: Trends and evolution of the Costs of Capital in RE Financing	Augustin Roth	Eclareon
	Session 9: Technology biases in technology-neutral auctions	Vasilios Anatolitis	Fraunhofer ISI
11:50-12:00	Wrap-up	Pablo del Río	CSIC

# Organizational issues

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- Workshop will be recorded and published, but without the Q&A sessions
- If you have any questions (or want to provide feedback), you have two options:
  - Click on the “raise your hand” button in the software
  - **Type your questions in the question box**

➔ Looking forward to a fruitful and lively discussion!



GOBIERNO  
DE ESPAÑA

MINISTERIO  
PARA LA TRANSICIÓN ECOLÓGICA  
Y EL RETO DEMOGRÁFICO

# RÉGIMEN ECONÓMICO DE ENERGÍAS RENOVABLES

(Economic Regime for Renewable Energy)

October 2020

Hugo Lucas Porta

Head of Cabinet State Secretary for Energy

# Energy context

REER



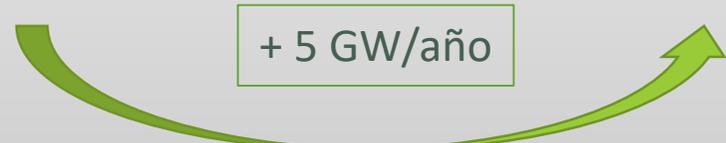
- Spain has adopted **ambitious targets** with respect to the deployment of renewable energy sources in its **National Integrated Energy and Climate Plan (PNIEC) 2021-2030**, which implies the deployment of around **5.000 MW/year** of new capacity in the next decade.

	2020	2025	2030
% generation of renewable energy in the electricity system	42%	60%	74%

Technologies (MW)	2020	2025	2030
Wind (on-shore and off-shore)	28.033	40.633	50.333
Solar PV	9.071	21.713	39.181

+ 22 GW

+ 30 GW



# On the need for a new renewable energy support mechanism...

REER



- Ambitious **international commitments** in renewable energy.
- **Cost reductions** for electricity generation. Technologies such as wind and PV can compete in the market (low operating costs)
- **Expected reduction of the price of the electricity market** in the hours with greater renewable electricity generation (“price cannibalisation” effect).
- **Difficulties in the financing of projects** as a result of the risks on future revenues.
- Possible **loss of interest for investors** due to the expected reduction of the revenues.
- The **Specific Remuneration Regime** provides revenues to installations which are additional to the ones they receive for the sales of electricity in the market.

# On the need for a new renewable energy support mechanism...

REER



- **Facilitate the financing** of new projects, avoiding the risk of “price cannibalisation” in order to comply with the targets.
- Immediately transfer the **cost savings** of electricity generation from renewable energy sources to consumers.
- Boost the green economy and facilitate the **economic recovery**.
- Facilitate **planning** through a schedule which provides certainty to the whole value chain, avoiding shortage periods.
- To partially transpose **Directive (UE) 2018/2001** on the promotion of the use of energy from renewable sources

# Introduction to REER.

REER



- Intended for **new renewable installations**.
- It allows **the enlargement** of existing installations and **hybridisation** of technologies.
- It can be awarded through an **auction** mechanism.
- It consists of the **collection of a price for the energy** sold in the market during a given period.
- **No** possibility to generate a **deficit** and **no burden** for the country's general budget.

# Regulatory outline

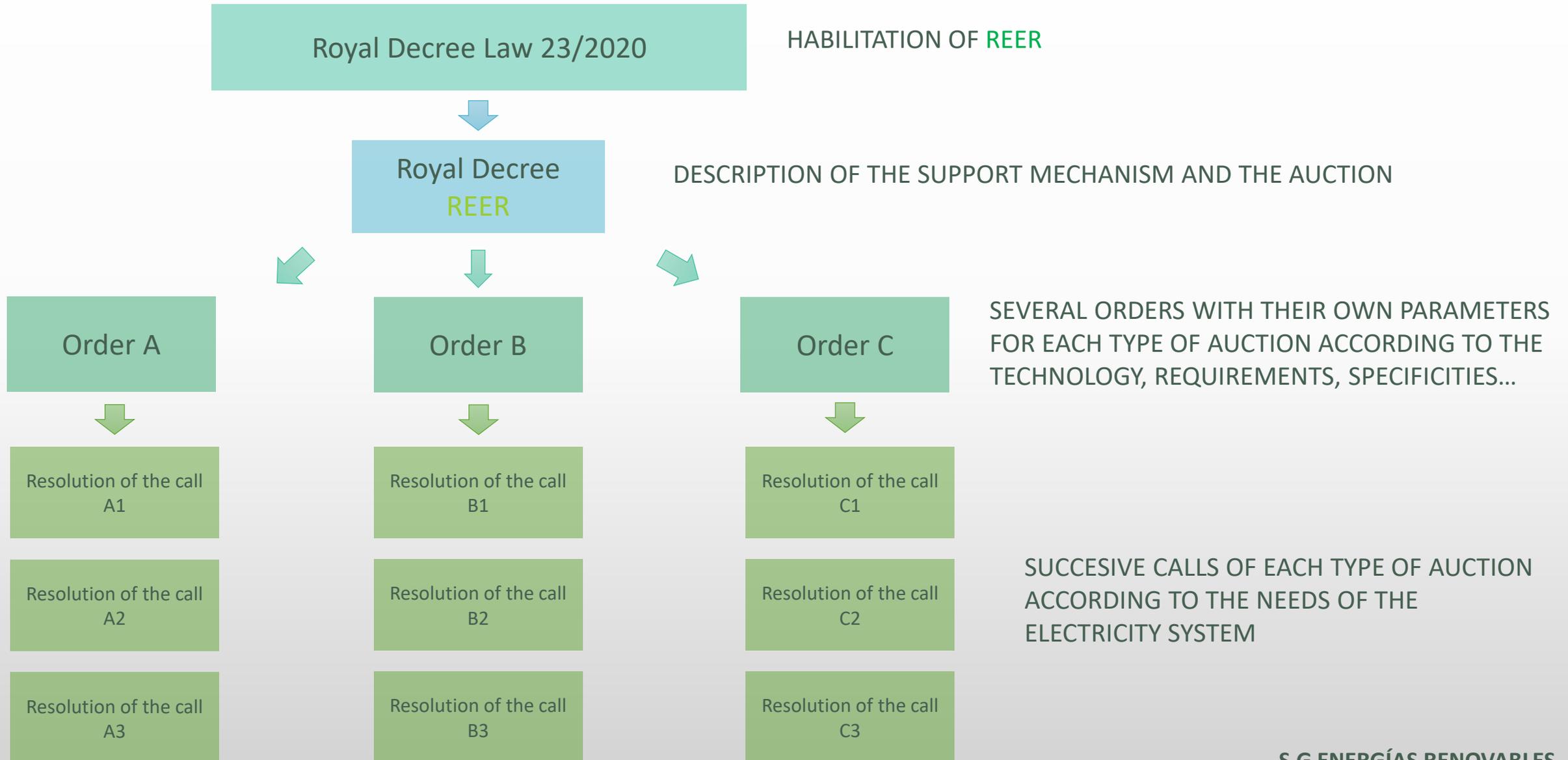
REER



ACT/LAW	Parlament (18-24 months)	Law 24/2013 Marginalist
ROYAL DECREE LAW		
ROYAL DECREE	Council of Ministres (6-...)	
MINISTERIAL ORDER	Minister (weeks)	
RESOLUTION	Secretary of State (days)	

# Regulatory outline

REER



- **Auctioned product:** energy, capacity or a combination of both.
- **Commitment made:** to deliver energy in a maximum term.
- **Supply variable:** price per unit of electricity (€/MWh) to be delivered.
- **Retribution:** payment of a price, based on the result of the auction, for the energy negotiated.
- **Form of delivering:** through the sale of electricity in the daily market, intraday market and adjustment services.
- **Type of auction:** sealed bid, pay as bid, with reserve prices (mandatory) and minimum price (facultative).

- **Settlement of the mechanism:** settlement in the market by OMIE.
- **Penalties:** foreseen due to non-compliance and renunciation to the mechanism, proportional to the volume of energy pending delivery.
- **Entities participating in the auction:** OMIE is responsible for the auction and CNMC is responsible for the supervision.
- **Organismos participantes en el mecanismo:** OMIE and REE are responsible for the energy sold and its settlement.
- To achieve an **ordered development** which allows a significant **integration** of renewable energy, a distinction can be made in the auction calls between the different generation technologies as a function of their technical characteristics, dispatchability levels, location criteria, technological maturity and others which ensure the transition towards a decarbonised and consideration of the particularities of renewable energy communities.

# Auctioned product and energies (I)

REER

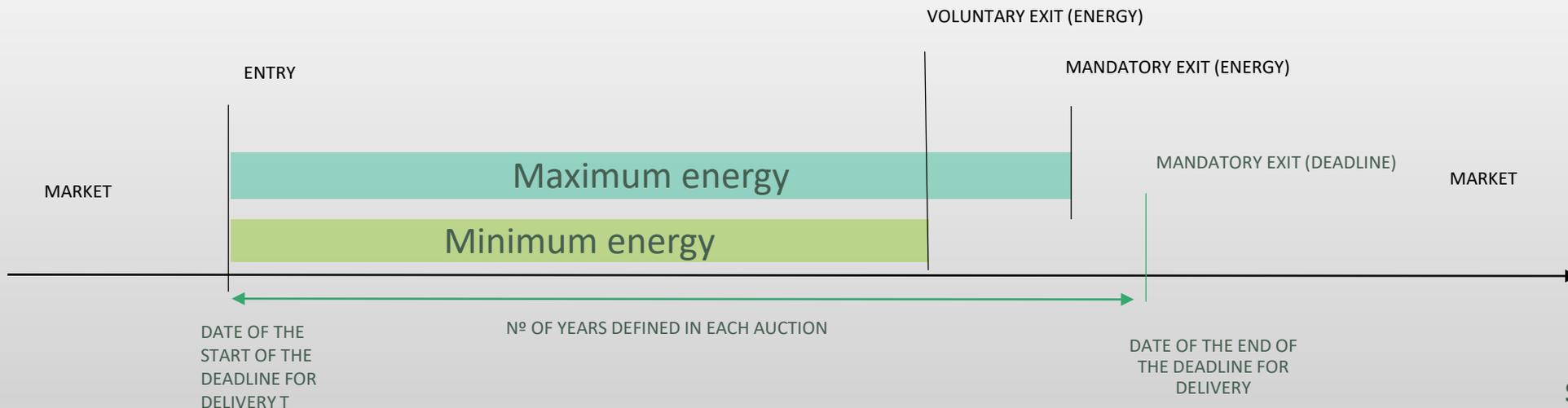


**Energy of the auction:** energy delivered by each installation adhered to the retribution of the mechanism in the daily and intra-daily market.

**Minimum energy of the auction:** minimum volume of energy of the auction to be delivered. It is the commitment made by the installation. If it is not reached, a penalty applies. When it is reached, the installation may voluntarily abandon the mechanism.

**Maximum energy of the auction :** maximum volume of energy of the auction which can be delivered. When it is reached, the installation must abandon the mechanism.

**Maximum delivery deadline:** period within which it is mandatory to deliver the energy committed. When the deadline is exceeded, the installation leaves the mechanism and can participate freely in the market. Different deadlines can be set for different technologies.



# Auctions – Control parameters

REER



**Reserve price:** maximum price over which bids are excluded, it may be confidential. The aim is to control the maximum price which can be awarded to a project.

**Risk price:** minimum price below which bids are excluded, it may be confidential. Its use is facultative. The aim is to remove reckless bids, whose variability is uncertain, avoiding failed allocations.

**The minimum relation required** between the volume of the auctioned product and the volume of product being offered in order to ensure the effective competition in each auction.

**Maximum percentage limit** of the volume of product being awarded to a corporate group or technology with respect to the total volume of the product being auctioned, in order to ensure competition, diversification and a higher guarantee of success of each auction.

The **market exposure of the awarded installations** is guaranteed through the following provisions:

- The installations have the **obligation to bid** in the daily and intra-daily markets with their best production forecast.
- The installations **will be able to participate in the adjustment and balancing services** according to the applicable regulation, that is, on a level playing field with the rest of technologies.
- The installations only sell under the REER a part of their energy, the so-called Maximum Energy of the Auction. After exiting the retributive mechanism, the rest of the energy which is generated by each installation during its useful lifetime can be sold **in the market and at market prices.**

Additionally, the royal decree envisages that, in **given calls**, it will be possible to include an **additional element of market exposure**, through a parameter called **percentage of market adjustment**.

The energy sold is remunerated at the price obtained on the basis of the award price from the auction and the market price. The aim is to encourage production in the hours of the day with the highest prices in order to reduce the price in those hours.

- Default value: 0% - Maximum of 50%.
- Beneficial for dispatchable technologies and storage.

The price which is perceived by the installations depends on the award price from the auction, the market price and the percentage of market adjustment.

**Precio percibido en Mercado Diario**

$$P_{pMD} = P_{Adjud} + \%Ajus * (PMD - P_{Adjud})$$

**Precio percibido en Mercado Intradivario**

$$P_{pMI} = P_{Adjud} + \%Ajus * (PMD - P_{Adjud})$$

# Settlement of the mechanism

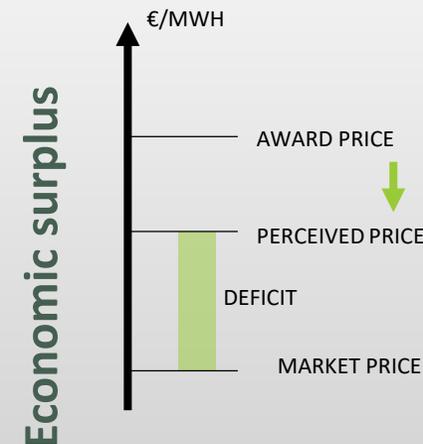
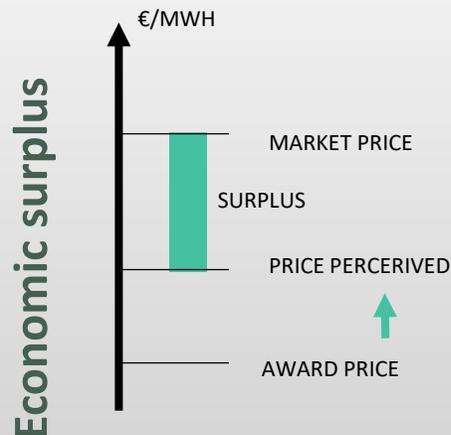
REER



**The installation:** bids with its best production forecast in the daily and intraday market, at a free price.

**OMIE:** settles for each installation the sold energy according to the difference (negative or positive) with the price resulting from the market in each negotiation period.

**OMIE:** distributes the economic deficit or surplus generated everyday among the national acquisition units as a proportion of its final programme (daily settlement). Storage installations not adhered to the REER are excluded.



The **Electronic Registry of the REER** is created. It has two statuses for installations: **Pre-allocation and Exploitation**.

After the result of the auction is known, installations will have a deadline to deposit the pre-allocation economic guarantee and ask for the registration in **pre-allocation** status.

Once registered in **Pre-allocation**, the economic guaranteed to participate in the auction is cancelled and there is a maximum deadline to register under **Exploitation**.

After the installation is built, the sale of electricity to the market starts (outside the mechanism) and, then, the registration under **Exploitation** is requested. Compliance with all the established requirements needs to be demonstrated.

Once the installations is registered under **Exploitation**, the guarantee deposited under pre-allocation is cancelled and the perception of the retributive regime starts.

A delay in the registration under **Exploitation** is allowed. However, this will lead to a penalty on the pre-allocation guarantee which will be proportional to the delay incurred.

REER



Thank You



# Lessons learnt from auctions in Spain.

Lucía Dólera  
Projects Director - APPA Renovables  
23rd October 2020

# What is APPA Renewables?

Business Association

Born 1987

Active in Spain and Europe

All the renewable technologies

Integrated vision for the national renewable development



Autoconsumo



Biocarburantes



Biomasa



Eólica



Geotermia



Marina



Minieólica



Minihidráulica



Solar Fotovoltaica



Permanent member of the **Consejo Consultivo de la Electricidad**



The only business association in its **Consejo Rector**



Founder member of the **Comité de Agentes Mercado de la Electricidad (CAM)**



Principal of several **Certification Committees**

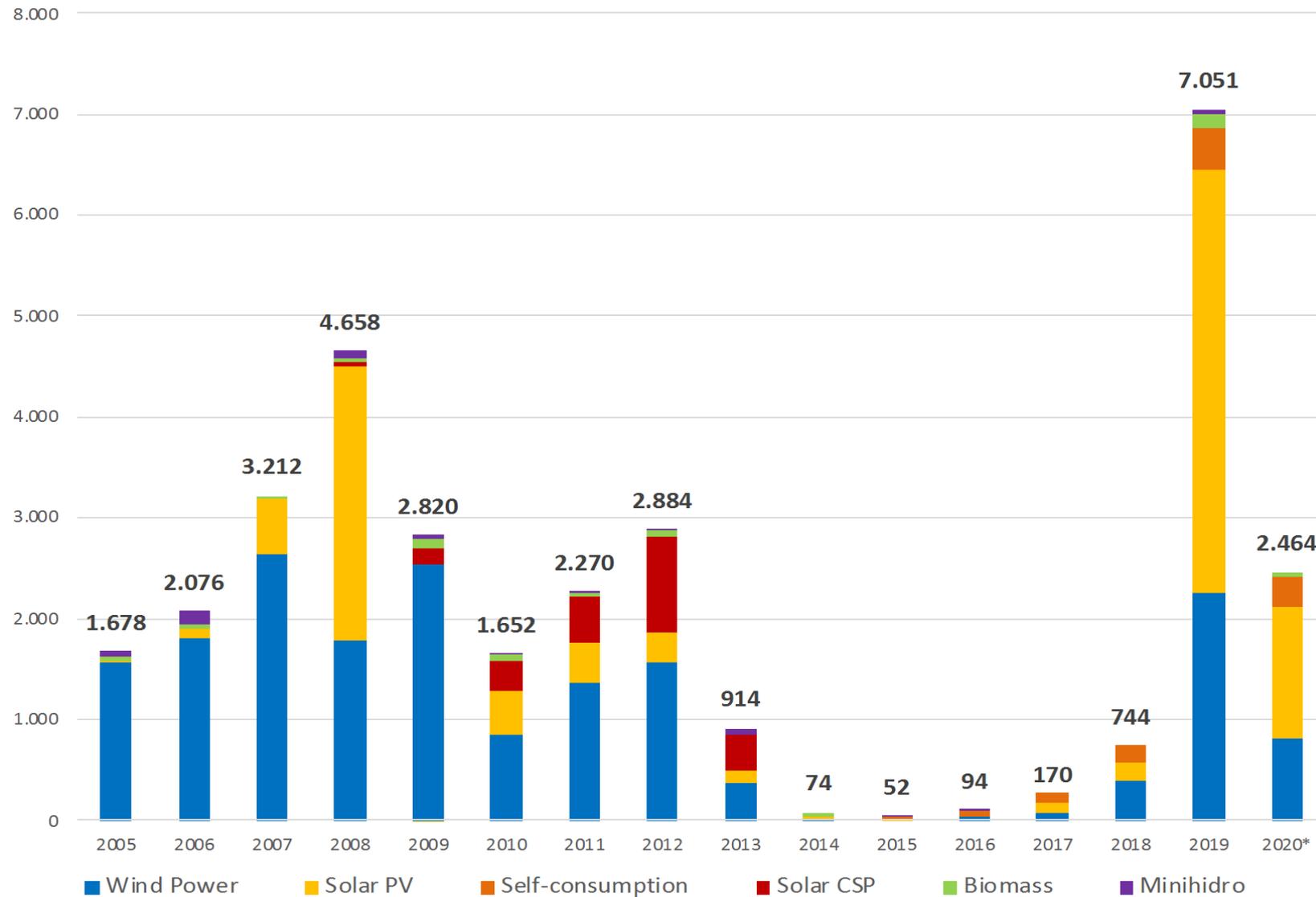
Active in many other public entities: Regional energy agencies, technological

# APPA Renewables members

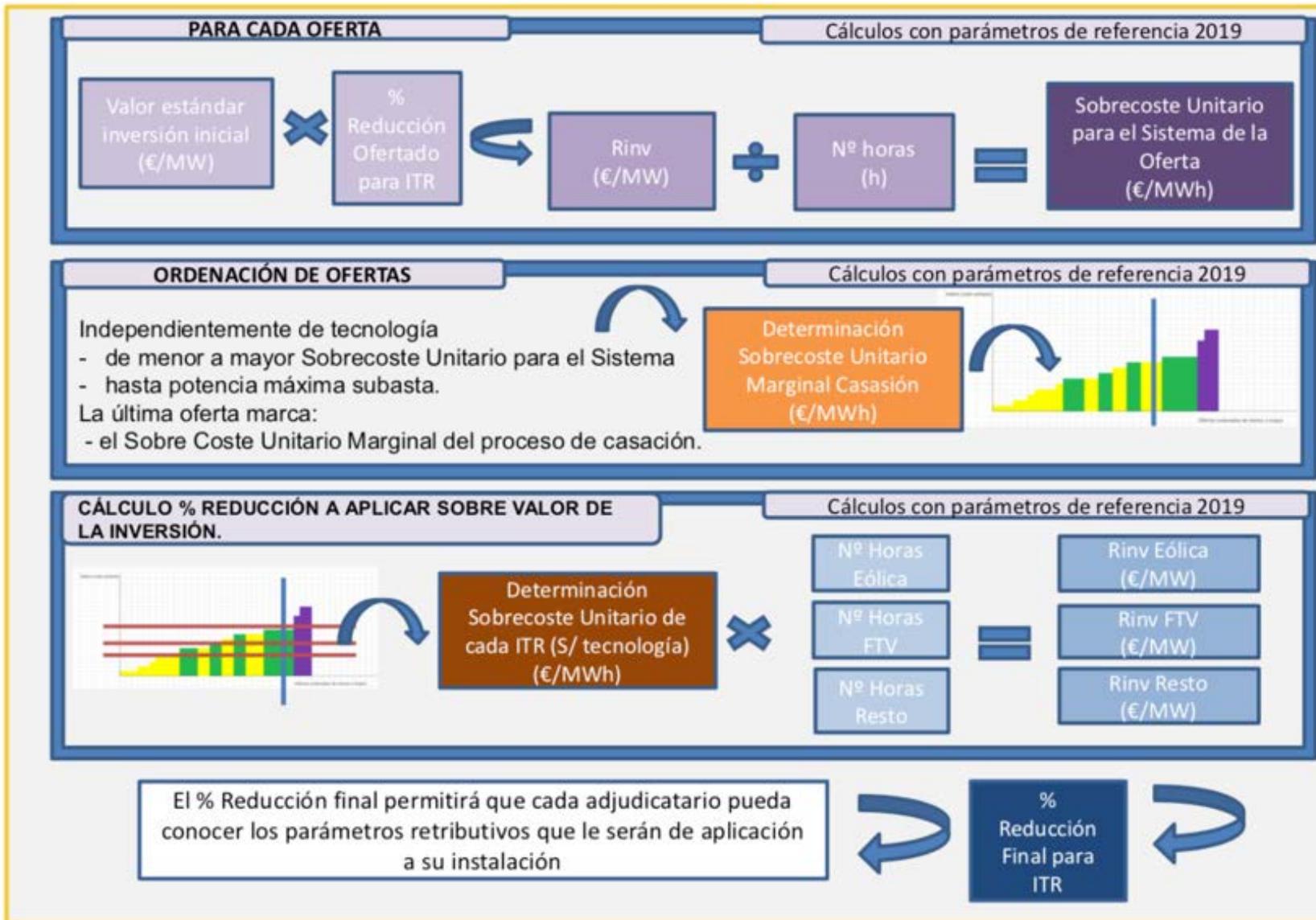
APPA Renewables has nearly 400 associated companies. APPA Renewables works for more than 33 years for the interests of its members. All the renewable technologies are gathered in APPA Renewables.



# Power installed (september 2020)



# Spanish Auction's structure (2017)



- Objective: reaching the objectives for Spain for 2020.
- It was auctioned Power (MW) not production (kWh)
- There weren't technology objectives, no technological neutrality.
- Marginalist Auction: the higher price that closes is the one that applies to the bids.
- All offers were at the maximum discount planned, and a "floor" was guaranteed

# Auctions results January 2016 and May 2017

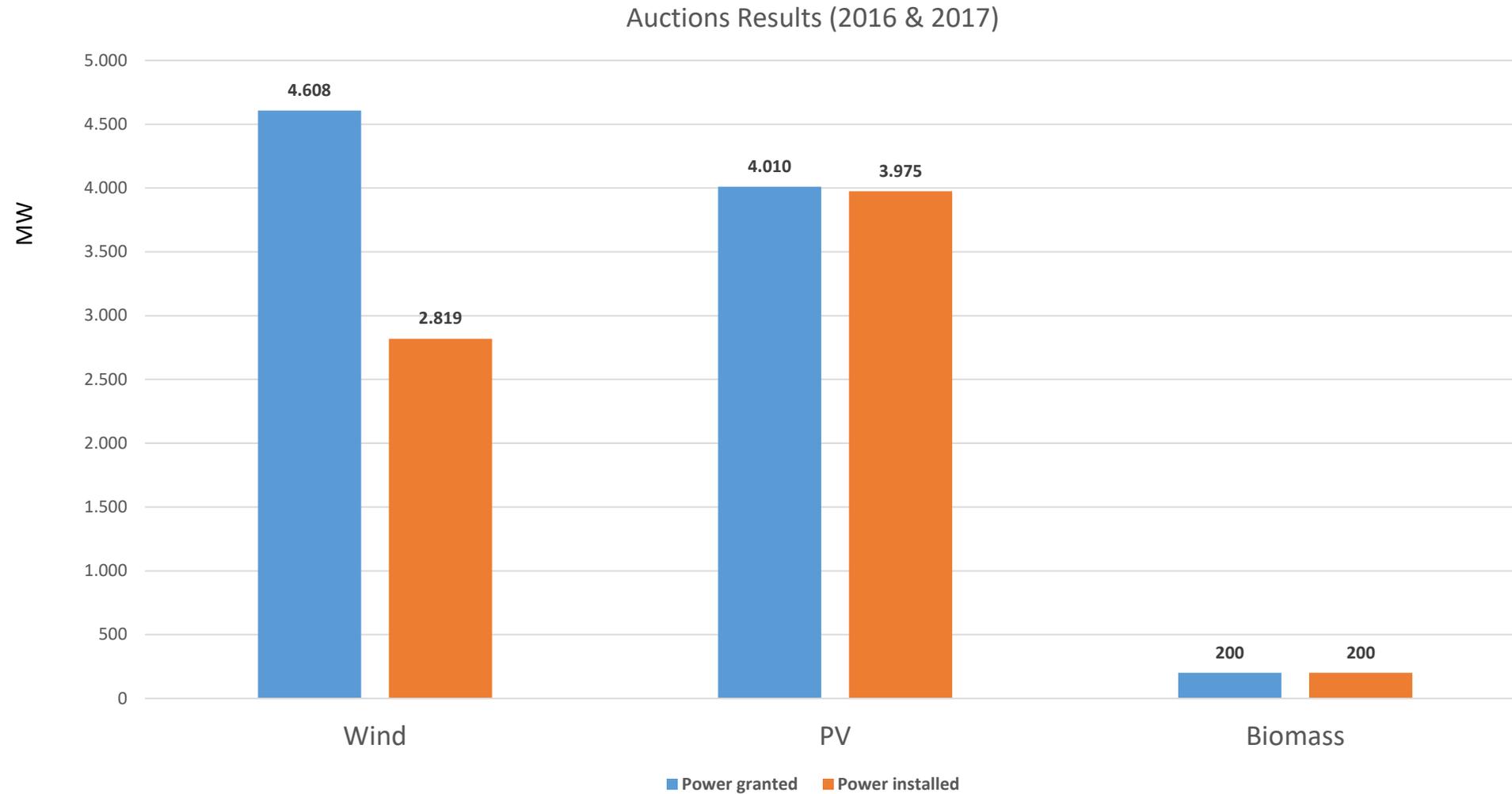
<b>2016 AUCTION</b>	
WIND	500 MW
BIOMASS	200 MW

<b>WIND POWER (May 2017)</b>	
Companies	Power granted (MW)
SOCIEDAD ARAGONESA TRANSEUROPEA DE EERR	1200
GAS NATURAL FENOSA	667
ENEL	540
ENERGIAS EOLICAS Y ECOLOGICAS	238
SISTEMAS ENERGETICOS SIERRA DE VALDEFUENTES	206
NORVENTO	129
ALFANAR	0,003
COBRA	0,003
ENERGIAS RENOVABLES DEL BIERZO	0,003
HOCENSA	0,003
EDP	0,002
CEPSA	0,001
GESTAMP	0,001
GREENALIA	0,001
<b>TOTAL</b>	<b>2 980,02</b>

<b>Solar PV (May 2017)</b>	
Companies	Power granted (MW)
TECNOLOGIA INGENIERIA Y CALIDAD	1
GAS NATUTAL FENOSA	0,009
X-HELIO	0,009
COBRA	0,007
ILDEFONSO-PEDRO TAUSTE ORTIZ	0,007
LOTAPERA	0,004
IB VOGT	0,001
<b>TOTAL</b>	<b>1,037</b>

<b>WIND POWER (July 2017)</b>	
<b>Companies</b>	<b>Power granted (MW)</b>
ALFANAR	720
IBERVENTO	172
GREENALIA	133
GESTAMP	24
OTRAS	79
<b>TOTAL</b>	<b>1 128</b>

<b>Solar PV (July 2017)</b>	
<b>Companies</b>	<b>Power granted (MW)</b>
COBRA ACS	1550
X-HELIO	440
ENDESA	338
FORESTALIA	316
GAS NATURAL FENOSA	250
SOLARIA	250
OPDE	200
PRODIEL	180
SOLARPACK	100
ALTER	50
ALTEN	13
OTRAS	322
<b>TOTAL</b>	<b>4 009</b>



- Wind, solar PV promoters, demonstrated that it is possible to supply renewable energy by competing with conventional energies.
- This is due to two key aspects: on the one hand the maturity of the technologies, and on the other the reduction of costs that makes its LCOEs competitive with the rest of the conventional technologies.
- Despite the complexity of the 2017 Spanish auction, it had an advantage, the auction ensured the profitability, and in the case the market price (pool) collapses, a regulatory “floor” appears as a payment per MW installed that is around € 25-30 / MWh
- Despite the limited time to develop the projects, from those 8.100 MW awarded (in May and July 2017), on the 31<sup>st</sup> December, almost the 80% managed to be connected.
- The power not installed was mainly due to administrative issues, delays in permitting....
- The electric system operator and transport operator made also great efforts to accommodate in the system all this huge amount of renewables. Never before such amount of renewables were connected in the grid in such a short time.



### I. DISPOSICIONES GENERALES

#### JEFATURA DEL ESTADO

**6621** *Real Decreto-ley 23/2020, de 23 de junio, por el que se aprueban medidas en materia de energía y en otros ámbitos para la reactivación económica.*

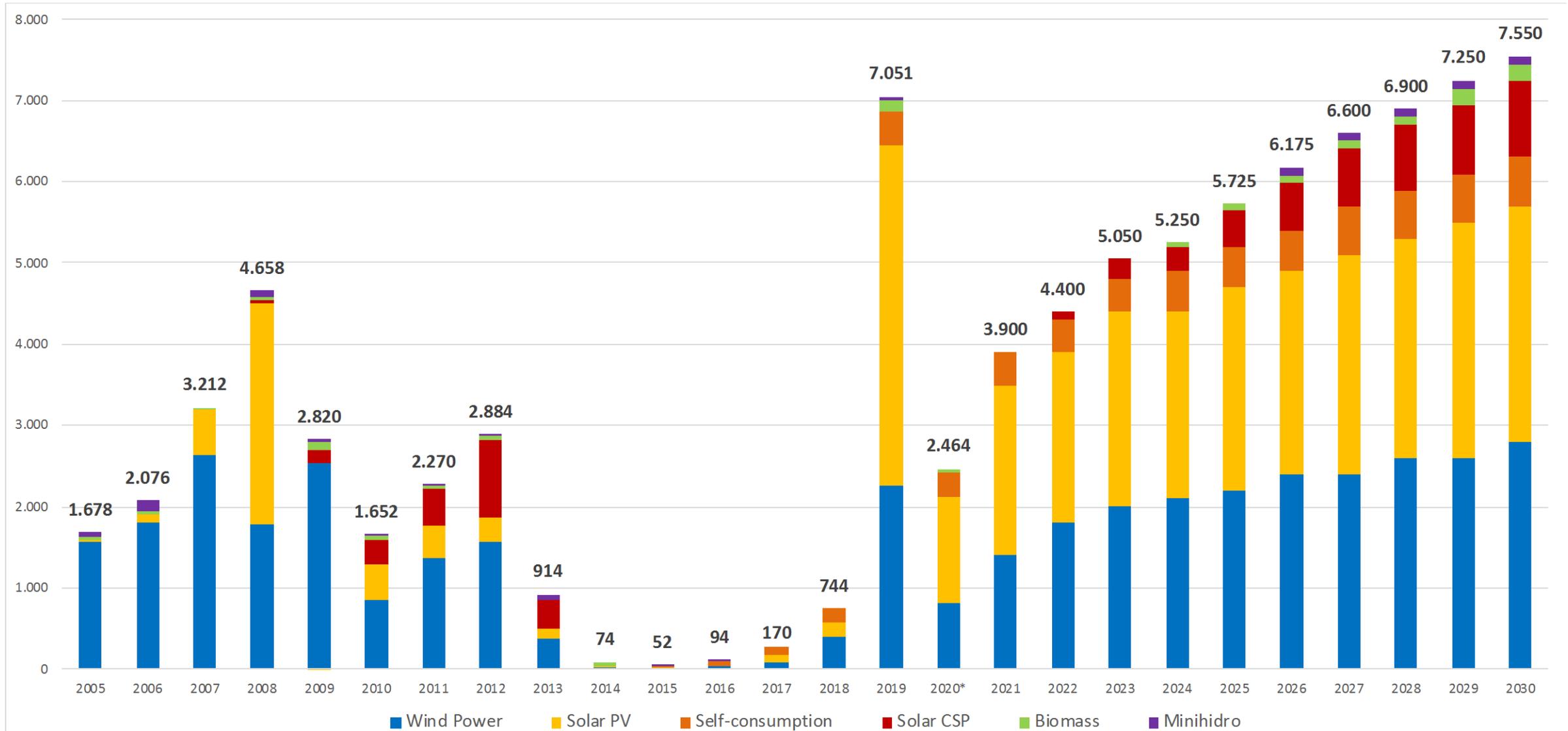
«7 bis Adicionalmente al régimen retributivo específico previsto en el apartado anterior, al objeto de favorecer la previsibilidad y estabilidad en los ingresos y financiación de las nuevas instalaciones de producción de energía eléctrica a partir de fuentes de energía renovable que se construyan, el Gobierno desarrollará reglamentariamente otro marco retributivo para la generación de energía eléctrica a partir de fuentes de energía renovable, basado en el reconocimiento a largo plazo de un precio fijo por la energía.

El referido marco retributivo se otorgará mediante procedimientos de concurrencia competitiva en los que el producto a subastar será la energía eléctrica, la potencia instalada o una combinación de ambas y la variable sobre la que se ofertará será el precio de retribución de dicha energía.

En los procedimientos de concurrencia competitiva, que deberán estar orientados a la eficiencia en costes, se podrá distinguir entre distintas tecnologías de generación en función de sus características técnicas, tamaño, niveles de gestionabilidad, criterios de localización, madurez tecnológica y aquellos otros que garanticen la transición hacia una economía descarbonizada, así como tener en cuenta las particularidades de las comunidades de energías renovables para que estas puedan competir por el acceso al marco retributivo en nivel de igualdad con otros participantes, todo ello de acuerdo con la normativa comunitaria.

- ◆ Specific auctions for technologies: wind, solar photovoltaic, biomass, etc..
- ◆ Auction product: MW (capacity to be installed)
- ◆ Offers based on energy price, product offered: €/MWh (with two decimals)
- ◆ Pay as Bid system: the bidders get the offered price.
- ◆ A fixed price for energy is offered for a given volume, and the right to auction can be combined with the market
- ◆ Remuneration for a maximum period of 15 years for auctioned energy
- ◆ Since then, the incomes will come from the pool price.
- ◆ Prequalification for auction: project identification, access authorization, etc.
- ◆ Deadlines for administrative maturity and implementation.

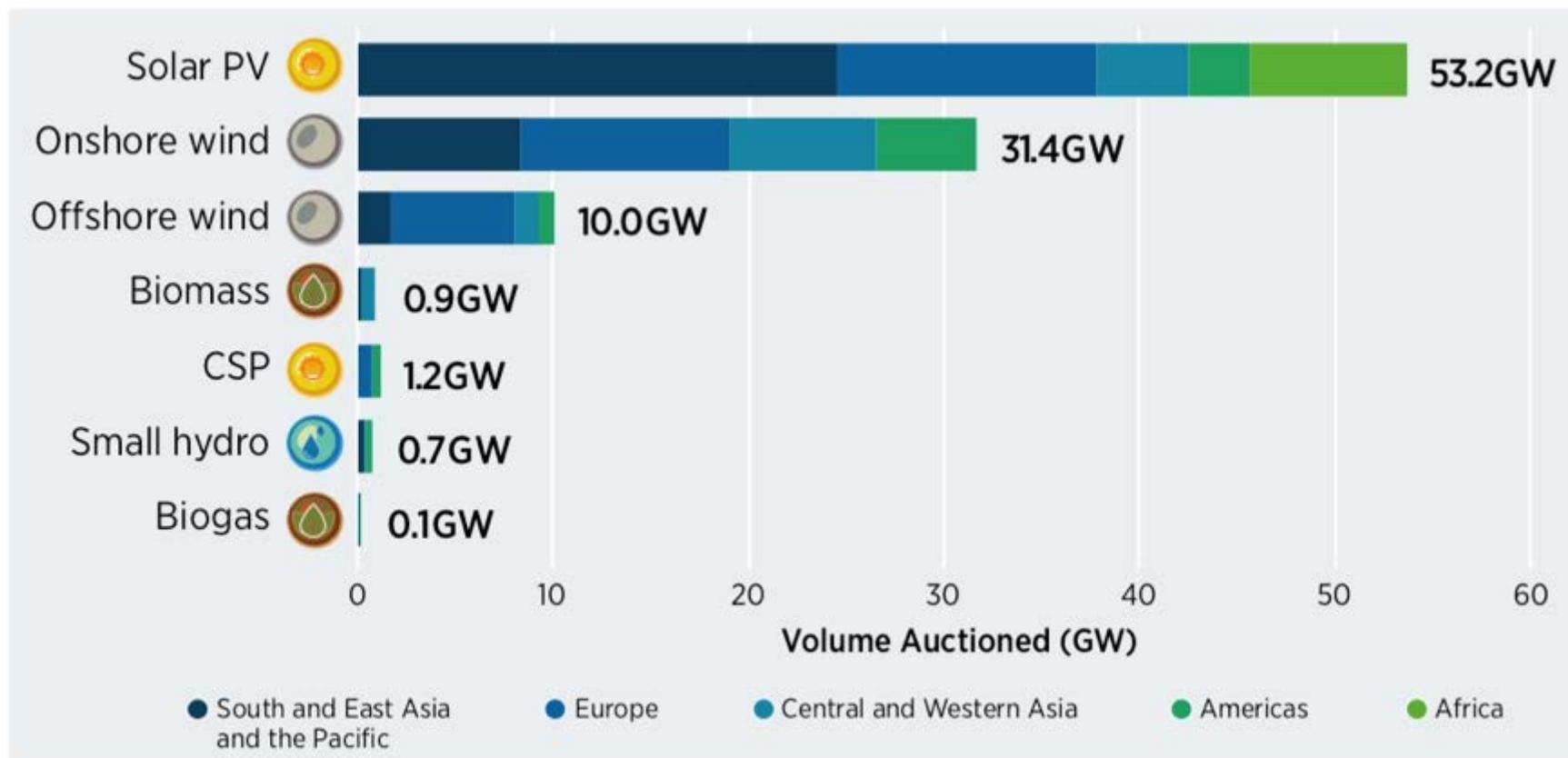
# Installed Capacity (september 2020) and Roadmap 2030



Source: REE, CNMC and estimated from APPA Renovables. \* Year 2020 until september

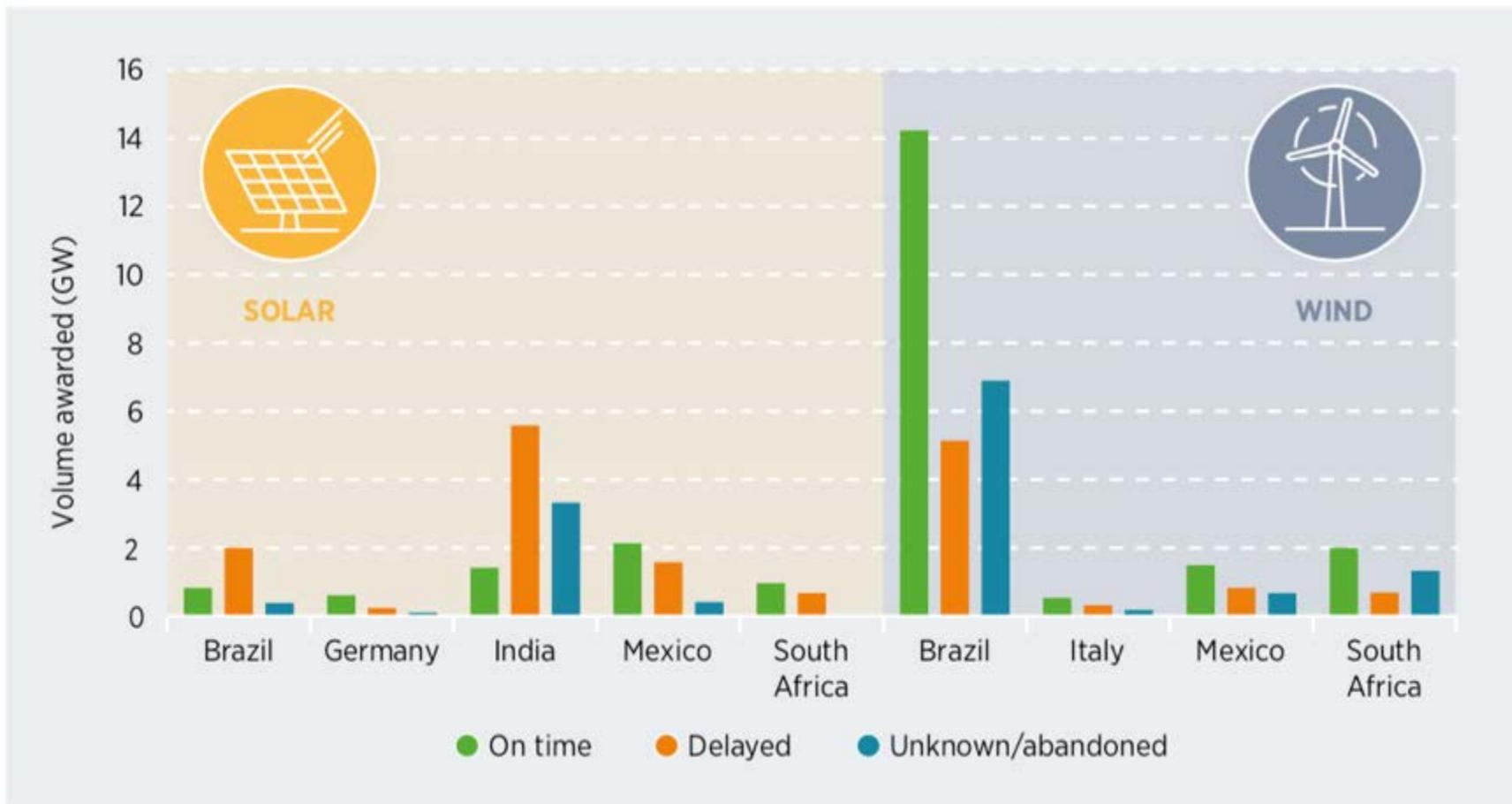
# International auctions experience

## Auctions 2017 & 2018 by region and technologies



Note: PV = photovoltaic, CSP = concentrated solar power

## Delays and status of auctions held in 2017 and 2018



- Auctions are a great tool to incorporate the renewable energies into the Electric System.
- Auctions are essential for the competitiveness of technology, as well as a backbone for the economy at a social and territorial level.
- Auctions must be the result of a prior energy planning process.
- A new auction is scheduled to be held before the end of the year in Spain. However it will be crucial to know the timing of future auctions in order to avoid excessive competitive pressure
- Among the set of regulatory and energy policy measures set forth by Spain's Royal Decree-law 23/2020, of June 23, auctions to grant the support for renewable electricity, it's of particular importance and highly expected by the renewable sector.
- Most of the key design details for the next Spanish auctions, on which success of the new scheme will ultimately depend are pending to be confirmed.



*Thank you very much  
for your attention*

[www.appa.es](http://www.appa.es)

[appa@appa.es](mailto:appa@appa.es)

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Sede Barcelona  
Muntaner, 248. 1º1ª.  
08021 Barcelona  
Tel. 93 241 93 69  
Fax. 93 241 93 67  
[appa@appa.es](mailto:appa@appa.es)

Sede Madrid  
Dr. Castelo 10, 3ºC-D  
28009 Madrid  
Tel. 91 400 96 91  
Fax. 91 409 75 05  
[comunicacion@appa.es](mailto:comunicacion@appa.es)



# Wind Energy: The challenge of auctions in Spain.

Heikki Willstedt  
Director of Energy  
Policies

23 October 2020

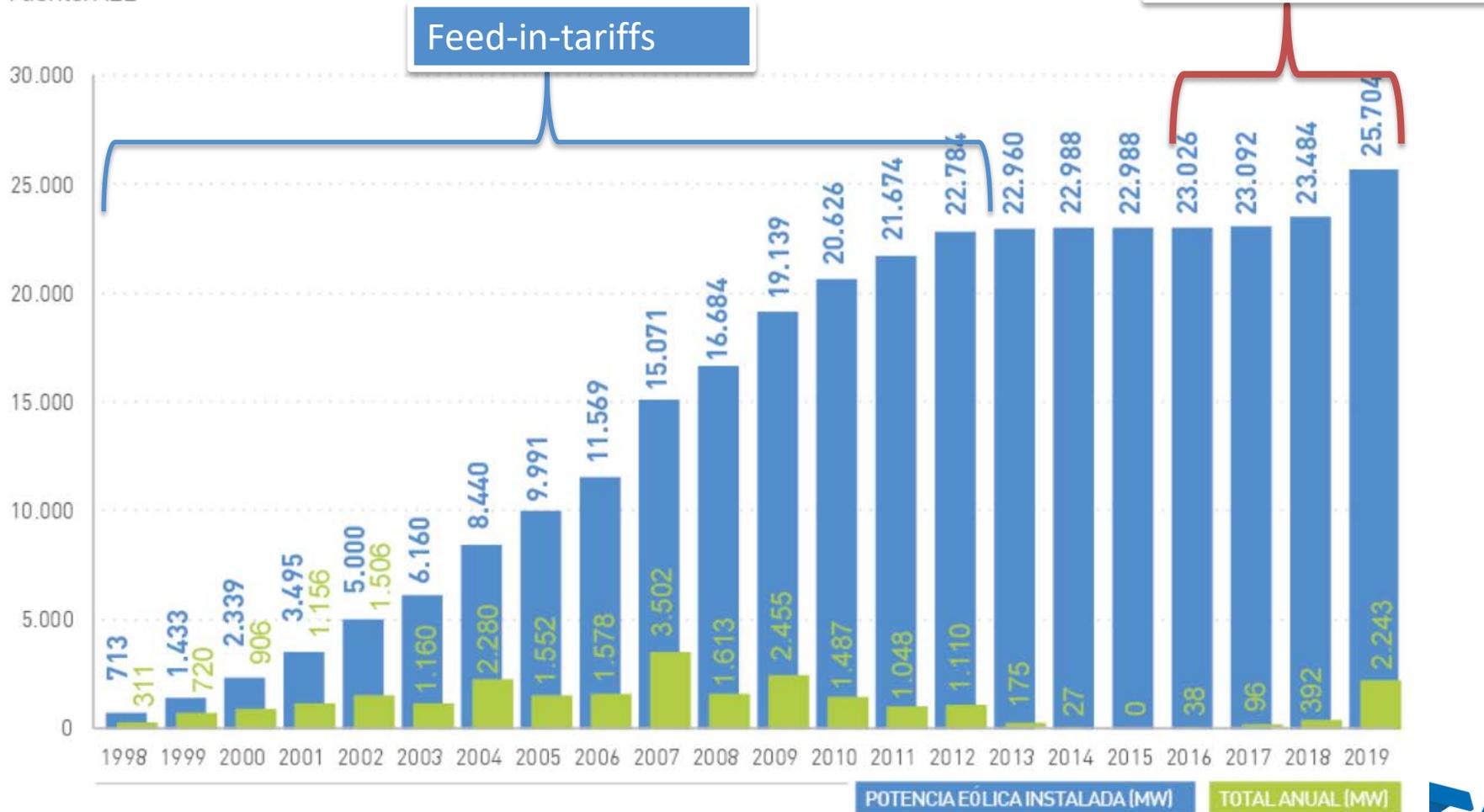
# A demanding scene



# Evolution of wind power in Spain

EVOLUCIÓN ANUAL Y ACUMULADA DE LA POTENCIA INSTALADA EN ESPAÑA

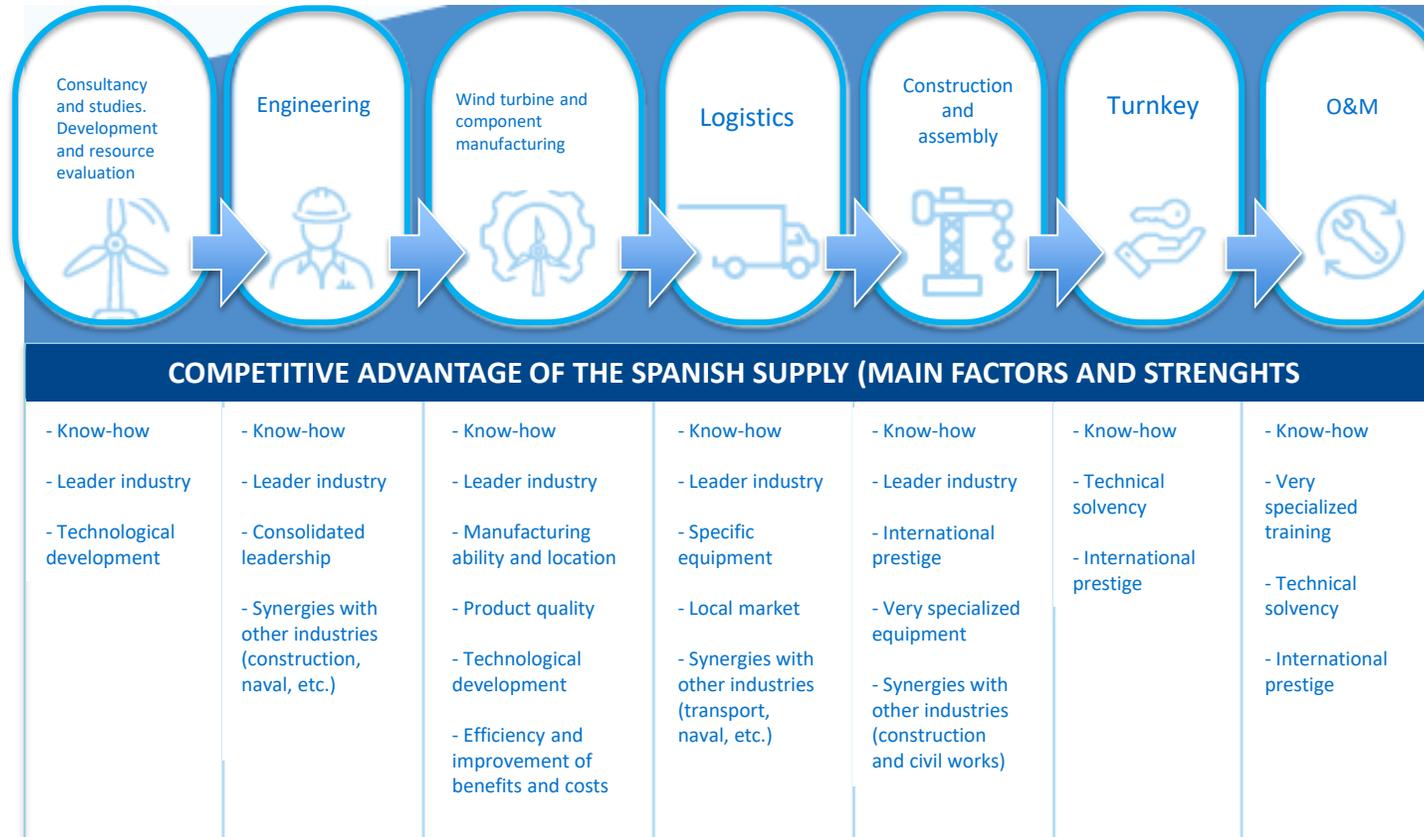
Fuente: AEE



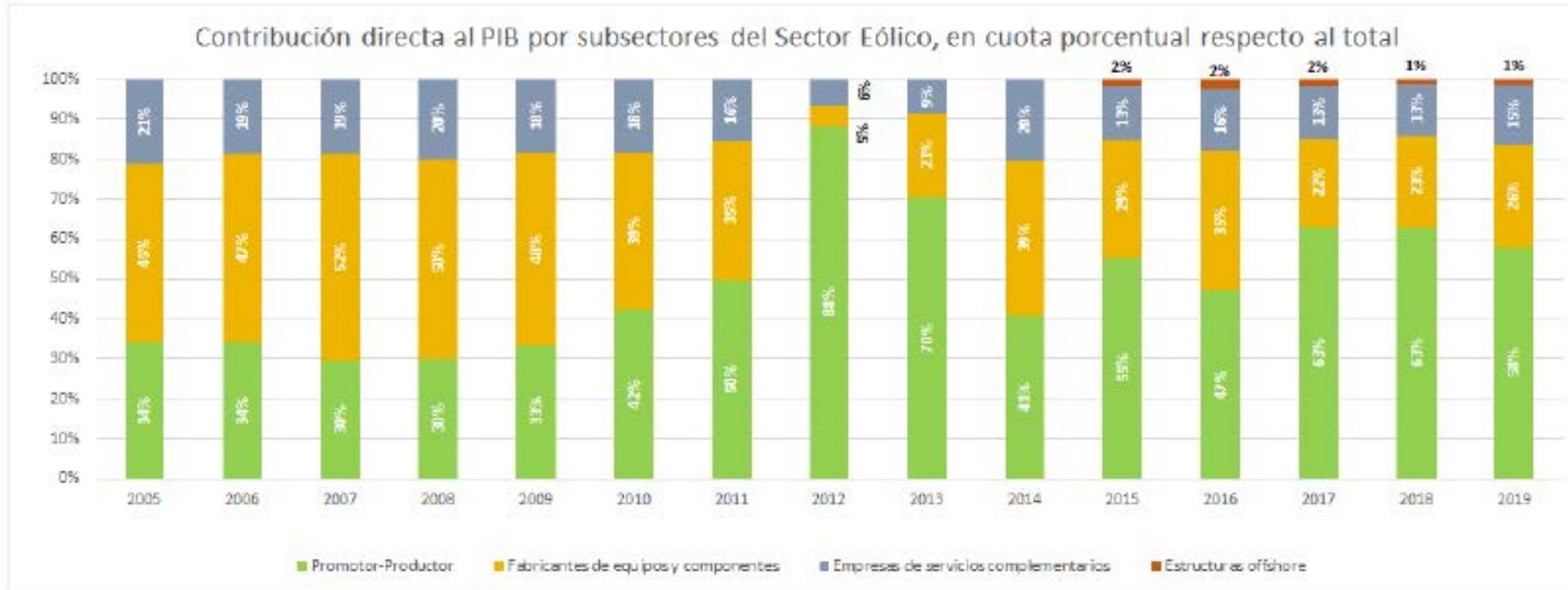
Lorem Ipsum Dolor

# The supply chain of the wind power industry

- ▶ The Spanish wind power industry is a **significant case** of industrial development and supply with a **100% presence in the value chain**.



# The evolution of wind subsectors 2005-2019



Source: Deloitte



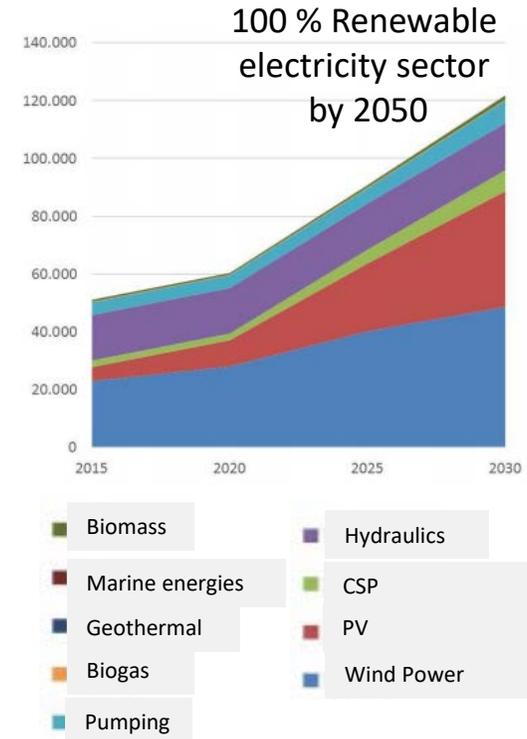
# NECP, roadmap to 2030

## Evolution of the installed power of electrical energy (MW)

Target Scene of the generation mix (MW)				
Year	2015	2020*	2025*	2030*
Wind power (on- and offshore)	22,925	28,033	40,633	50,333
PV	4,854	9,071	21,713	39,181
CSP	2,300	2,303	4,803	7,303
Hydraulics	14,104	14,109	14,359	14,609
Mixed Pumping	2,687	2,687	2,687	2,687
Pure Pumping	3,337	3,337	4,212	6,837
Biogas	223	211	241	241
Other renewables	0	0	40	80
Biomass	677	613	815	1,408
Coal	11,311	7,897	2,165	0
Combined cycle	26,612	26,612	26,612	26,612
Cogeneration	6,143	5,239	4,373	3,670
Fuel and Fuel/Gas (islands)	3,708	3,708	2,781	1,854
Residues and others	893	610	470	341
Nuclear	7,399	7,399	7,399	3,181
Storage	0	0	500	2,500
<b>TOTAL</b>	<b>107,173</b>	<b>111,829</b>	<b>133,802</b>	<b>160,837</b>

\*2020, 2025 and 2030 are estimates of the NECP Target Scene

Source: Ministry for Ecological Transition and Demographic Challenge

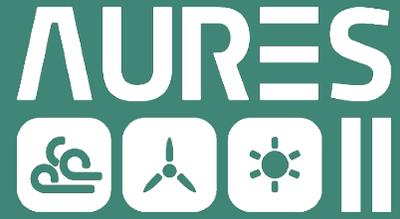


The Plan foresees for 2030 a total installed capacity in the electricity sector of **161 GW** of which **50 GW** will be **wind power**

The weight of **Renewable energies** in the final Energy consumption evolves **from the current 20% to 42% in 2030**

Thank you for your attention  
@aeeolica





# Empirical Analysis of the Impact of Auctions on the Supply Chain

Pablo del Río & Christoph Kiefer

CSIC

AURES II - Regional Workshop 5 / 23 October 2020



AURES II has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 817619

## Task 4.2. Empirical Analysis of the Impact of Auctions on the supply Chains



**Objective:** To empirically analyse the effects of auction design on RES supply chains

To estimate the perceived relative impacts of auction and auction design elements on two aspects of **Market Concentration (MC)**: the **number** of firms and their **diversity** (that is, the impact on small actors), with respect to other factors influencing these aspects (context conditions), focusing on two stages of the value chain (developers and manufacturers).

- Perceived impact of different auction design elements on the  $n^o$  and diversity of firms.
- Perceived relative impact of auctions as compared to other contextual factors influencing the value chain on the number and diversity of firms.

# Task 4.2. Empirical Analysis of the Impact of Auctions on the supply Chains

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## Design elements

- Material prequalification requirements on projects.
- Material prequalification requirements on bidders.
- Financial prequalification requirements.
- Technology neutrality.
- Project size limitations (maximum/minimum).
- Schedule / high frequency
- Price-only auctions
- Uniform vs. PAB
- Remuneration type
- Realisation period.

# Task 4.2. Empirical Analysis of the Impact of Auctions on the supply Chains

## Methodology (I)

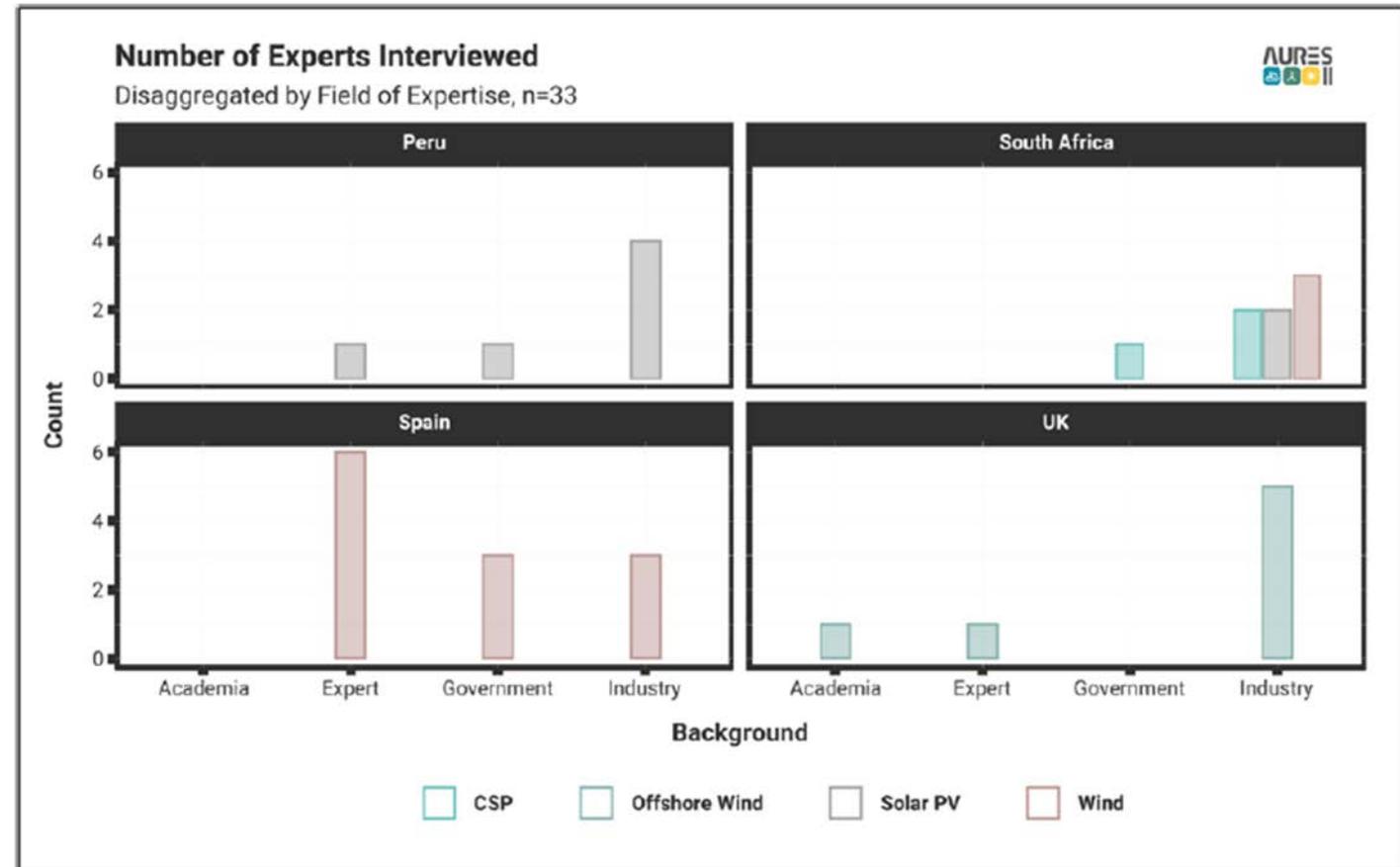
- Structured interviews with key experts (stakeholders / actors) from the RES sectors of four countries. An Expert Elicitation-based approach.
- Focus on two stages (project developers and component manufacturers).
- Focus on four technologies (on-shore wind, off-shore wind, solar PV and CSP).
- Case studies:
  - Spain (onshore wind and PV): *CSIC*. 
  - UK (offshore wind): *University of Exeter*. 
  - Peru (onshore wind, PV): *Factor*. 
  - South Africa (CSP, PV and on-shore wind): *CSIC and Factor*. 



# Task 4.2. Empirical Analysis of the Impact of Auctions on the supply Chains

## Methodology (III):

(33) Expert Interviews were completed during March – July 2020



# Task 4.2. Empirical Analysis of the Impact of Auctions on the supply Chains



## Results and overall findings. Auction DEs.

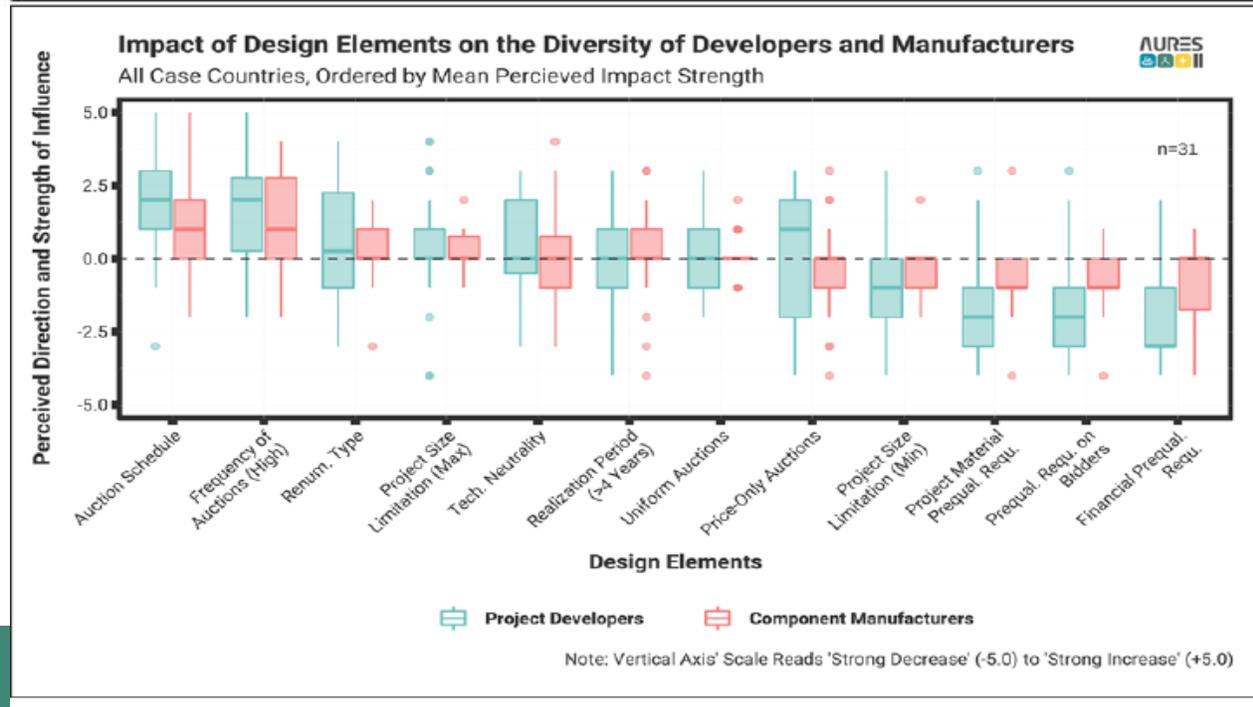
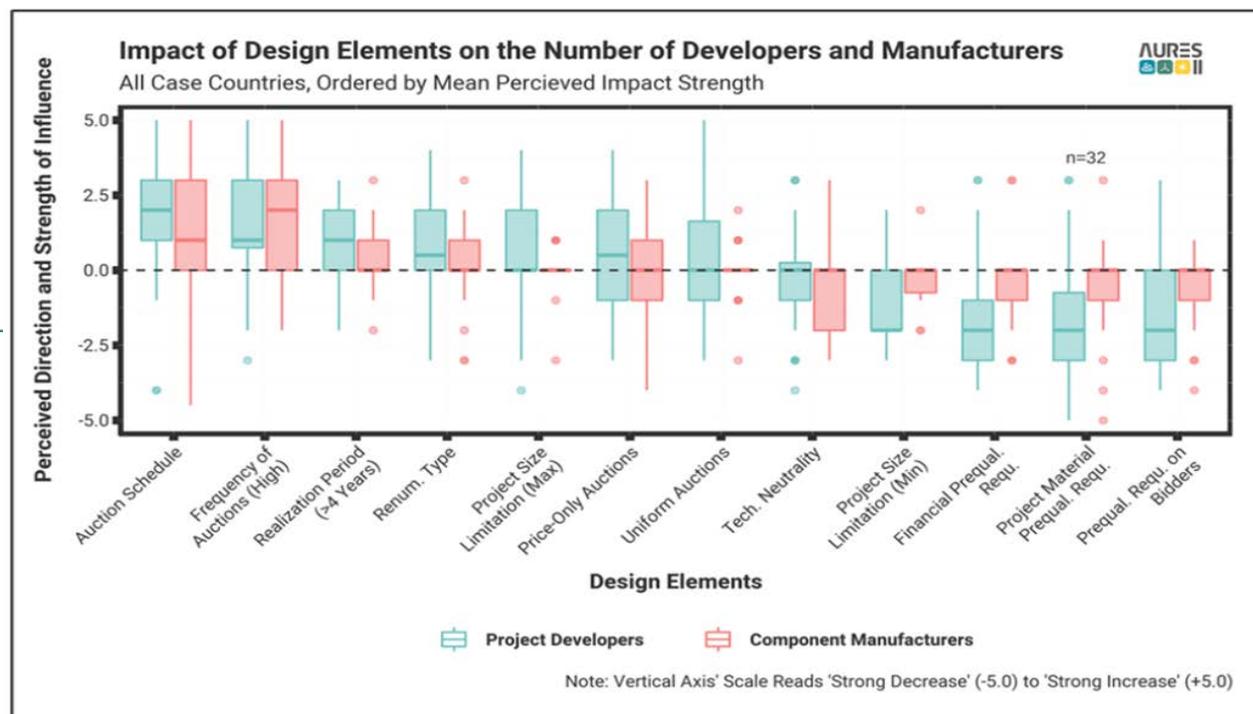
- Auctions and auction DEs have **a marked effect on the number and diversity of project developers and component manufacturers.**
- The expert elicitation process has established support for **the existence of impactful DEs that are expected to affect the number and diversity of project developers and component manufacturers.**
- Broadly speaking, **DEs tend to affect the value chains of the four considered countries in quite similar ways.**
- However, there are **substantial technology and country differences**, in line with our idea that the impact of auctions and auction DEs can be expected to be both RE technology-specific and country-specific.
- It is worthwhile underlining that **the DEs which tend to affect the n<sup>o</sup> and diversity of firms to a greater extent (i.e. the frequency of auction rounds, existence (or not) of a transparent schedule, and prequalification requirements), are the DEs that are most likely to get tangled up with non-auction policy areas.**

# Task 4.2. Empirical Analysis of the Impact of Auctions on the supply Chains

## Results and overall findings

### Impact of DEs on the n<sup>o</sup> and diversity of firms

- **Some DEs appear to induce large impacts on the n<sup>o</sup> and diversity of firms, whereas others have a very modest influence.**
- The positive and negative impacts of specific DEs on the number and diversity of firms are perceived to be **more pronounced for project developers, than for component manufacturers.** The opposite is true for all kinds of prequalification requirements.

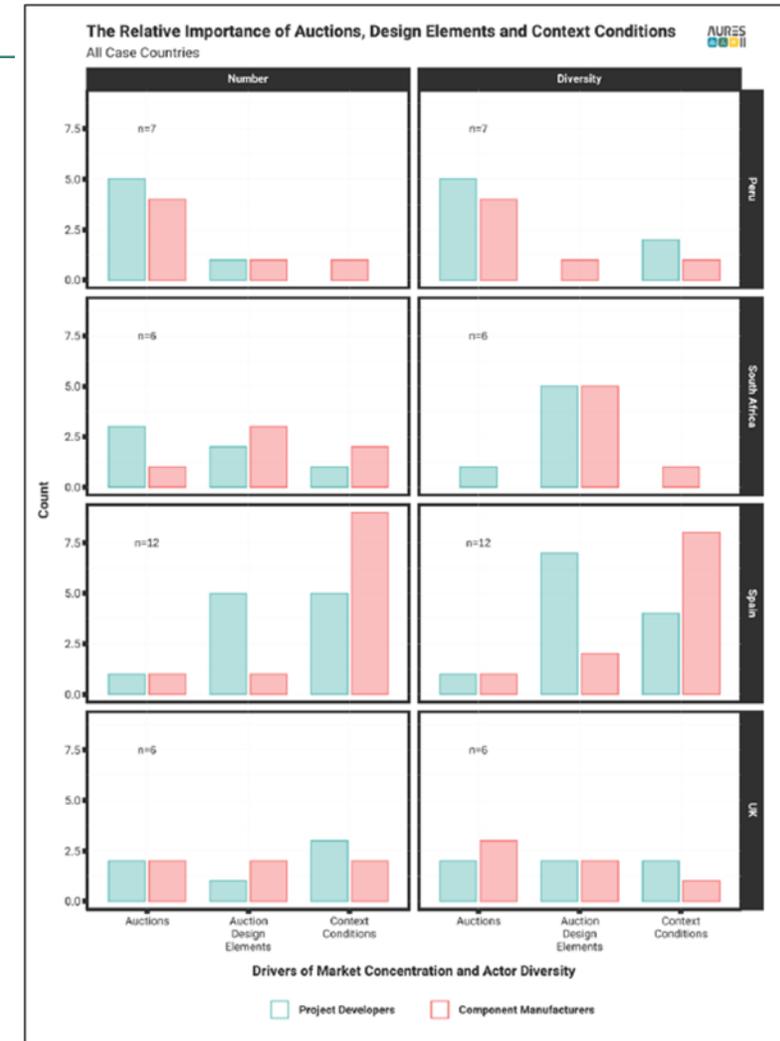


# Task 4.2. Empirical Analysis of the Impact of Auctions on the supply Chains

## Results and overall findings (IV)

### The relative importance of auctions, design elements and context conditions

- Interviewed experts held **a range diverging views** as to whether auctions, auction DEs, or context conditions, are most important in terms of shaping the number and diversity of actors in the two value chain segments of interest
- The **perceived relative importance** of auctions, as compared to specific auction DEs and context conditions, **varies considerably between countries with respect to their impact on the n° and diversity of firms.**
- Confirms the assumption that **auctions themselves are by no means the major determinant of the n° and diversity of firms in the two considered stages of the value chain.** Country-specific context (and other) factors will always also play a certain role in this regard.



# AURES



Pablo del Río

CSIC

[pablo.delrio@csic.es](mailto:pablo.delrio@csic.es)

## AURES II

Website: <http://aures2project.eu/>

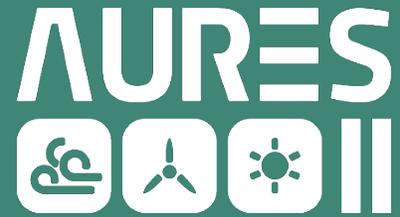
LinkedIn: AURES II

Twitter: @auctions4res

Newsletter: <http://eepurl.com/gd42zz>



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# The end of the RES auction?

scenarios and pathways outline task 7.2 findings report



AURES II has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 817619

# Defining auctions

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- It has been common to talk about RES auctions as a transitional instrument between (e.g.) FiTs and ‘unsubsidised’ renewables to be removed once prices become ‘competitive’
- But:
  - Auctions (or the outcomes) provide more than revenue support – including very substantially altering project risk profiles
  - The concept of the auction does not specify the identity of the auctioneer – it may be public, private, community, etc
  - Or what is exchanged

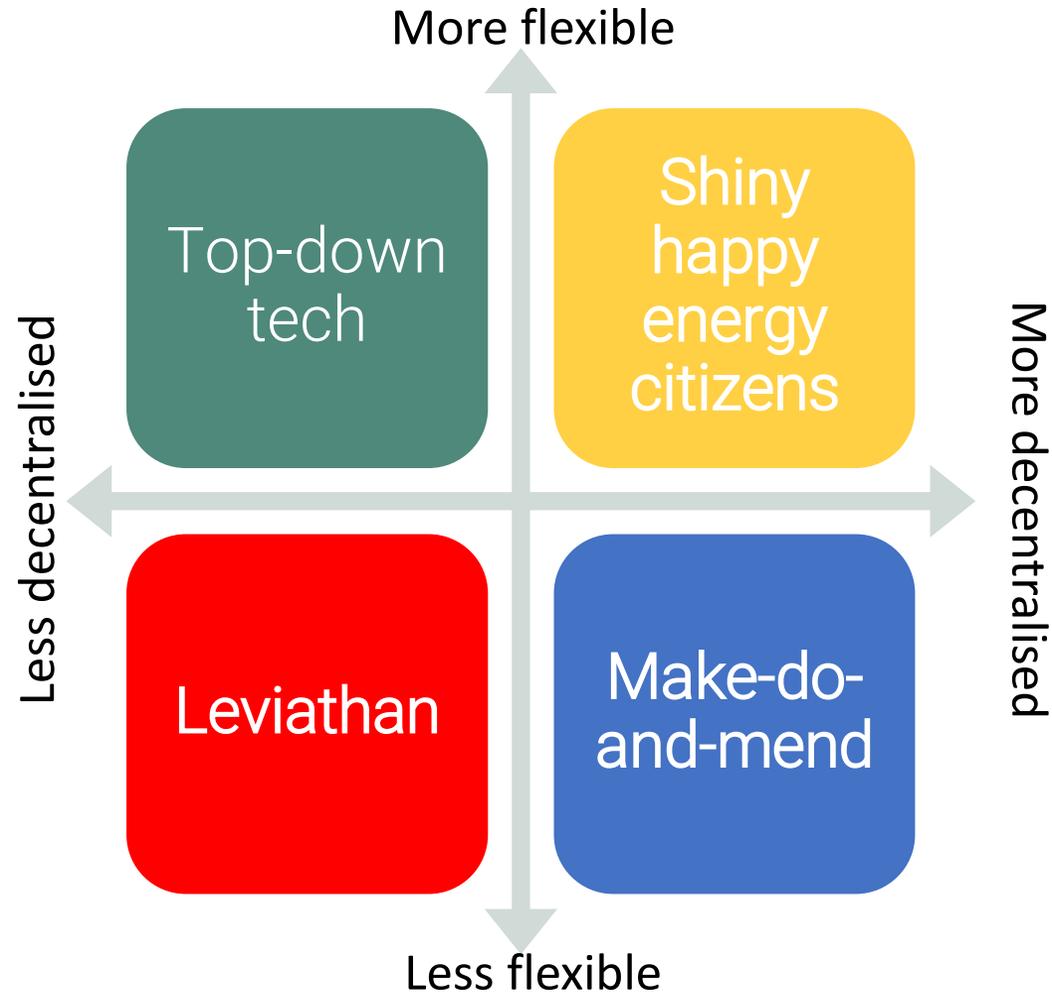
***A scarce number of an agreements giving a route to market for electricity production and allocated through a competitive, largely bid price-driven ranking process***

# Defining scenarios

---

- Research questions
  - What *could* auctions be used for in the future?
  - Who is involved?
  - And what products are being priced?
- Future role for auctions determined by technical, economic and social trends
- Routes to market: commercial and/or regulatory arrangements

# Proposed scenario framework



# Future routes to market

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- Public RES auction guaranteeing supplements to private revenues
- Corporate or community PPA
- Return of the feed-in tariff
- Merchant contracting

# Boundary conditions

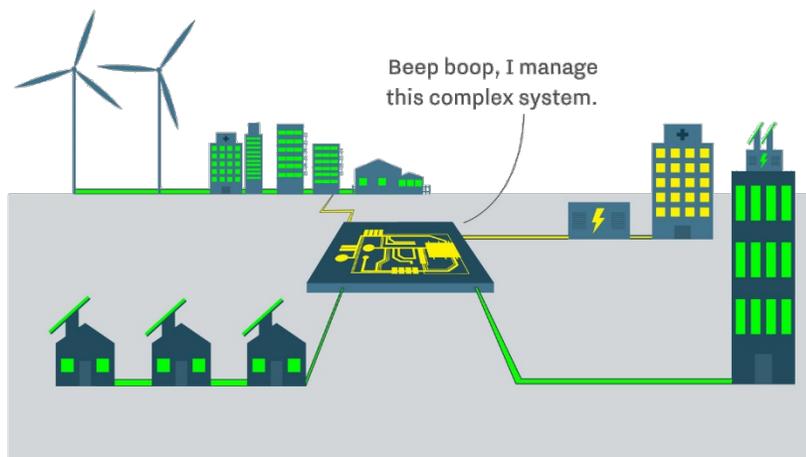
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- All scenarios meet EU decarbonisation goals for 2050
- RES auctions for electricity production as the main focus

# Shiny happy energy citizens

## High flexibility, high decentralisation:

- Local governance
- Active distribution system management
- Greater demand-side response
- Accurate valuation of system services
- RES-compatible, local markets
- Broad participation (actor diversity)



## RES auctions

- Private and public procurement
- Auctions held by diverse range of actors at numerous governance levels
- Regulatory input to manage (inter alia) network impacts, actor diversity

# Top-down tech

## High flexibility, low decentralisation:

- National or transnational governance
- Active transmission system management
- Greater demand-side response
- Accurate valuation of system services
- Large role for technology companies
- RES-compatible, national or trans-national markets
- Incumbent firms dominate



## RES auctions

- Private procurement rather than public support (of a range of products)
- Auctions held by major consuming industries or utilities
- Public-good design input (e.g.) actor diversity likely absent from auctions

# Make-do-and-mend

## Low flexibility, high decentralisation

- Local governance
- More passive, but locally planned networks
- Less demand-side response but strong incentives to reduce demand through EE
- Poor valuation of system services
- Local markets
- Broad participation (actor diversity)



## RES auctions:

- Little central procurement/support
- Local and community-scale actors playing a significant role, primarily on the demand-side
- But possibly procuring energy through 'community' PPAs

# Leviathan

## Low flexibility, low decentralisation

- National or transnational governance
- More passive, centralised networks
- Less demand-side response
- Poor valuation of system services
- National or trans-national wholesale markets
- Incumbent firms dominate



## RES auctions:

- High risk environment for independent producers
- Regulated PPA offers from incumbent utilities
- In extremis, public FiTs required to fulfil obligations

# The end of the RES auction?

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- Auctions (in some form) are likely to remain an important part of the RESe landscape for the foreseeable future

## **Next steps:**

- Further validation of the framework until publication end October 2020

<https://exeter.onlinesurveys.ac.uk/scenarios-for-the-future-of-res-auctions>

- Future directions
  - Modelling some of the implications of the scenarios
  - Closer look at PPA innovation
  - Possible expansion towards non-RESe auctions



Oscar Fitch-Roy  
University of Exeter  
o.fitch-roy@exeter.ac.uk

## AURES II

Website: <http://aures2project.eu/>  
LinkedIn: AURES II  
Twitter: @auctions4res  
Newsletter: <http://eepurl.com/gd42zz>



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# Cross border auctions

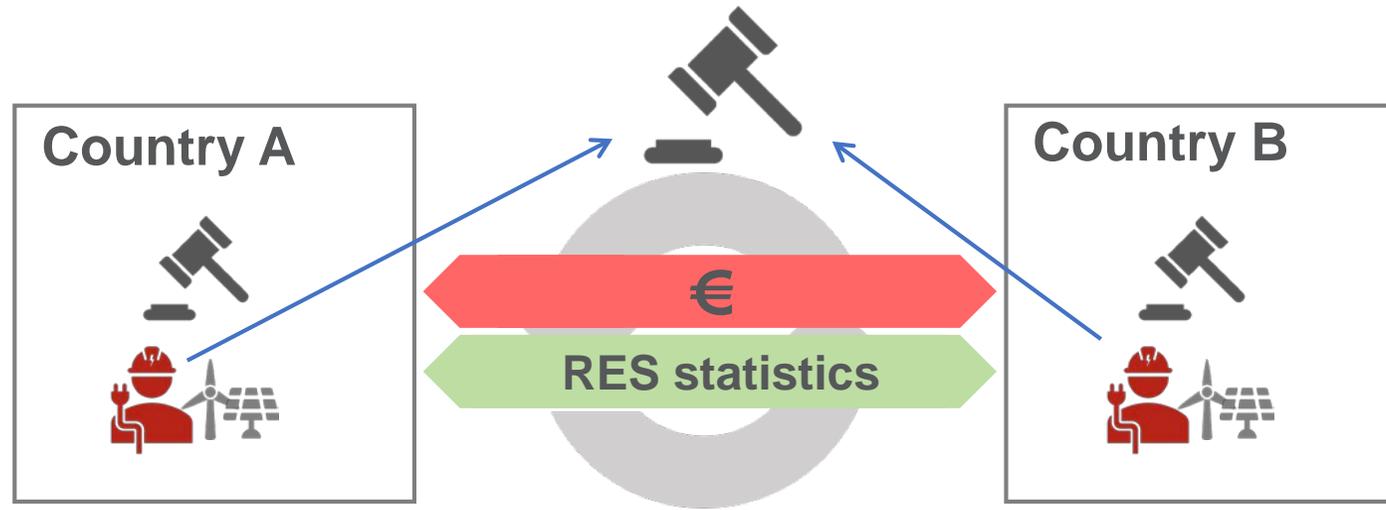
Felix von Blücher



5<sup>th</sup> AURES II Regional Workshop, 23 October 2020



# What are cross-border auctions?



## Cross-border auctions are characterized by:

- being open for participation of projects from more than one country
- creating competition between project developers from different countries
- resulting in cross-border flow of support payments and RES statistics

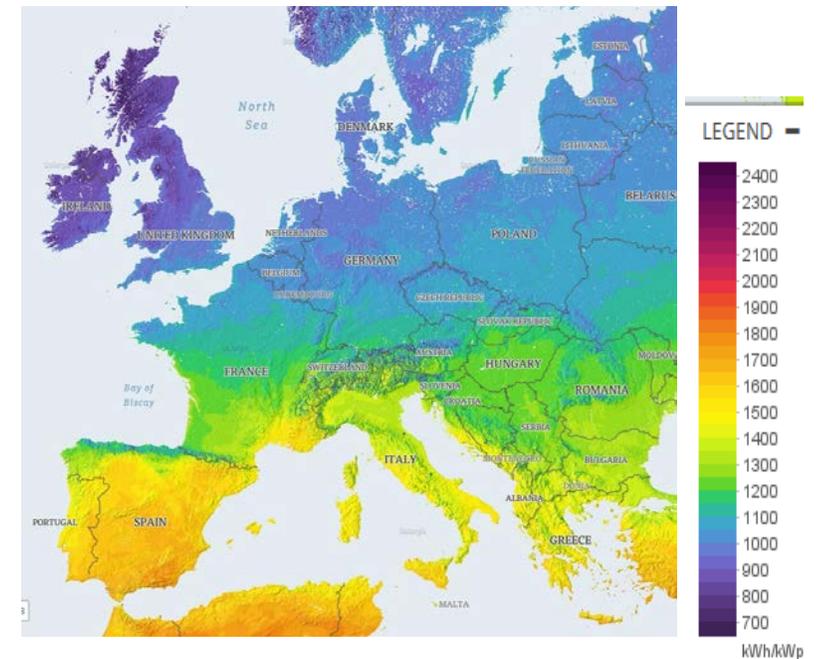
# Rationale of cross-border auctions

1. Potential to significantly **reduce support payments** by deploying RES in areas with:

- Better natural resource potential
- Higher market values
- Lower cost of capital

2. **Increase competition:** countries may use x-border auctions to increase competition in their domestic scheme

3. **Transfer of knowledge** and testing different design



# Why are international auctions an emerging topic?

- **NOW: State aid:** requires schemes to be open in principle, currently following Member States has opening obligations: DE, LU, ES, EE, RO, EL, IT, PT, BE, HU
- **FUTURE: RED II, Article 5:** Voluntary opening of national schemes ( $\geq 5\%$  in 2023-26; afterwards 10%); potentially binding as of 2025
- Two **additional EU instruments** to incentivize cross-border cooperation:



**New funding line under future CEF:** for “cross-border renewables projects” → available grants (~ 1.2€ billion 2020 - 2027)



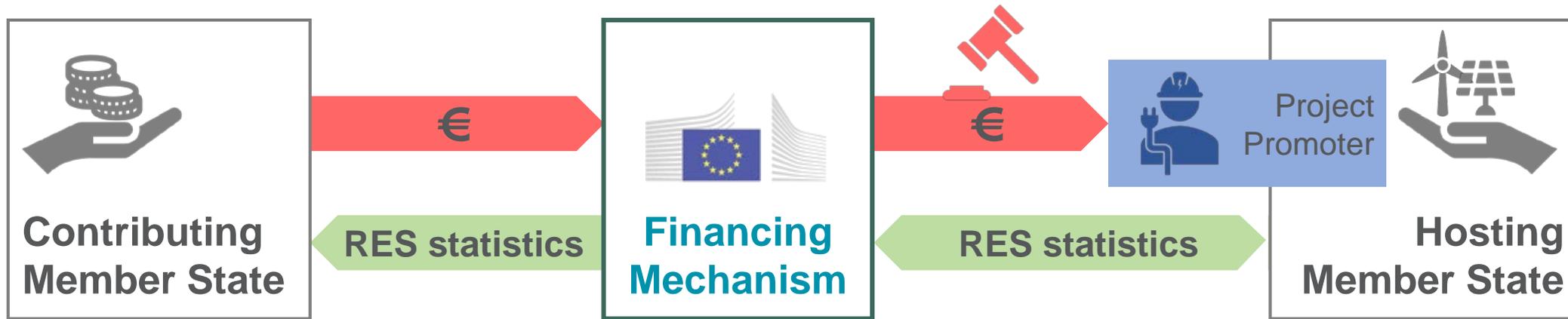
**2030 RES governance:** “Financing Mechanism” (gap-filler) may trigger EU wide RES auctions



Countries with opening obligations

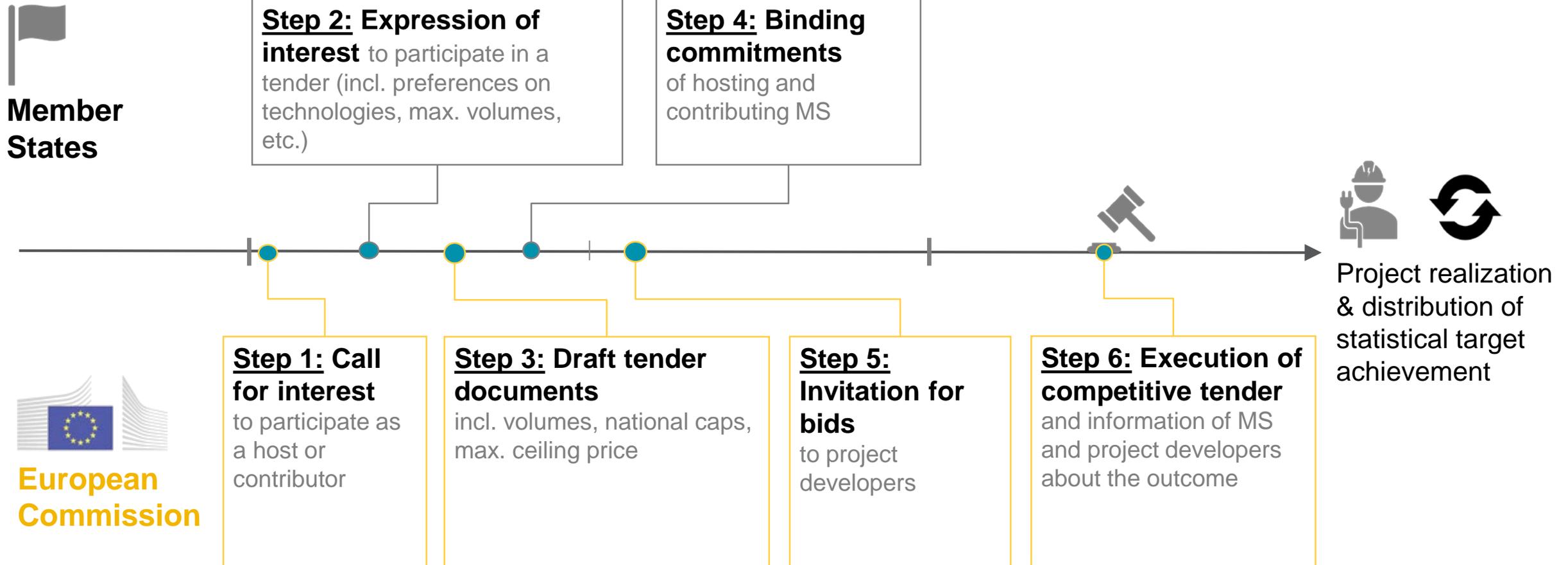
# Case study: Auction of the EU Financing Mechanism

A new option to cost-effectively deploy renewables



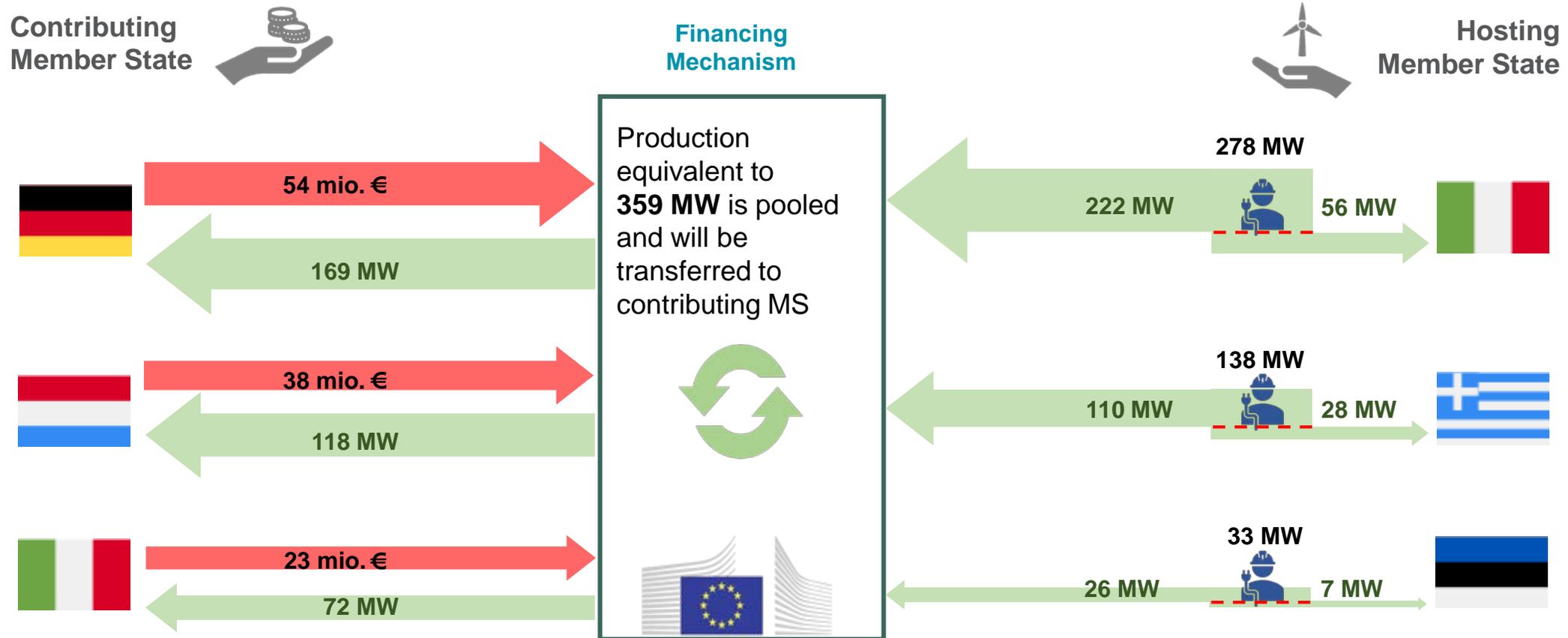
- ➔ **Participation is voluntary** for contributing and hosting MS.
- ➔ Mechanism focusses on **new RES projects** and thus results in **continuous generation** of statistical benefits.
- ➔ **Support payments** are borne entirely by contributing MS.
- ➔ **Contributors** receive statistical RES target contribution. Some RES statistics remain with the **hosting MS**.

# Focus of case study: Process of setting-up a tender based on Member States' input



# Illustrative outcome of a wind onshore auction

- 449 MW awarded volume
- Weighted average bid price is **256 €/kW**





Felix von Blücher:

[Felix.von.bluecher@guidehouse.com](mailto:Felix.von.bluecher@guidehouse.com)

## **AURES II**

Website: <http://aures2project.eu/>

LinkedIn: AURES II

Twitter: @auctions4res

Newsletter: <http://eepurl.com/gd42zz>



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# AURES – II: Case studies – preliminary results

László Szabó  
REKK

5th AURES II Regional Workshop, 23 October, 2020



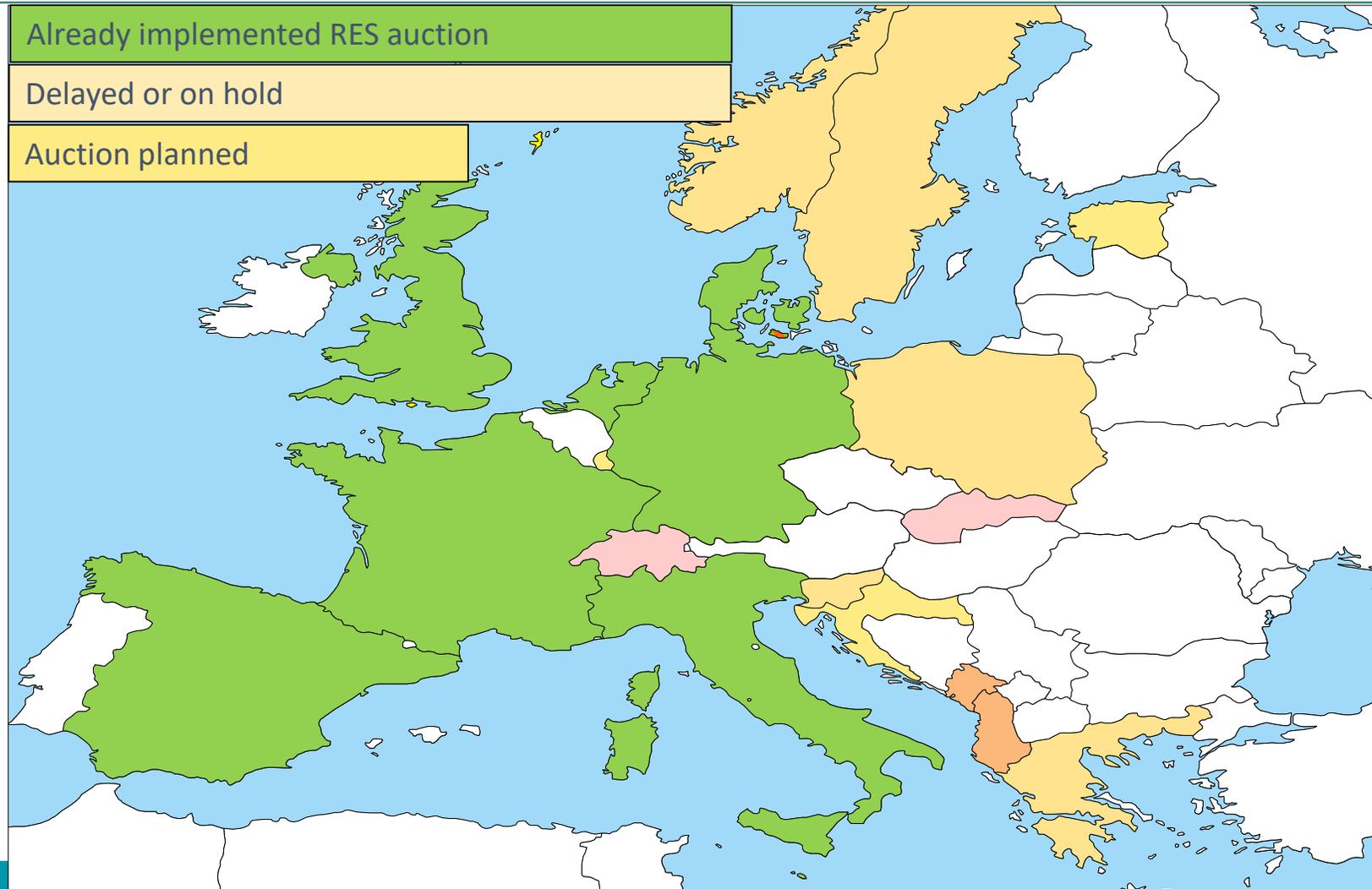
# Outline

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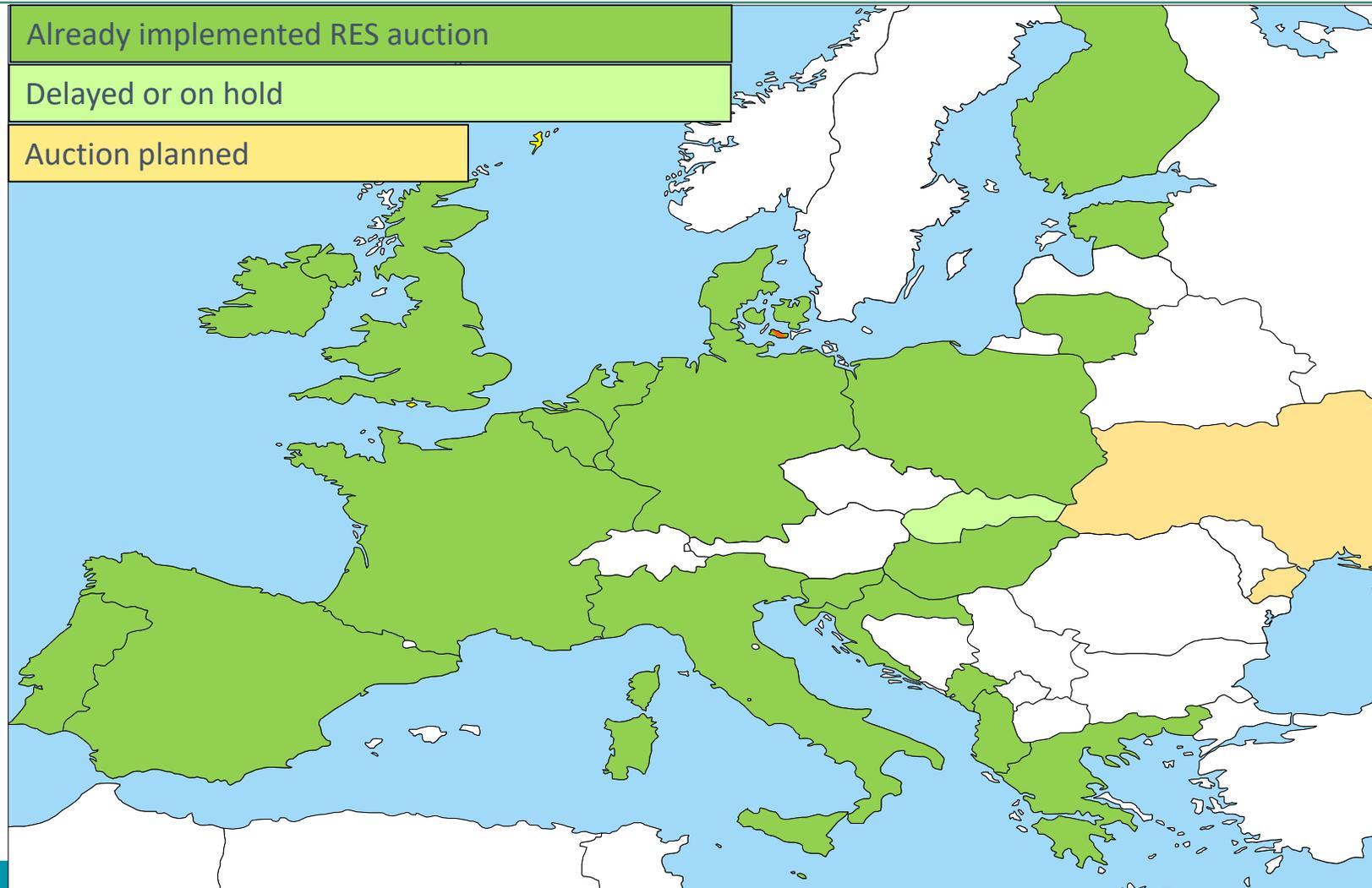


- State of renewable auctions in the EU
- General trends based on the AURES II case studies
- Design of auctions
- New approaches/new developments

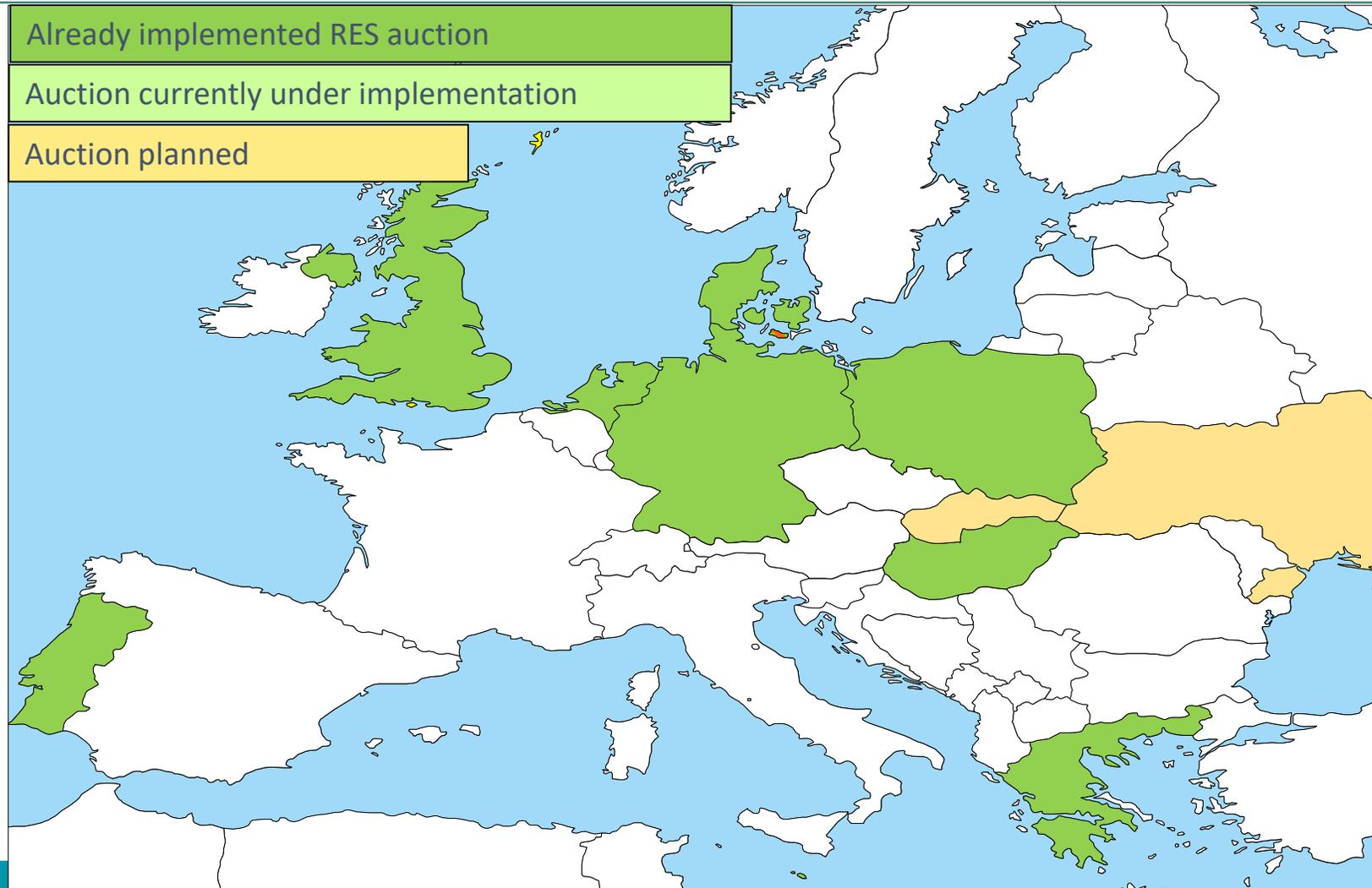
# State of auctions – at finalising AURES I case studies (2016)



# State of auctions – 2020



# State of auctions – case studies covered in AURES II in the EU



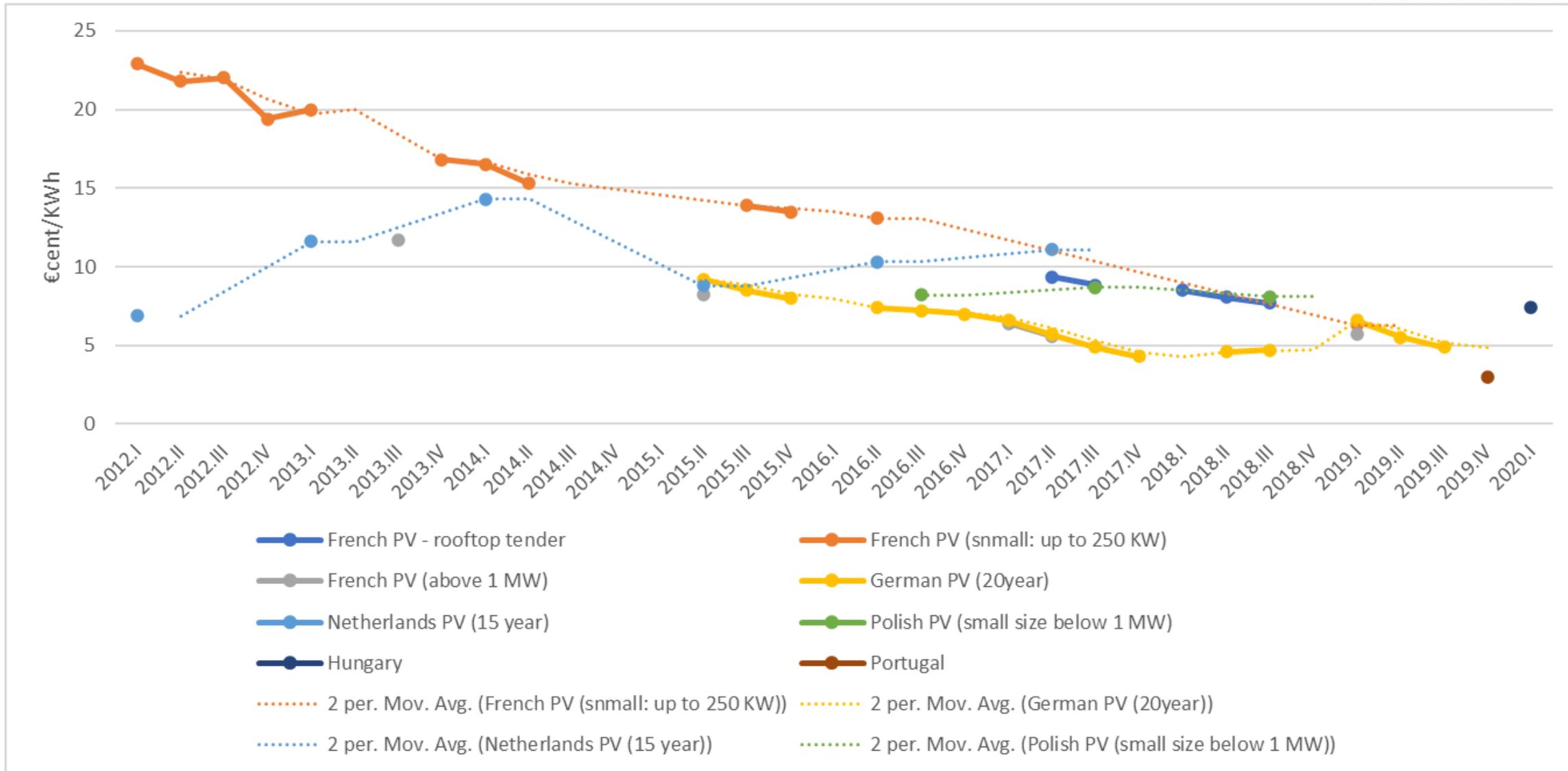
# Trends

- Wider range of countries participate since the last assessment (2016)
- Learning effects and regionalisation are observable:
  - Many countries adapt design elements from more advanced auctions, and also regions (e.g. countries in CEE) start to learn from each other in the design
  - Central Eastern Europe (CEE) catches up: Slovenia, Poland, Hungary had more rounds of auctions already, Croatia started its auction and Slovakia postponed it.

## General price trends:

- Auction prices (in PV and wind) showed a general decreasing trend, but the last three-year development is ambiguous, mainly in wind (but also in some PV auctions) prices stabilize or increase
- CEE auctions already brought significant price reductions compared to the previous administrative Feed-in tariff (FIT) levels
- Big question if the CEE countries would observe similar decreasing trends in prices, as observed in the western countries.

# PV auction prices in Europe 2012-2020



# Design

- Learning and some harmonization are observable:
  - Remuneration scheme: generally floating premium, but choice between one sided or two sided premium (CfD) varies
- Pre-qualification criteria: still various approaches, conversion between financial vs material pre-qualifications; varying level of bid-bon and performance bond levels
- Realisation rates:
  - Still limited information available – without such information efficiency and effectiveness of the auctions is difficult to analyse
  - Governments should place higher emphasize and effort on tracking and reporting realisation rates (reliable realisation rate information is available for five countries)
- Many countries' auctions move away from technology specific auctions (overall auction design or trials): e.g. Germany, Denmark, but it is a question if wide-spread application of multi-technology auctions will come as a general design in the future

# New approaches/new developments



- Postponed RES support schemes for a long period, or changes in them (e.g. from FIT to FIP based auctions) have significant impact on participation rates:
  - Rush effect for the ,old' system
  - ,Many projects in pipeline' effect – results in strong competition in the first auctions
  - But big question on the longer term effects
- Some countries show the sign of grid access problems (limitations): e.g. CEE countries and Portugal

## New directions:

- The Netherlands: planned auctions, where carbon impact will be auctioned instead of generated energy – still in a planning phase
- Germany: Innovation auction with fixed premium and bundled technologies



László Szabó

REKK

Laszlo.szabo@rekk.hu

## AURES II

Website: <http://aures2project.eu/>

LinkedIn: AURES II

Twitter: @auctions4res

Newsletter: <http://eepurl.com/gd42zz>



AURES has received funds for the years 2018-2021 from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 817629

# Trends and evolution of the Costs of Capital in RE Financing

Agustin Roth – [ar@eclareon.com](mailto:ar@eclareon.com)

October 2020

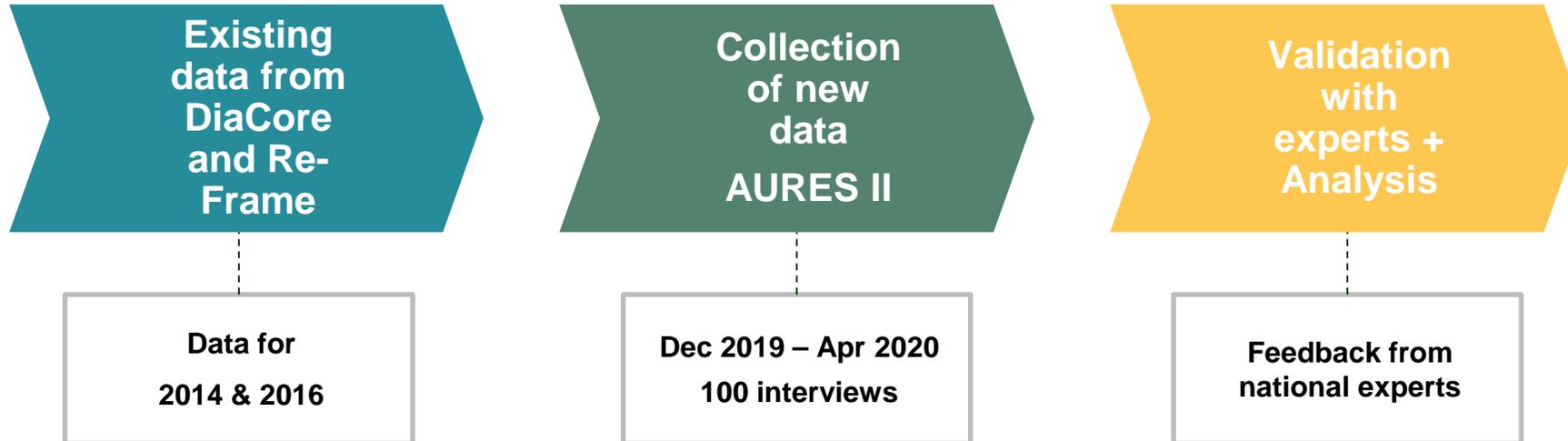
# Agenda

- 1. Weighted Average Cost of Capital**
- 2. Main results: 2019 & over time development**
- 3. Conclusions**

# Main highlights

- **Strong decrease of the Costs of Capital (WACC), Cost of Debt, and Cost of Equity**
- **Main drivers of change:**
  - **country risks & new business cases**
  - **monetary policy (interest rates)**
  - **Spill-over effects**
- **Lower Costs of Capital are a positive sign for a further RE development and to reach energy and climate goals**

# Introduction

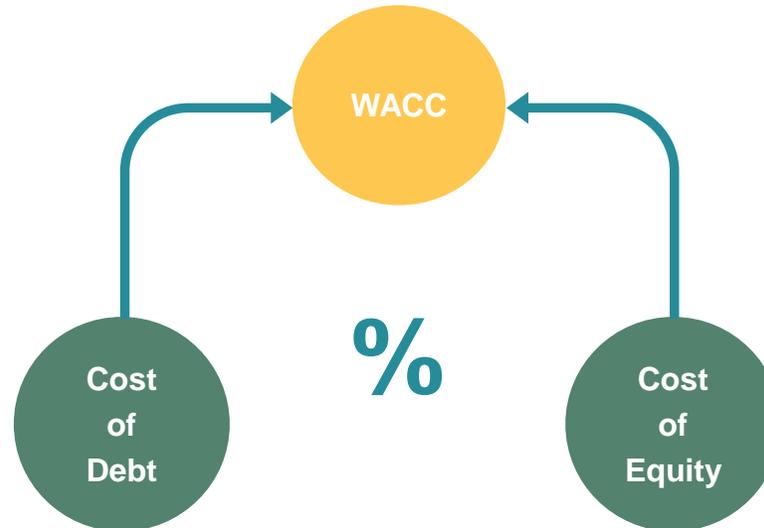


## Some caveats:

- Constant **changes** of RES market conditions
- Different level of **transparency** of market actors
- **Lack of current, significant projects** in some EU markets, made sometimes model estimations necessary

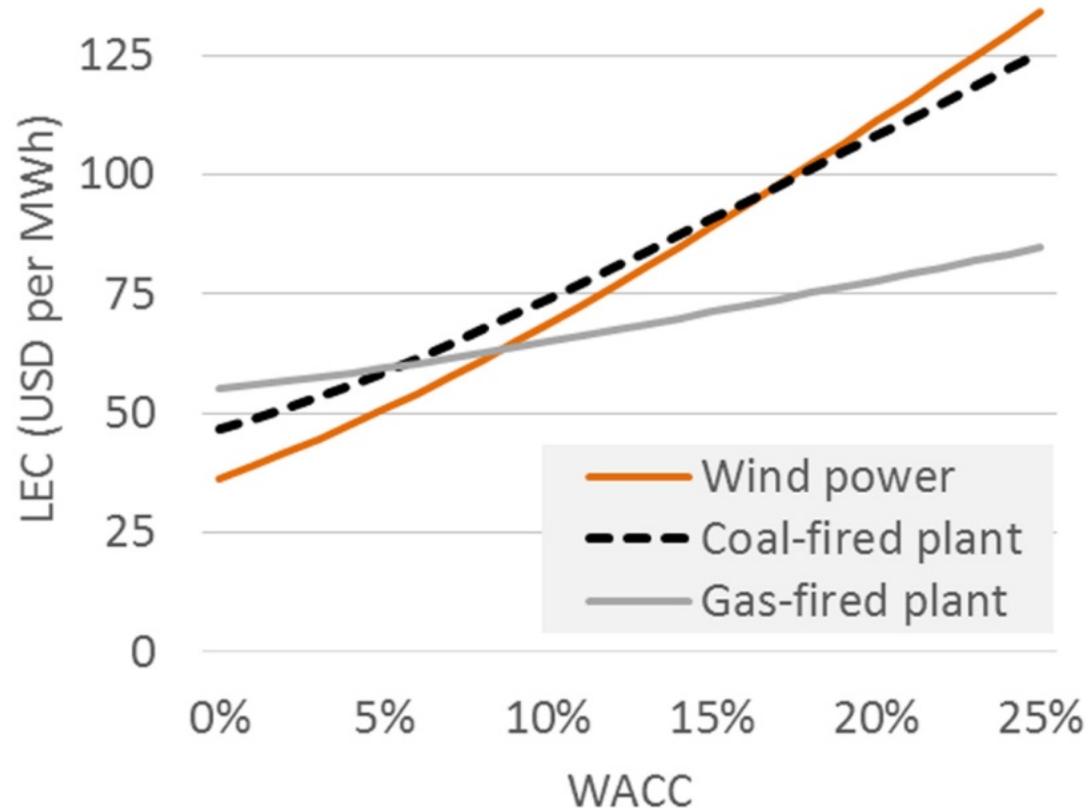
# Introduction

What is “Weighted Average Cost of Capital”?



# Introduction

Why should we care about it?



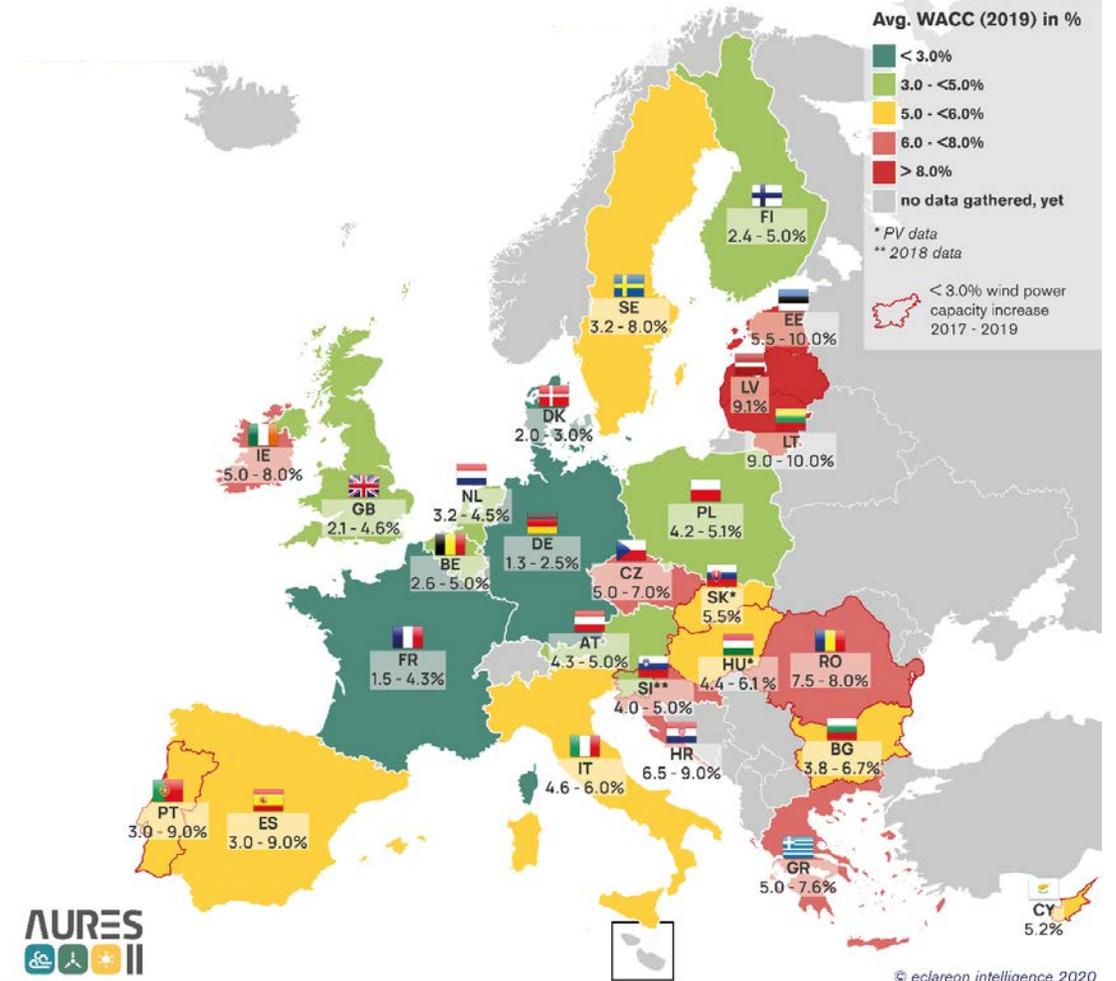
Costs of producing electricity are affected by WACC

Wind power is the cheapest and most cost-effective power source for a low WACC

Source: Hirth & Steckel (2016)

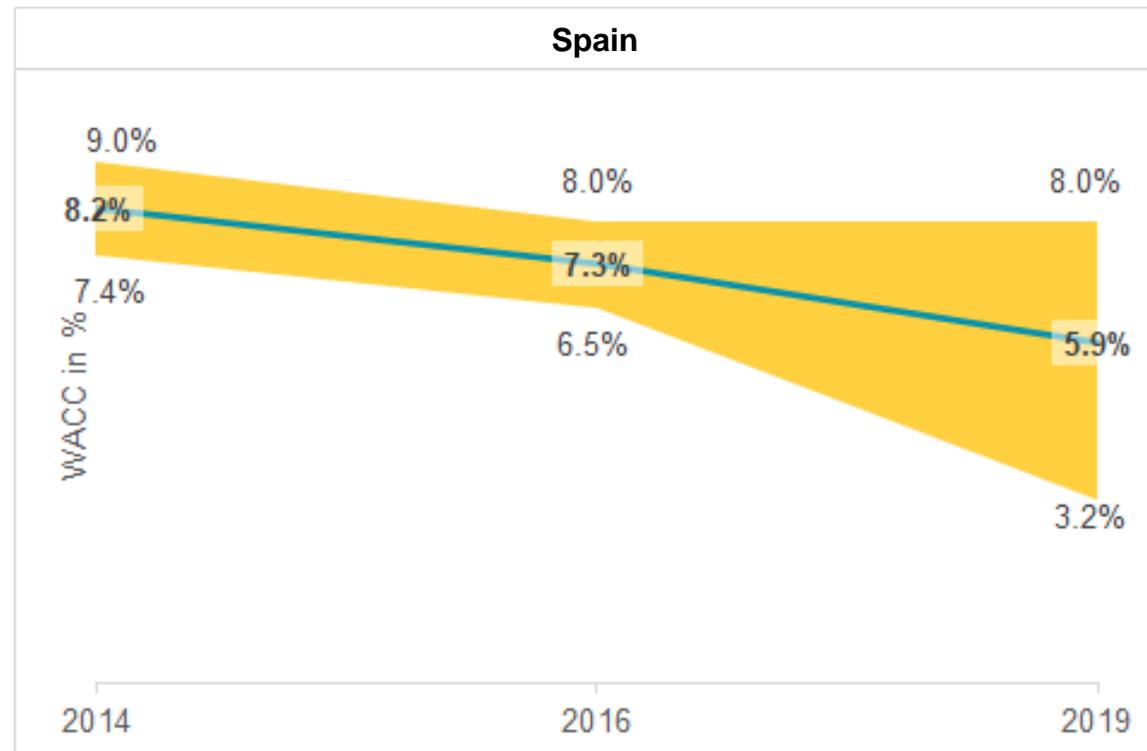
# WACC 2019 – Wind Onshore

Results show there is still a gap between Member States



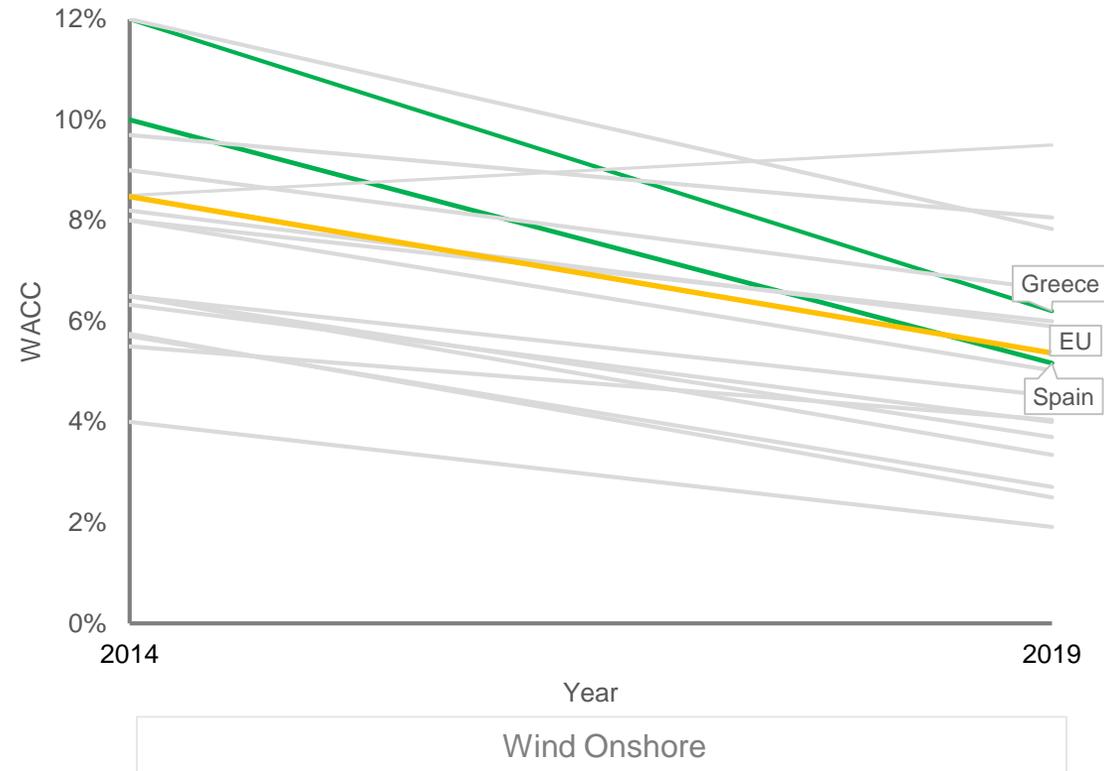
# Closer look: WACC Spread

Different business models and market players could be drivers behind the spread



# WACC Development 2014-2019

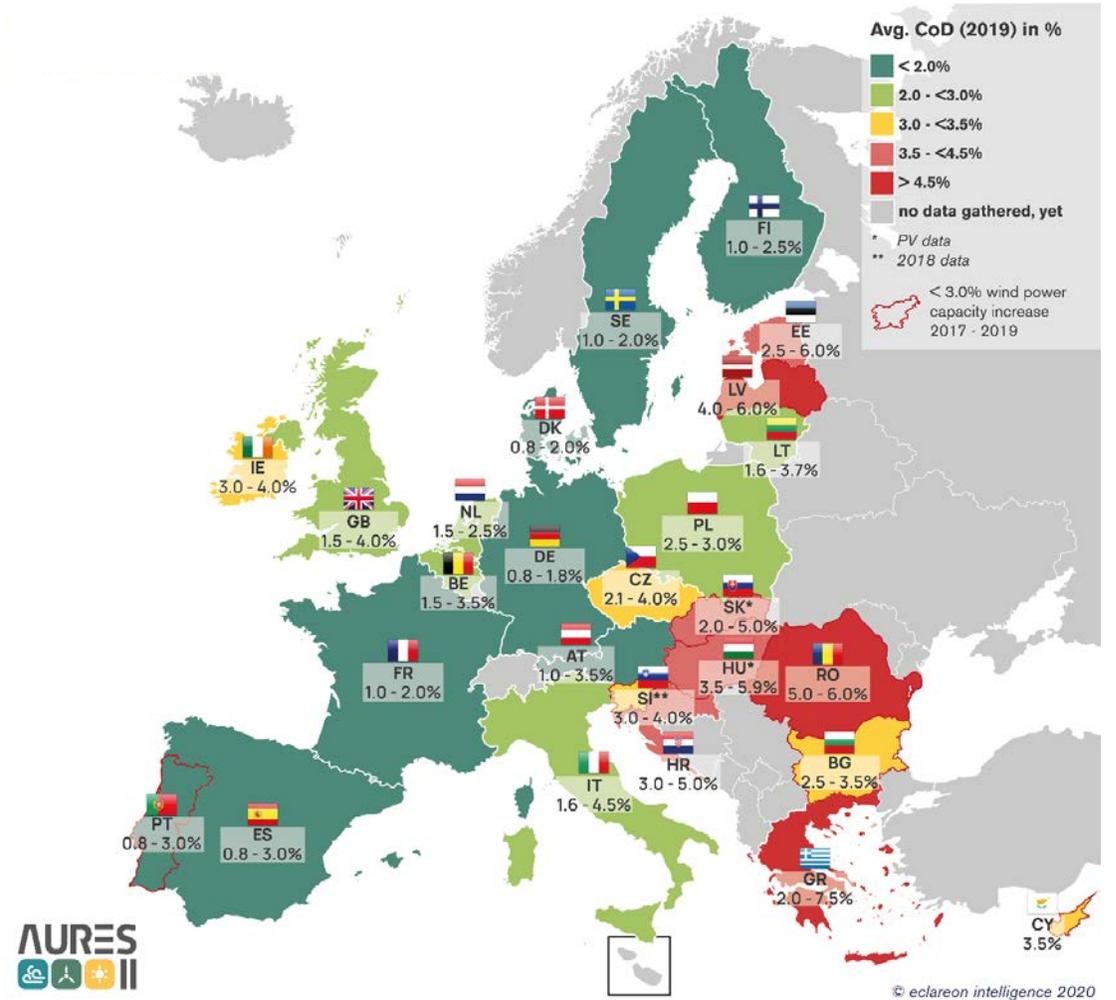
**Dramatic WACC decrease in most countries and the gap is narrowing**



Wind Onshore

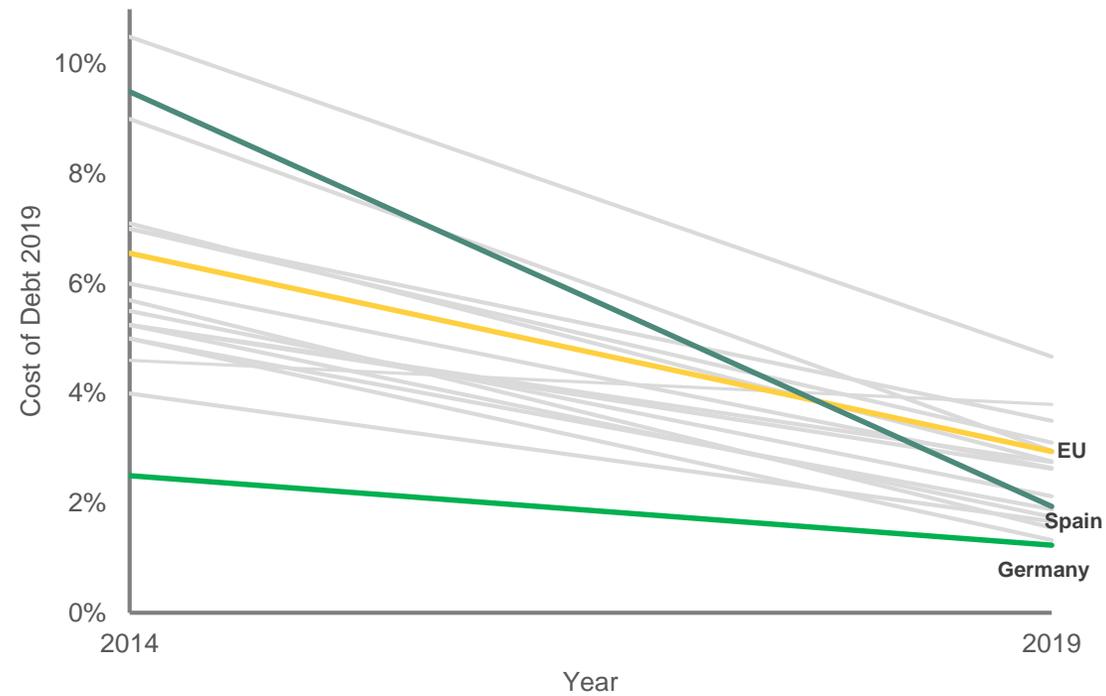
# Cost of Debt 2019

Many countries with an average CoD lower than 2%



# CoD Development 2014-2019

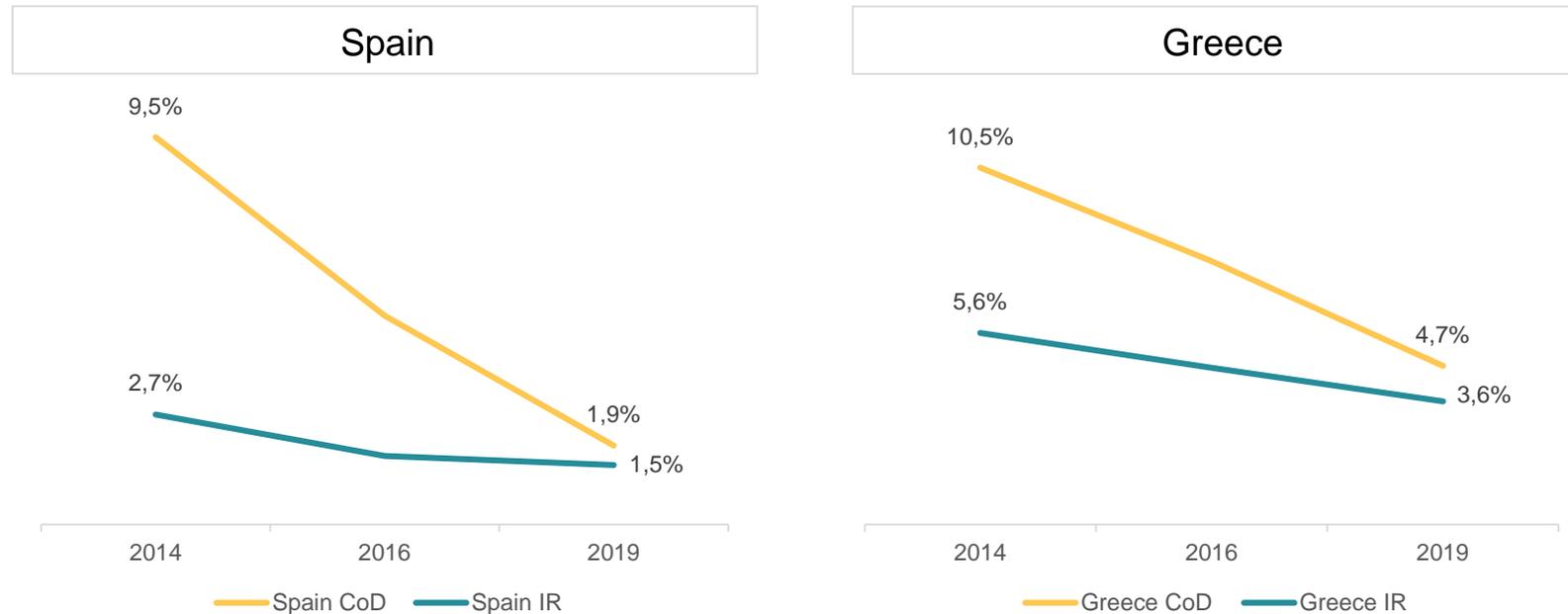
**Strong decrease of the Cost of Debt in all the EU**



Wind Onshore

# CoD Development 2014-2019

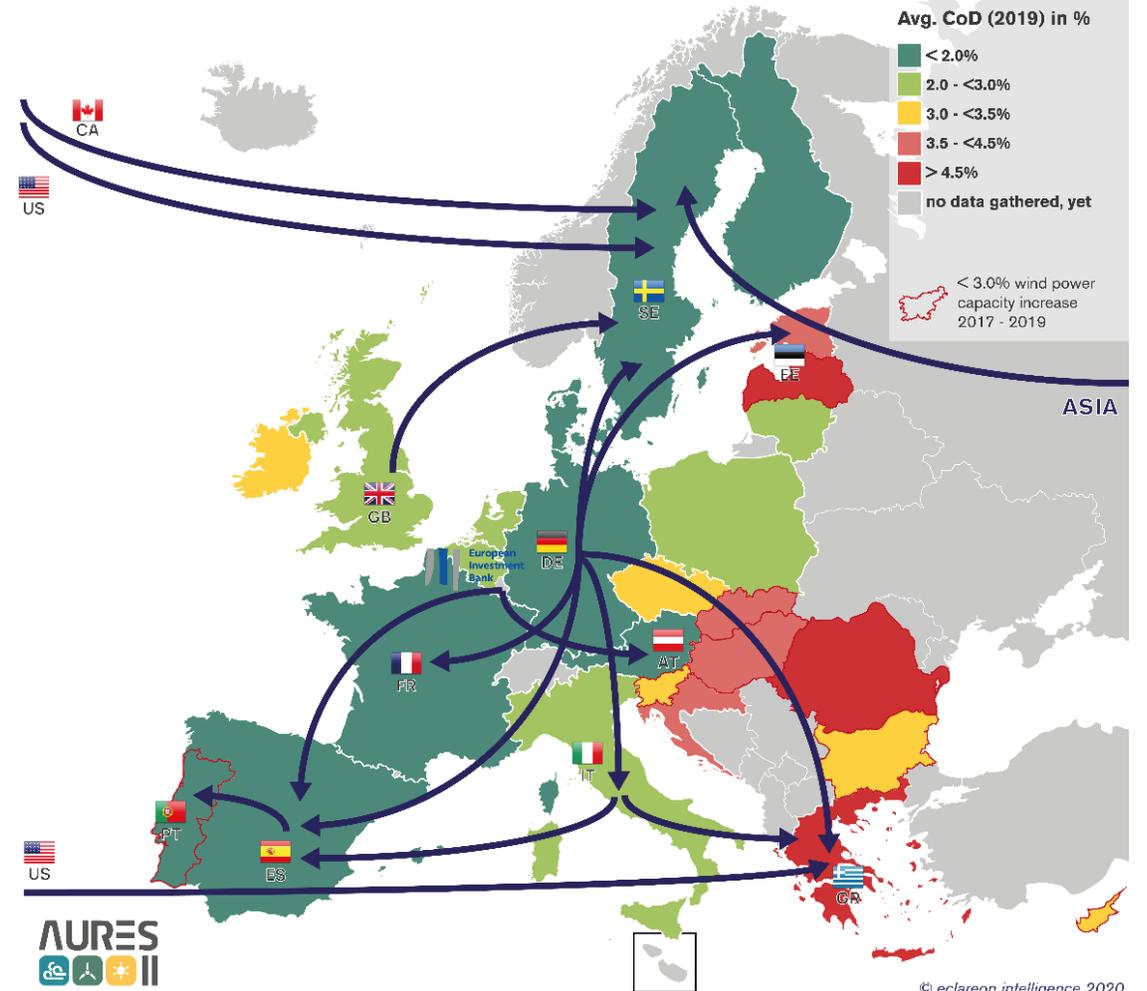
## Correlation between CoD and Interest Rates in the Eurozone €



Wind Onshore

# CoD Development 2014-2019

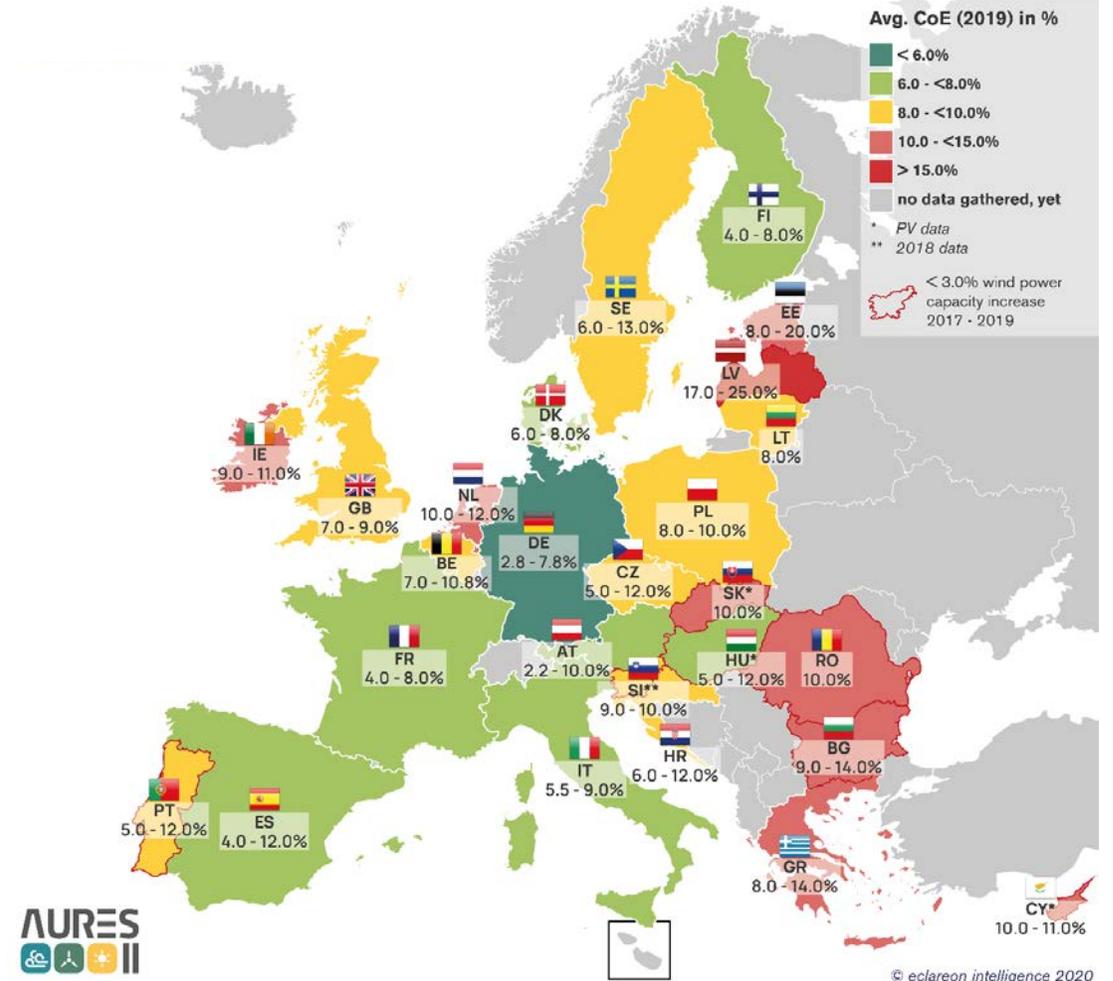
International flow  
of capital



# Cost of Equity 2019

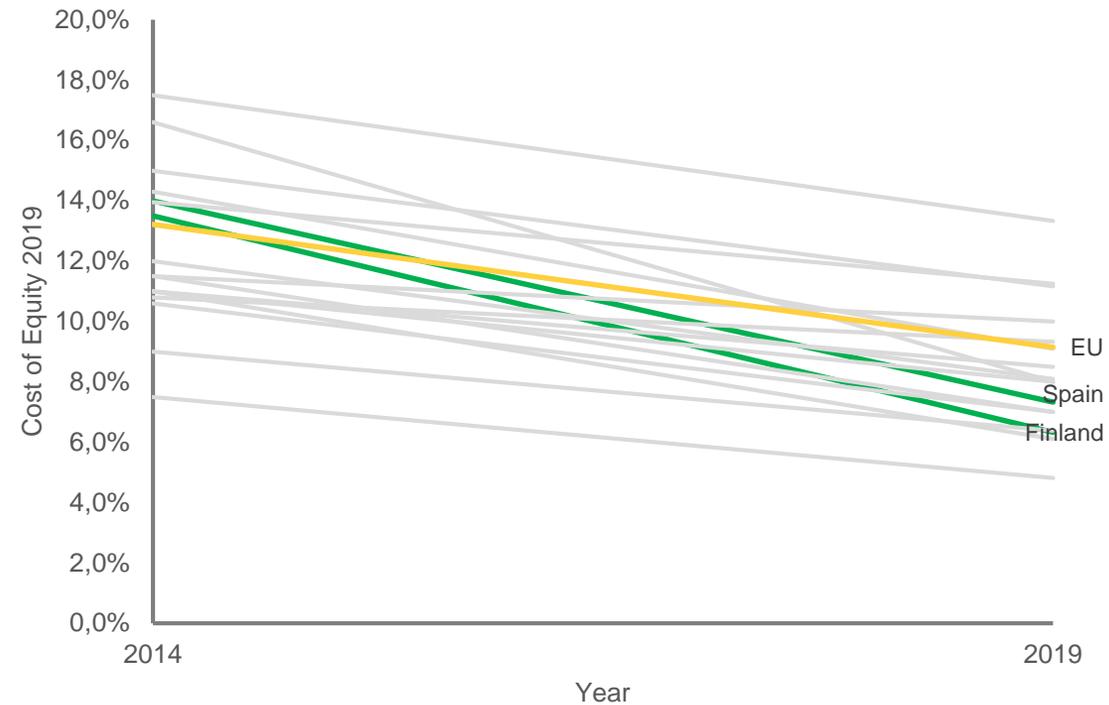
65% of countries with a CoE lower than 10%

Riskier countries = higher CoE



# CoE Development 2014-2019

New market players interested in *greening* their portfolios

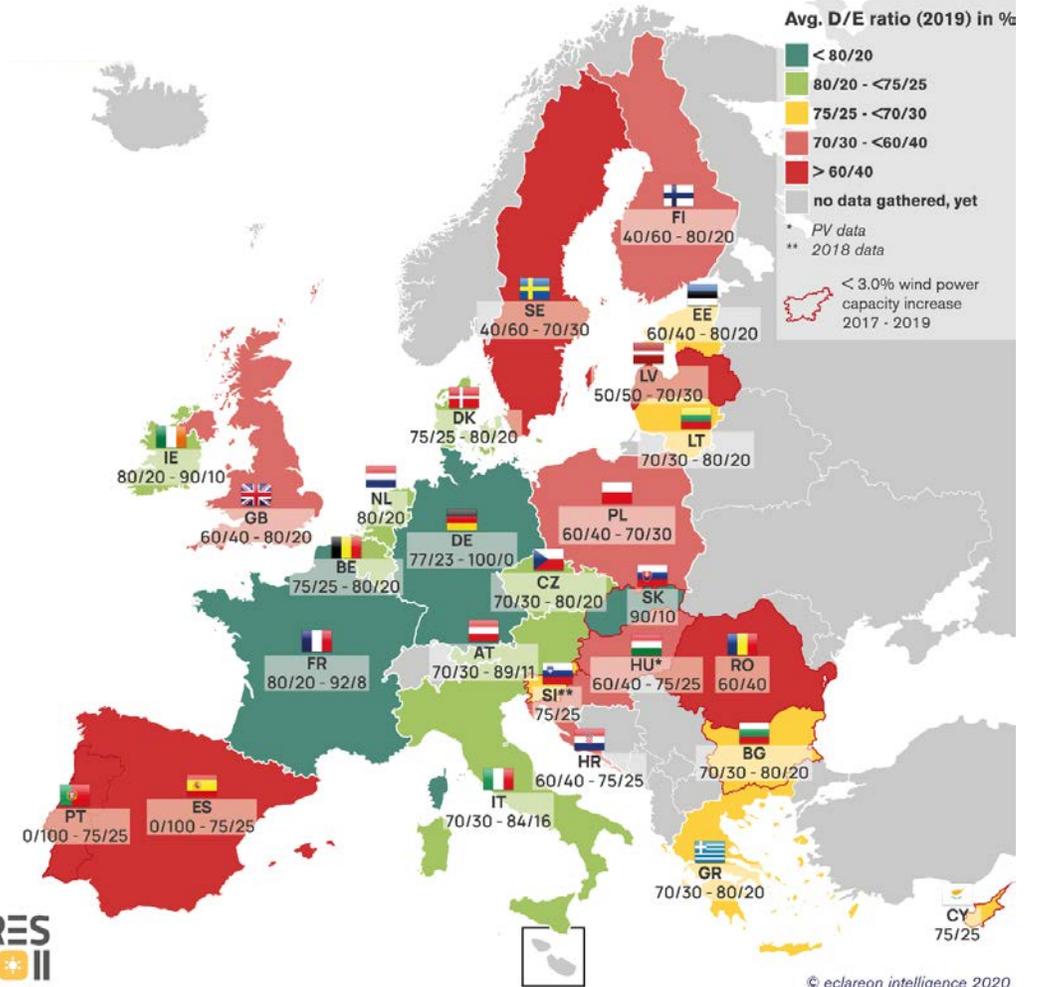


Wind Onshore

# Debt to Equity ratio 2019

Wide gap between countries

Riskier countries = reduced debt leverage capacity



# Conclusions

- **Dramatic decrease of the WACC, CoD, and CoE**
- **CoD: huge role of interest rates and international capital spill-overs**  
**CoE: emergence of new investors with different interests and business models**
- **Lower Costs of Capital are a positive sign for a further RE development and to reach energy and climate goals**

**Thank you!**

# Disclaimer

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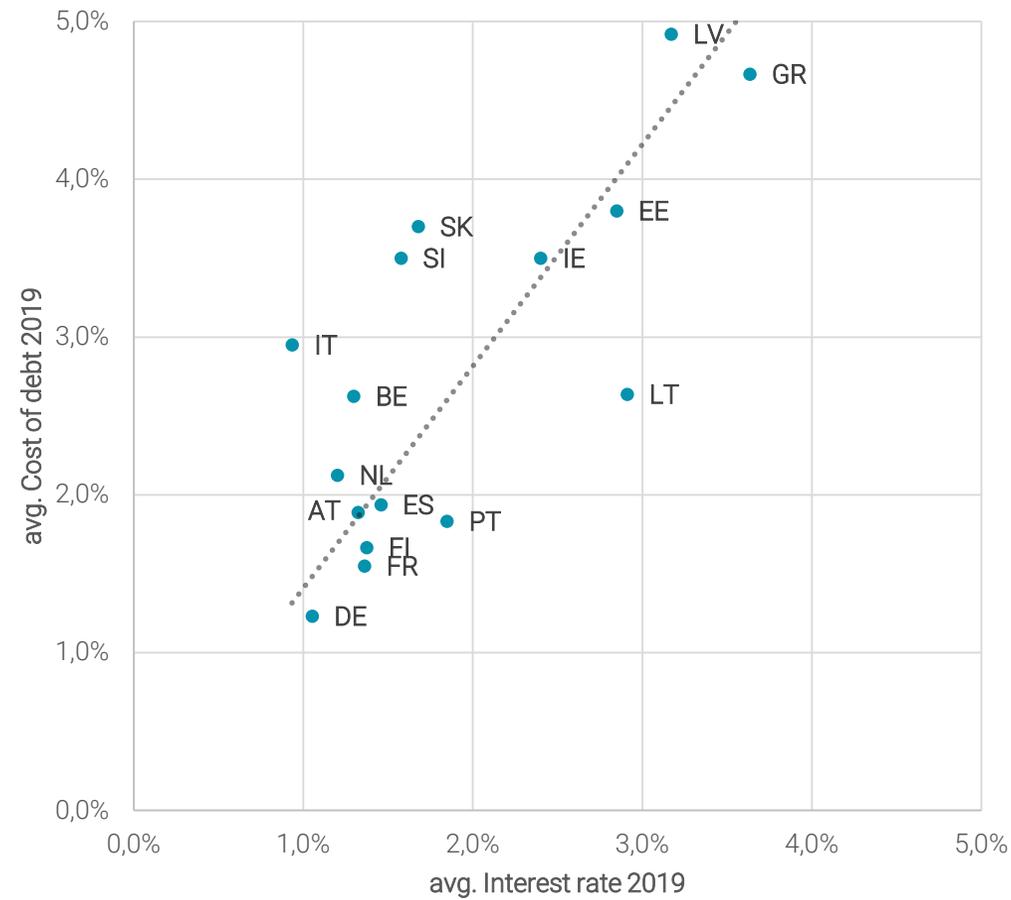
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# Correlation between Interest Rates and Cost of Debt



# Methodology

## Existing data

- Estimations of **costs of capital of wind onshore-investments** from DIA Core Project
- Comprehensive interview series with financial experts
- Evaluation of development of parameters

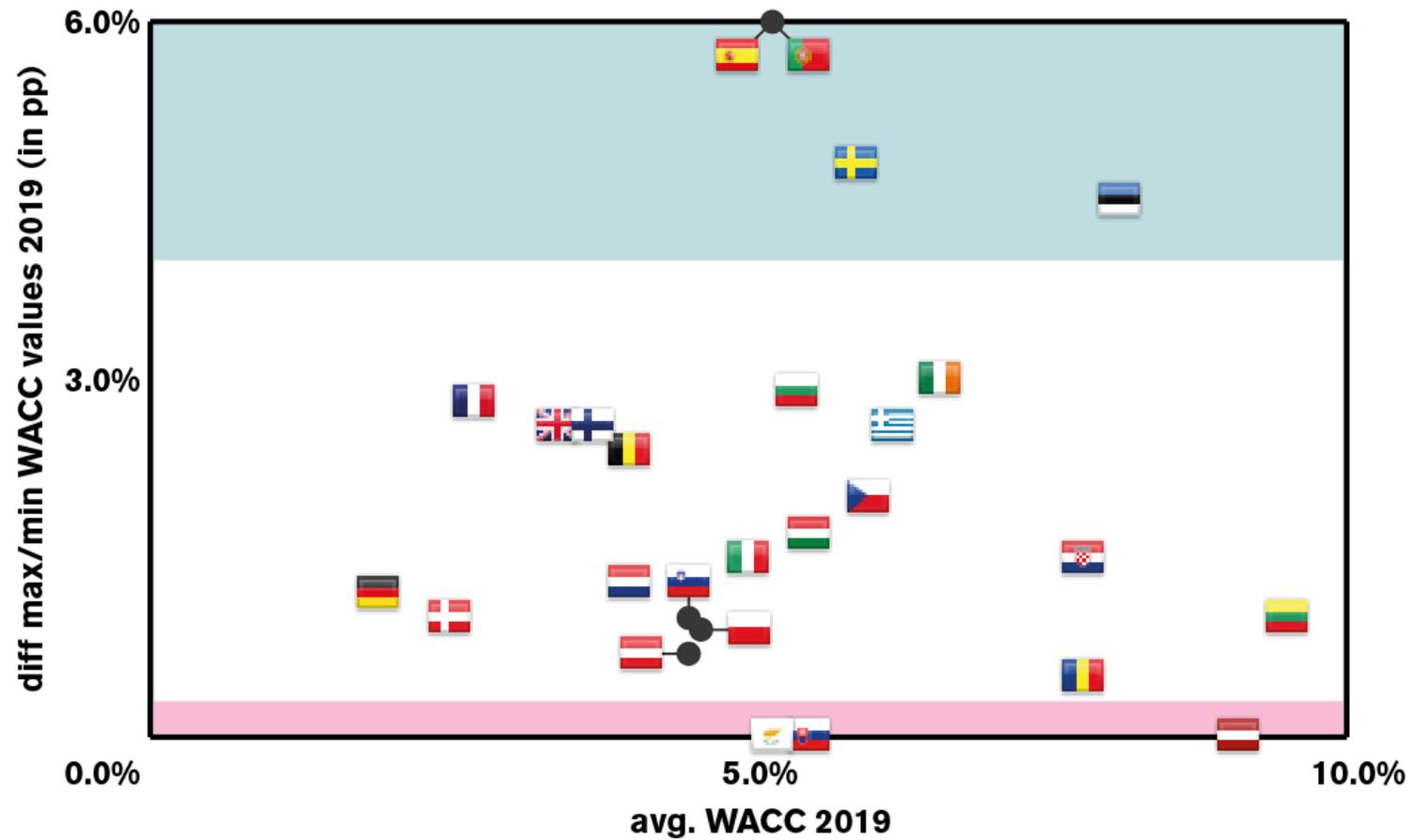
## Analysis

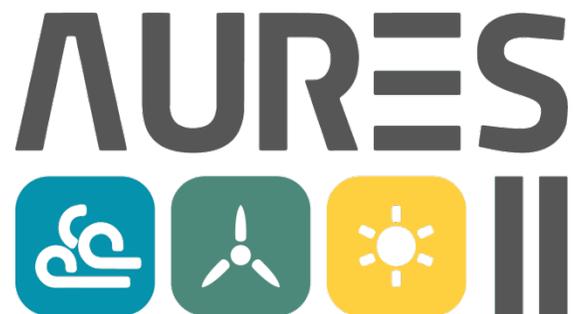
- Comparison with **interest rates for loans from other sectors in EURO zone**
- Description of trends

## Results

- Aggregation and visualization of meta data
- Presentation of results and **feedback from national experts**
- Preparation of deliverables: project presentation & database

# WACC Spread 2019





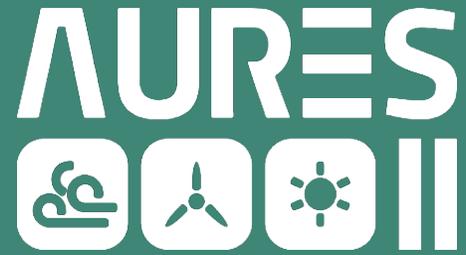
Agustin Roth  
Eclareon GmbH  
ar@eclareon.com

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# Multi-technology auctions and technological bias

Preview

5<sup>th</sup> Regional Workshop, virtual, 23 October 2020

# One topic - two reports

---

- Increasing number of multi-technology auctions in Europe
    - Demanded by EU COM and State Aid Guidelines
  - Important (future) trend in the landscape of RES auctions
  - Several challenges
    - Which technologies should be included?
    - How do multi-technology auctions perform?
    - Can/should we offer a level-playing field (e.g. realisation period, penalties, etc.)
    - How are they designed?
- ➔ D8.1 Report on technology biases in technology-neutral auctions
- ➔ **D7.2 Report on multi-technology auctions**

# Report on multi-technology auctions

## D7.2 Report on multi-technology auctions – end of November 2020:

- Establish exact **terminology** for auctions with more than one participating technology (multi-technology, technology-basket, technology-neutral, etc.), incl. technology-openness scale
- Overview of design elements, auction outcomes and broad analysis of multi-technology auctions in the EU
- Two-three brief case studies:
  - PJM, Brooklyn Queens Demand Management Program (US): renewables+DSM
  - SDE++ (Netherlands): CO2-savings
  - India: hybrid auction
  - Denmark: multi-technology auction (incl. hybrids)
  - Germany: innovation auctions



Vasilios Anatolitis

Fraunhofer ISI

[vasilios.anatolitis@isi.fraunhofer.de](mailto:vasilios.anatolitis@isi.fraunhofer.de)

## AURES II

Website: <http://aures2project.eu/>

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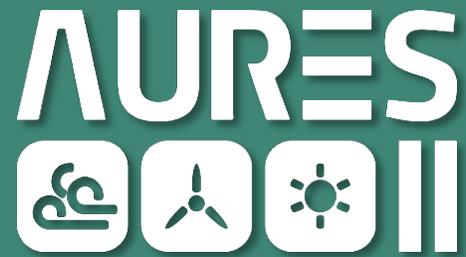
# Agenda



Time	Title	Speaker	Institution
10:00-10:05	Welcome	Vasilios Anatolitis / Pablo del Río	AURES II project coordinator Fraunhofer ISI / CSIC
10:05-11:50	Presentations		
	Session 1: The future outlook of renewable energy auctions in Spain	Hugo Lucas Porta	Ministry of Ecological Transition and Demographic Challenge
	Session 2: Lessons learnt from auctions in Spain	Lucía Dólera	APPA
	Session 3: Auctions and the Spanish wind energy value chain.	Heikki Willstedt	AEE
	Session 4: Empirical analysis of the impacts of auctions on the supply chain	Pablo del Río	CSIC
	Session 5: The end of the RES auction? Scenarios for the future of the instrument	Oscar Fitch-Roy	University of Exeter
	Session 6: Cross-border auctions	Felix von Bluecher	Guidehouse/Navigant
	Session 7: Lessons learnt from AURES II case studies	László Szabo	REKK
	Session 8: Trends and evolution of the Costs of Capital in RE Financing	Augustin Roth	Eclareon
	Session 9: Technology biases in technology-neutral auctions	Vasilios Anatolitis	Fraunhofer ISI
11:50-12:00	Wrap-up	Pablo del Río	CSIC

## Q&A:

We want to hear from you! During each presentation, you can post your questions to the Questions-Box. After each presentation, a couple of minutes will be dedicated to answering the questions.



**THANK YOU**

**for attending the**

**AURES II Regional Workshop 5**

**23 October 2020**