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# Evaluating the impacts of auctions for renewable energy support on financing conditions for wind energy projects

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# AURES II: EU funded research collaboration on auctions for renewable energy support



Funded by the European Union's **Horizon 2020** Framework Programme for research and innovation (2018 – 2021)

# Paper scope

**AUCTION SCHEMES**  
(bidding for support)



**PREMIUM SYSTEMS**  
(selling in the market)



## FINANCING CONDITIONS

### Cost of Capital

1. Weighted average cost of capital (WACC)

2. Cost of equity
3. Cost of debt
4. Debt-to-equity ratio
5. Hurdle rate premium

### Loan conditions

6. Debt Service Coverage Ratio (DSCR) requirements
7. Loan maturity

**TECHNOLOGY FOCUS: onshore & offshore wind, GEOGRAPHIC AREA: auction schemes in EU 28**

# Paper background

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- 1) Very large differences in costs of capital among EU member states
- 2) Wind energy projects sensitive to changes in financing condition
- 3) Clean Energy for all Europeans Package mandates the rollout of auctions across EU28

# Methodology



# Qualitative (exploratory) research design

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Methods applied:

- 15 semi structured interviews with diverse actor groups: project developers, bankers and equity investors (ongoing)
- 4 focus groups in two sessions (Wind Europe Bilbao, April 2019 and Wind Europe Finance Working Group meeting, June 2019) with over 30 participants

Why exploratory research?

- effects of auctions on financing not well understood in the literature
- map a set of propositions for future research

# Semi structured interviews

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Choice of interviewees:

- experience with auctions and schemes without auctions (e.g FIT)
- international experience in onshore and/or offshore wind energy
- typically a financing expert of the organisation

Main aspects of the interview grid:

- 1) change in financing conditions due to auctions
- 2) effects of individual auction designs
- 3) other auction general effects (such as effects on project planning etc.)

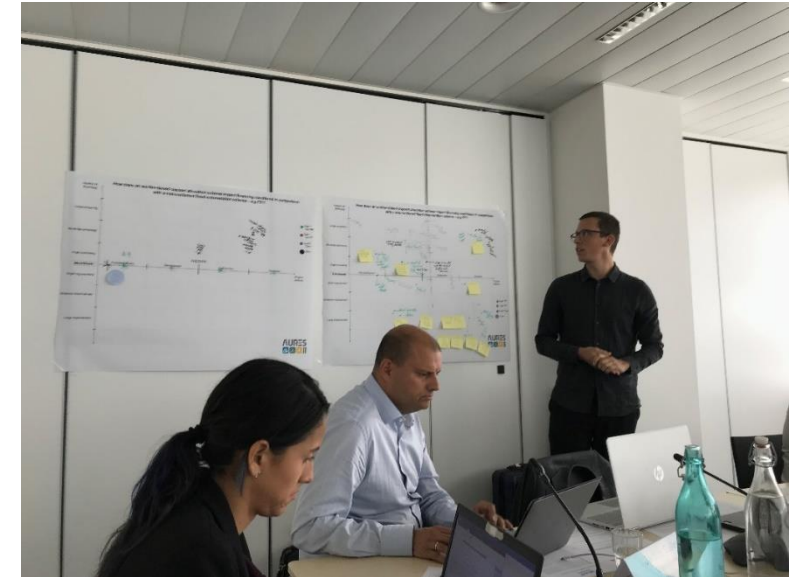
# Focus groups



**1. PRESENTATION OF CONCEPTS**



**2. WORKSHOP**

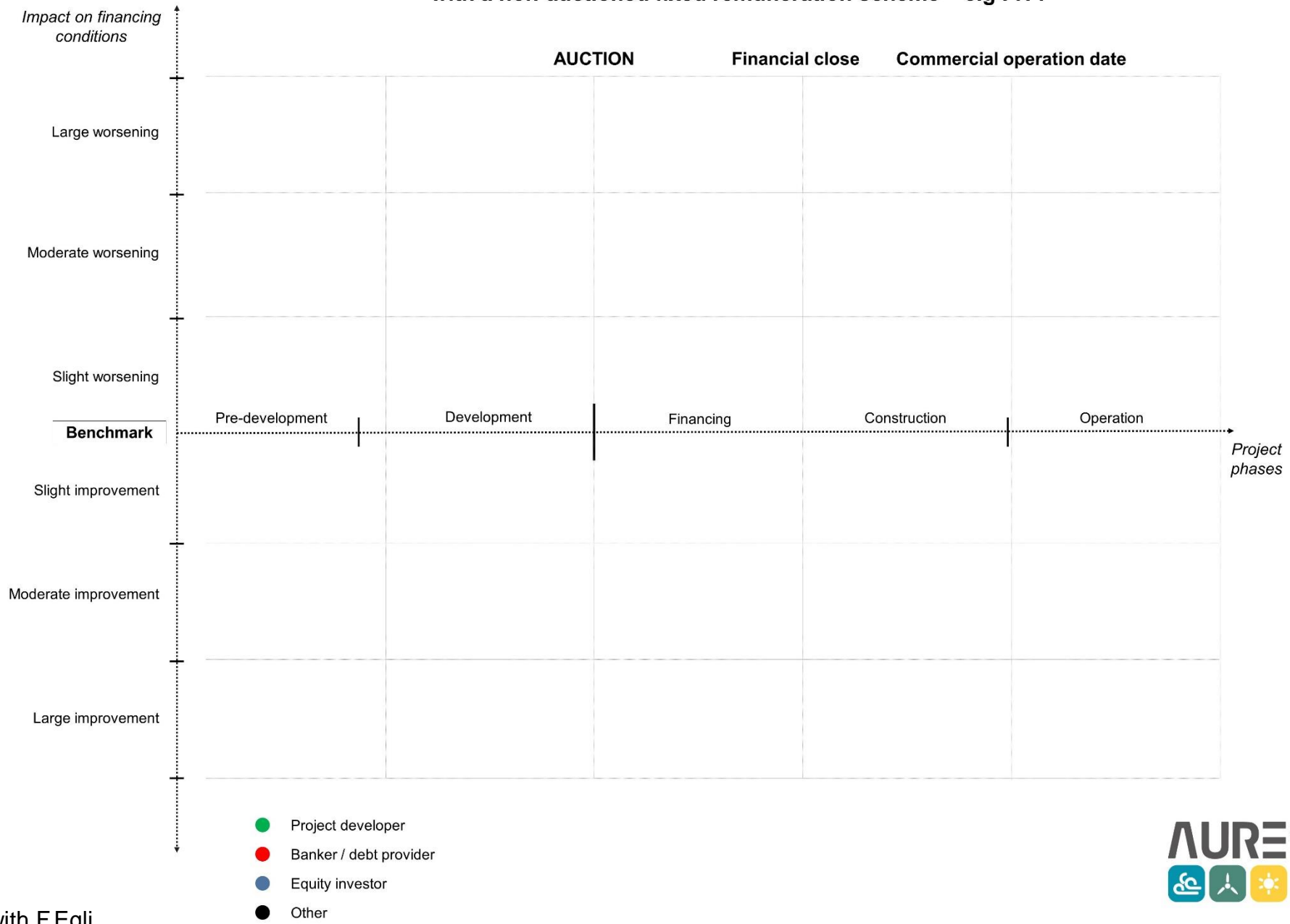


**3. DISCUSSION OF RESULTS**

**Each group assigned at least two moderators, discussion with the help of a visual aid**



## How does an auction-based support allocation scheme impact financing conditions in comparison with a non-auctioned fixed remuneration scheme – e.g FIT?



\*graph co-developed with F.Egli

- Auctions implemented
- No auctions yet

## STUDY PARTICIPANT EXPERIANCE

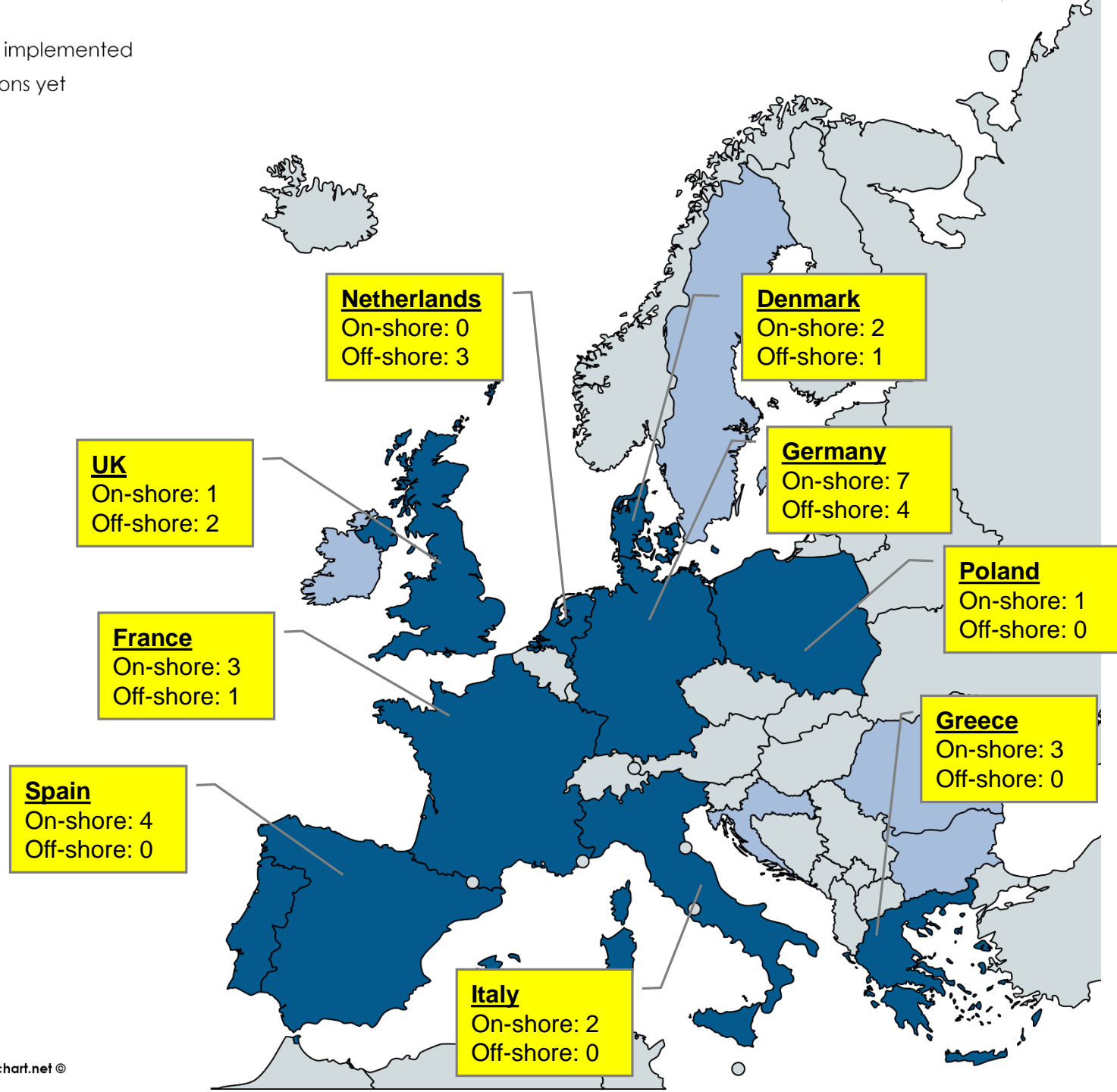
### INTERVIEWEES

On-shore: 7 countries, 10 participants  
 Off-shore: 4 countries, 6 participants

### FOCUS GROUP

Total: 30 participants, reported experience in 4 countries, including UK, DE and NL for off-shore wind and DE and SP for on-shore.

\*note: focus group data still being processed

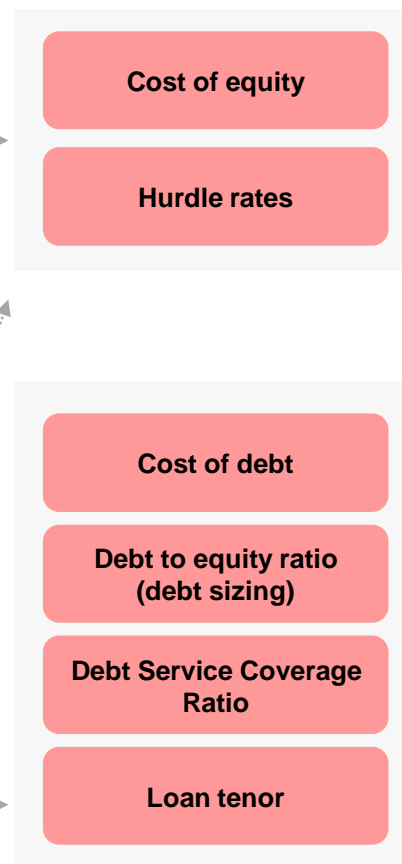
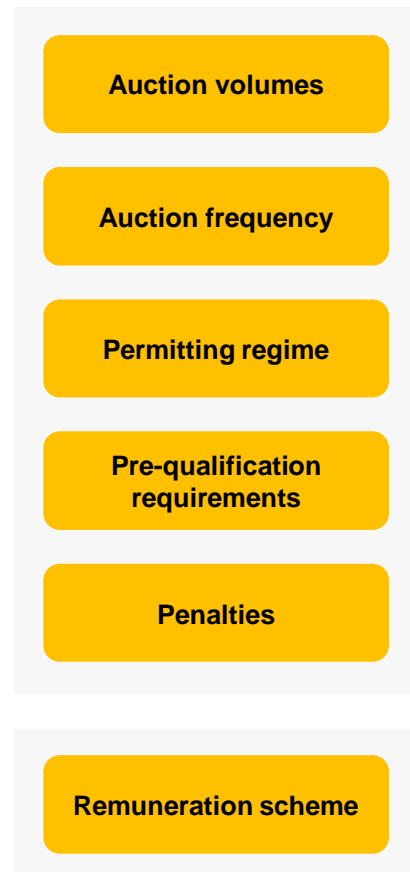


# Results

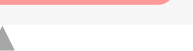
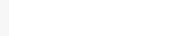
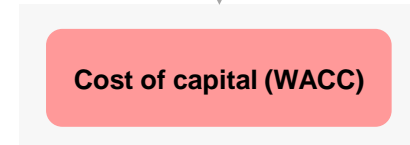
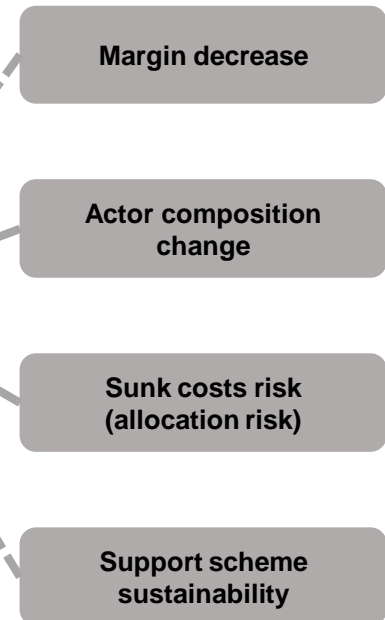


# Propositions on the effects of auctions on cost of capital and financing conditions

## DIRECT AUCTION DESIGN EFFECTS

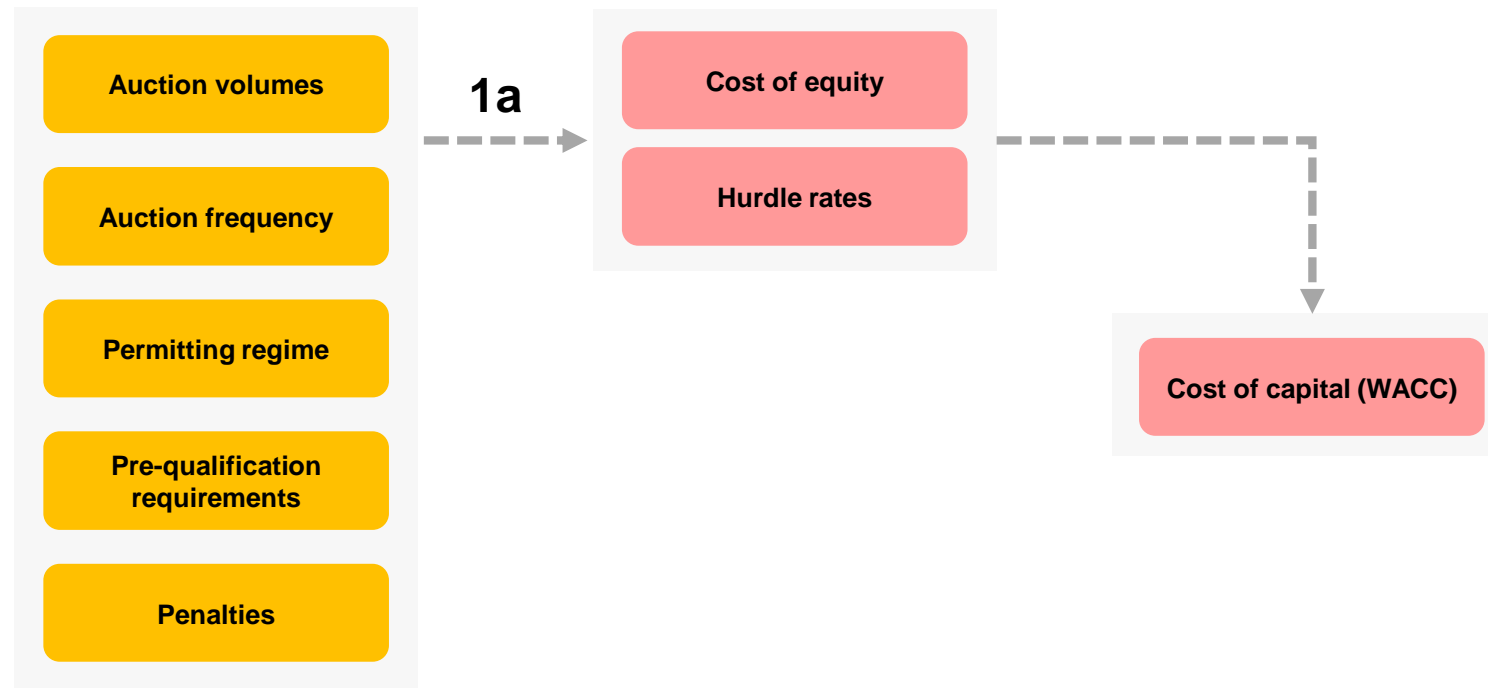


## INDIRECT AUCTION EFFECTS



# Proposition 1a: Auction designs in early project development stages could affect cost of equity

## DIRECT AUCTION DESIGN EFFECTS



# **Proposition 1a: Auction designs in early project development stages could affect cost of equity**



## Auction volumes and frequency

- well defined auction rounds stabilize the market and provide investor certainty
- more auction rounds enable losing projects to be resubmitted, while auction volumes signal potential to win in an auction

## Permitting regime

- pre-developed sites by the government in case of offshore decrease risk substantially (difference between UK and NL system)
- long permitting procedures might incline investors not to participate in auctions in order to keep within the realization periods and avoid penalties (example: permitting in onshore wind energy in Germany)

# **Proposition 1a: Auction designs in early project development stages could affect cost of equity**



## Pre-qualification requirements

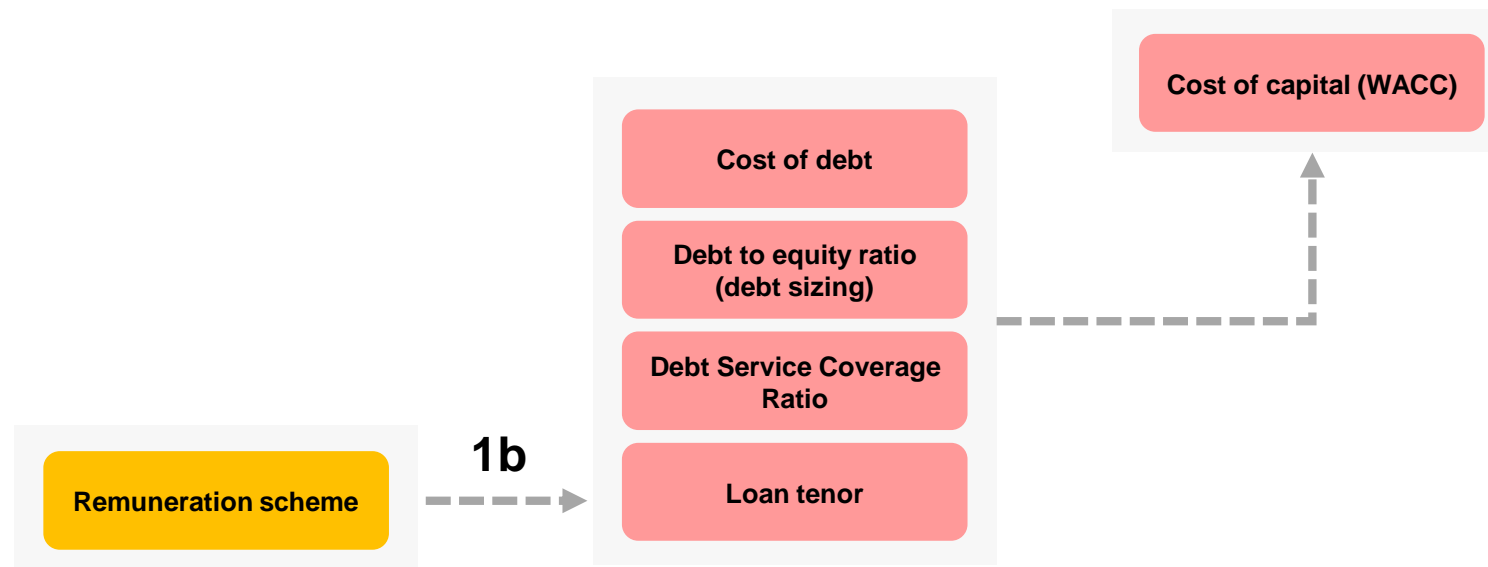
- Financial: bid bonds > if submitted as own equity, risk is higher because of the “lock down” of own funds. However even the bank guarantee could increase risk, since smaller developers are required to submit cash collateral
- Material: permits and other project development costs > amount to 1 to 2% of project costs and are lost if auction lost (sunk cost risk)

## Penalties

- Potentially high impact on risk if designed as “on-off switch” and if realization periods unrealistically defined

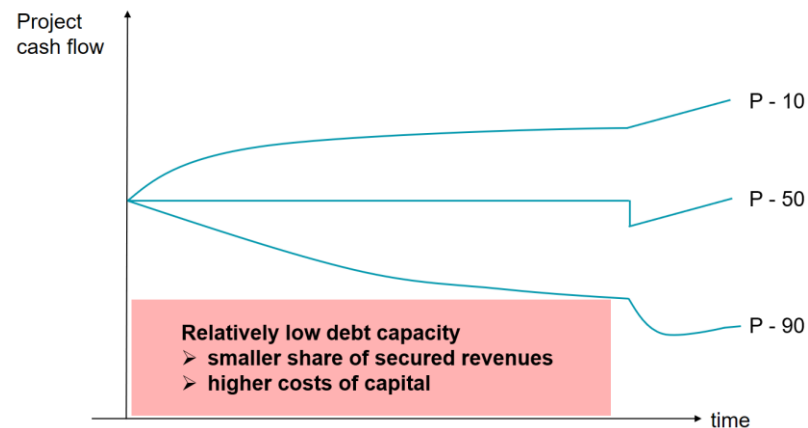
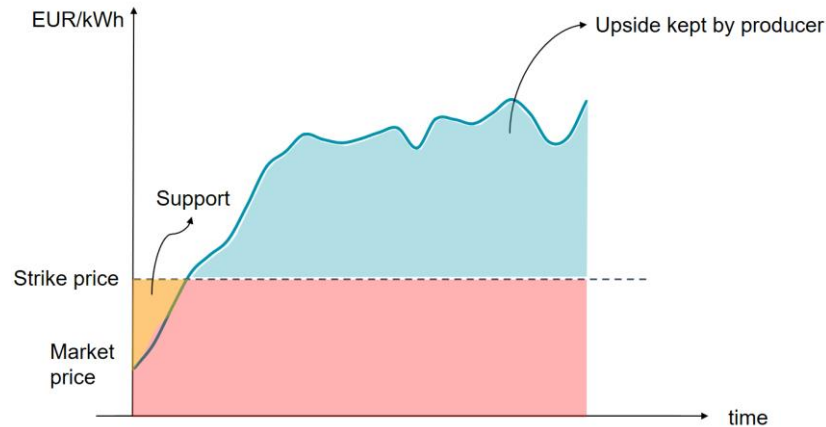
# Proposition 1b: The design of remuneration schemes could affect cost of debt and loan conditions

## DIRECT AUCTION DESIGN EFFECTS





# Proposition 1b: The design of remuneration schemes could affect cost of debt and loan conditions



## One sided CfD (floor price)

e.g in Germany

## Potential effects on financing

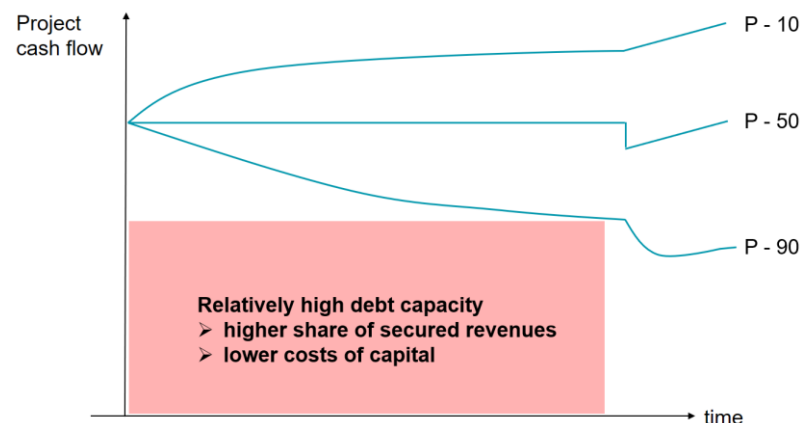
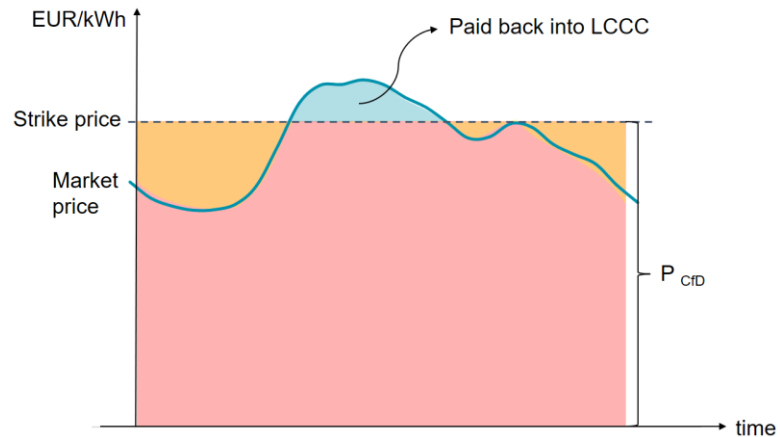
Offshore wind

- speculative bids
- smaller share of secured revenues
- smaller debt capacity
- less predictable cash flows
- higher equity requirements
- potentially higher financing costs (except if financed on balance sheet)

Onshore wind

- potentially no or small effect (except in case of very strong competition)

# Proposition 1b: The design of remuneration schemes could affect cost of debt and loan conditions



## Two sided CfD

e.g in UK

## Potential effects on financing

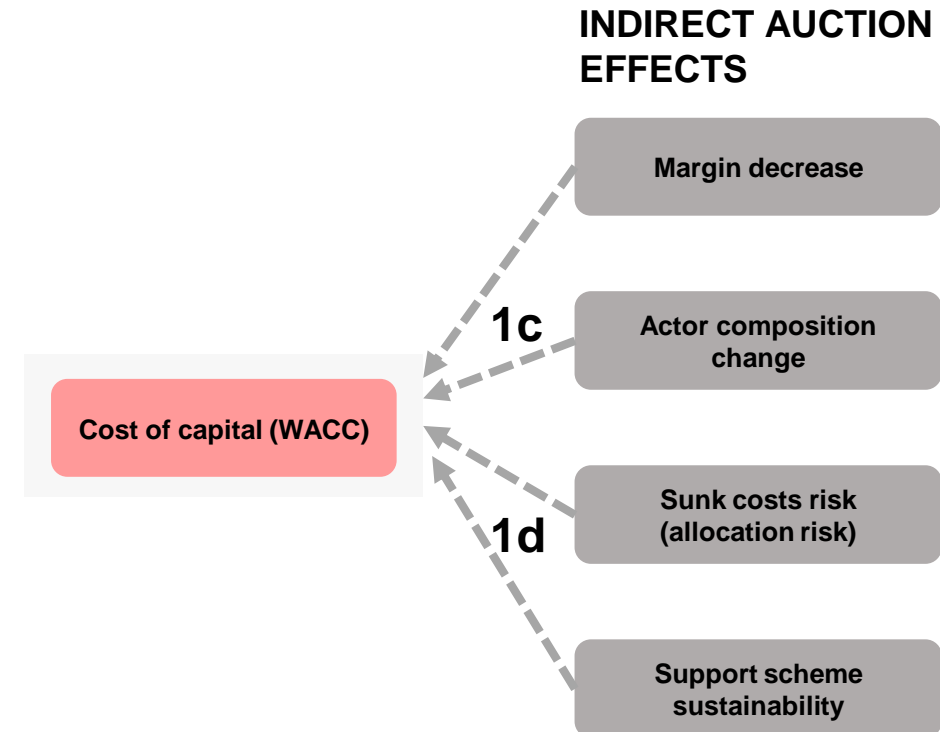
### Offshore wind

- higher and more realistic bids
- higher share of secured revenues
- greater debt capacity
- more predictable cash flows
- lower equity requirements
- potentially smaller financing costs (in case of project financing)

### Onshore wind

- similar to offshore wind

# Propositions of indirect auction effects



# Propositions of indirect auction effects

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Proposition 1c: Auctions could lead to a change in actor composition and thus change the average market WACC

- Helms et al. (2015): different market actors have different costs of capital as they require different returns on investment (e.g. utilities vs. private investors)
- Auction designs in early project phases might incentivize smaller actors (smaller balance sheet actors such as smaller project developers, energy cooperatives etc.) not to participate in auctions

Proposition 1d: Auctions might improve the sustainability of support schemes as they decrease the risk of retroactive support system changes

- Auctions lead to a decrease in support costs (general view), and this might decrease overall WACC, especially costs of debt as banks have more faith in the support scheme
- Especially relevant for higher risk countries (Romania, Bulgaria, Spain)

# Conclusions

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- 1) Costs of equity mainly affected by auction designs in early project development stages
- 2) Costs of debt and loan conditions affected mainly by remuneration scheme in place
- 3) Indirect auction effects could also impact overall market cost of capital

## Further research:

- conduct a EU28 survey on the effects of auctions on costs of capital and financing with a goal of 140 interviews
- model the effects using stochastic methods and finance theory (CAPM model, Merton model and credit risk etc.



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## AURES II

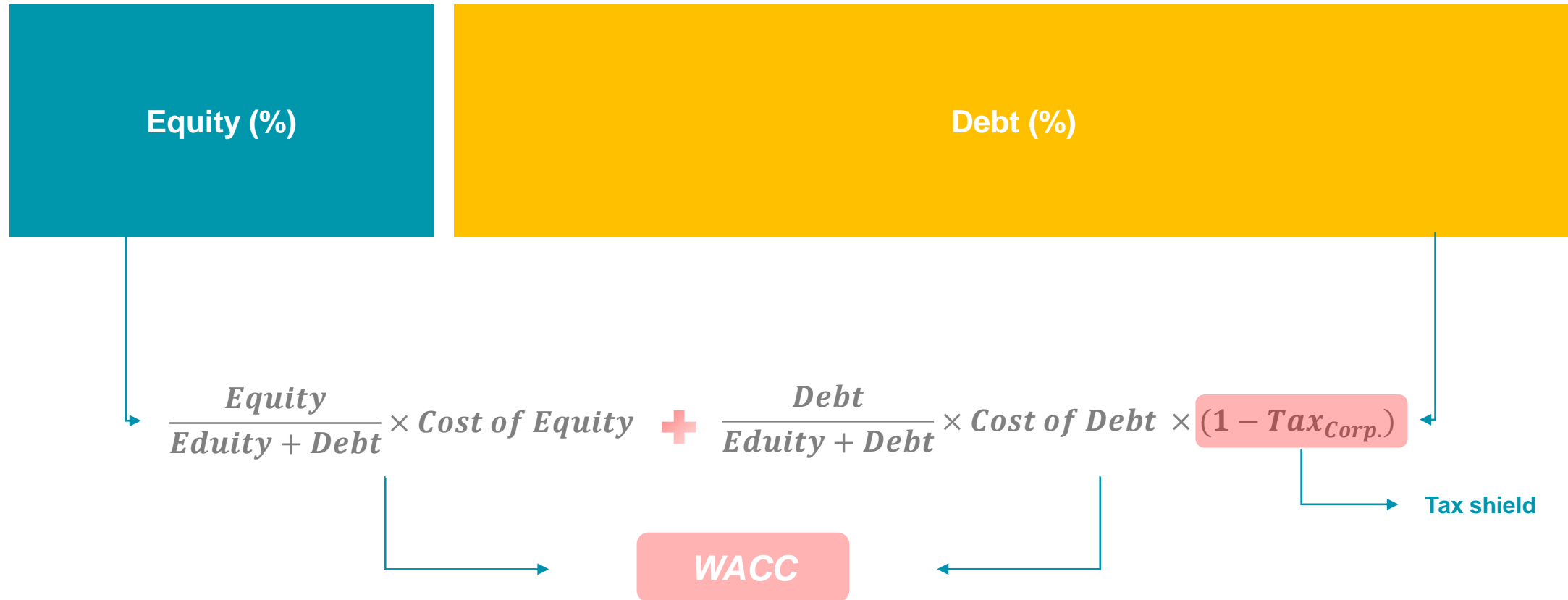
Website: <http://aures2project.eu/>  
LinkedIn: AURES II  
Twitter: @auctions4res  
Newsletter: <http://eepurl.com/gd42zz>



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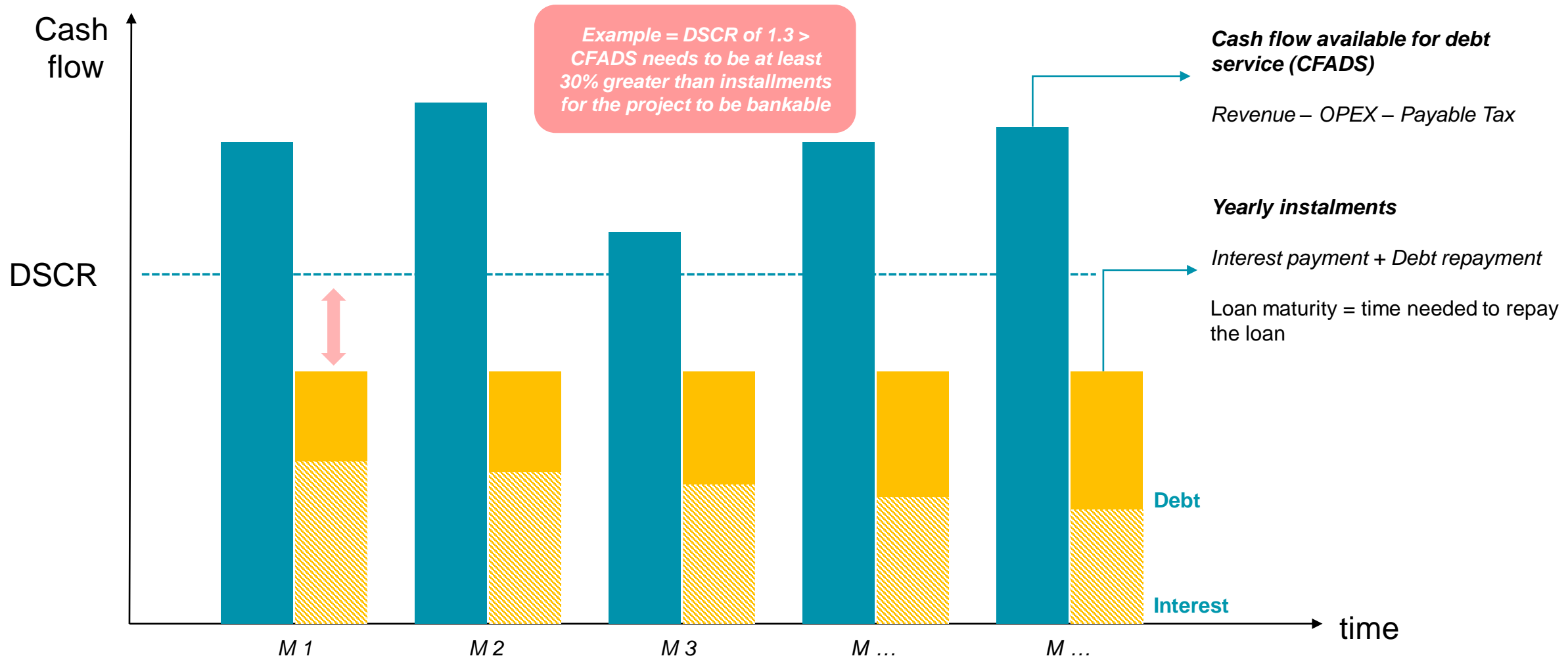
# Supporting slides

# Weighted average cost of capital (WACC)





# Loan conditions: debt service coverage ratio (DSCR) and loan tenor

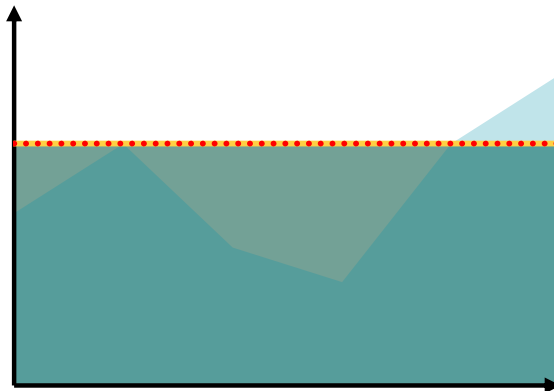


# Types of generation-based support schemes\*

MARKET INTEGRATION

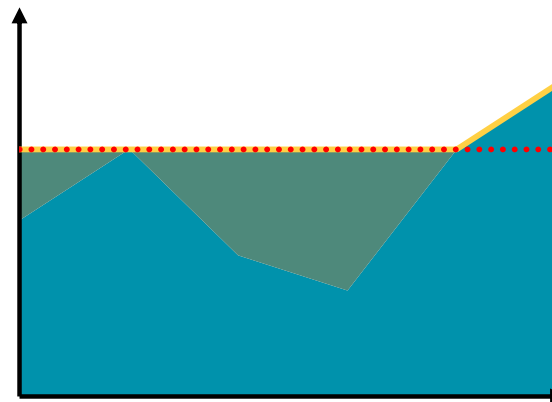
RISK

Feed-in tariff



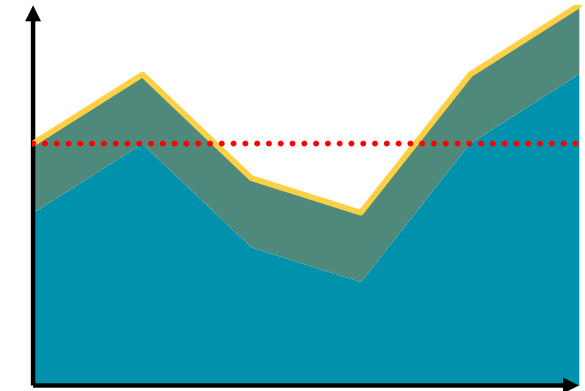
- Support payment
- Electricity market income
- Total income
- Strike price (LCOE)

One sided CfD (sliding FIP)



- Support payments
- Electricity market income
- Total income
- Strike price (LCOE)

Fixed feed-in premium

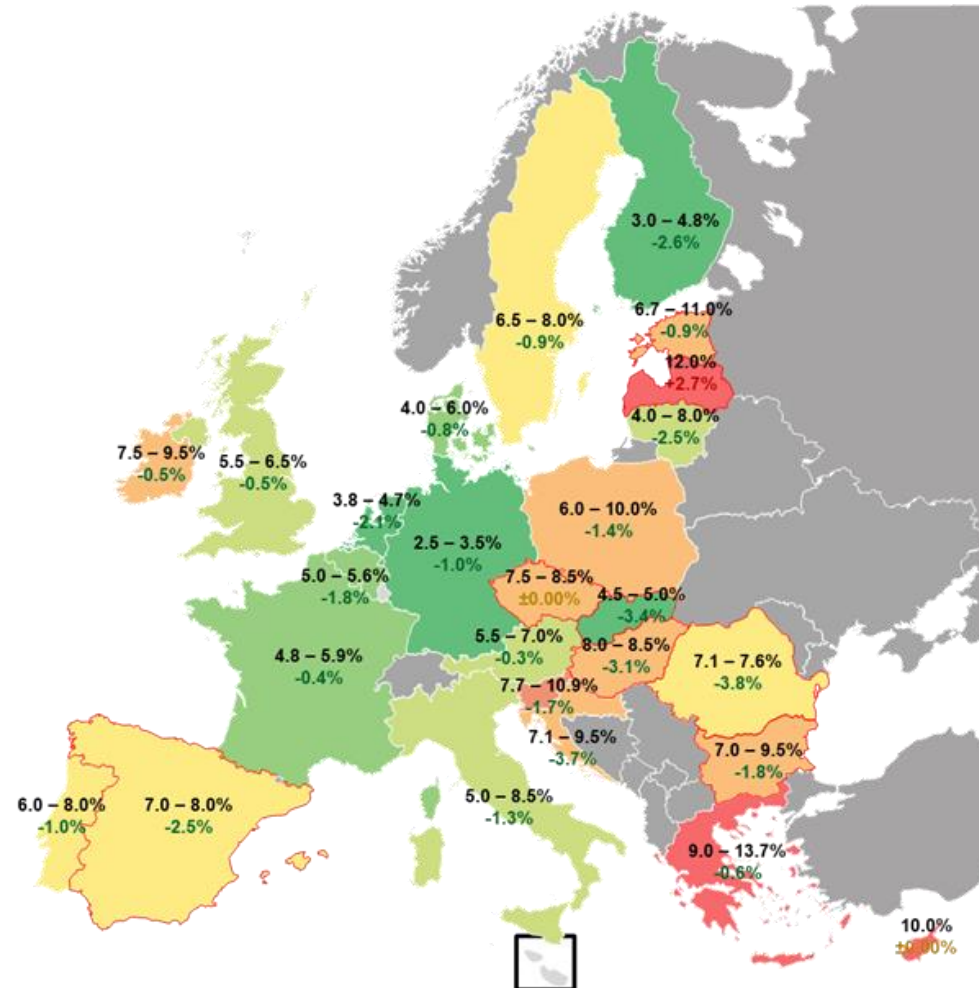
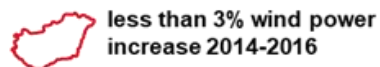
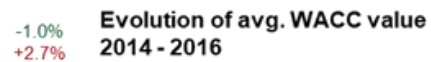
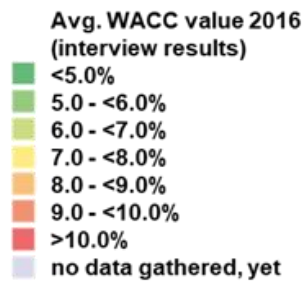


- Support payment
- Electricity market income
- Total income
- LCOE

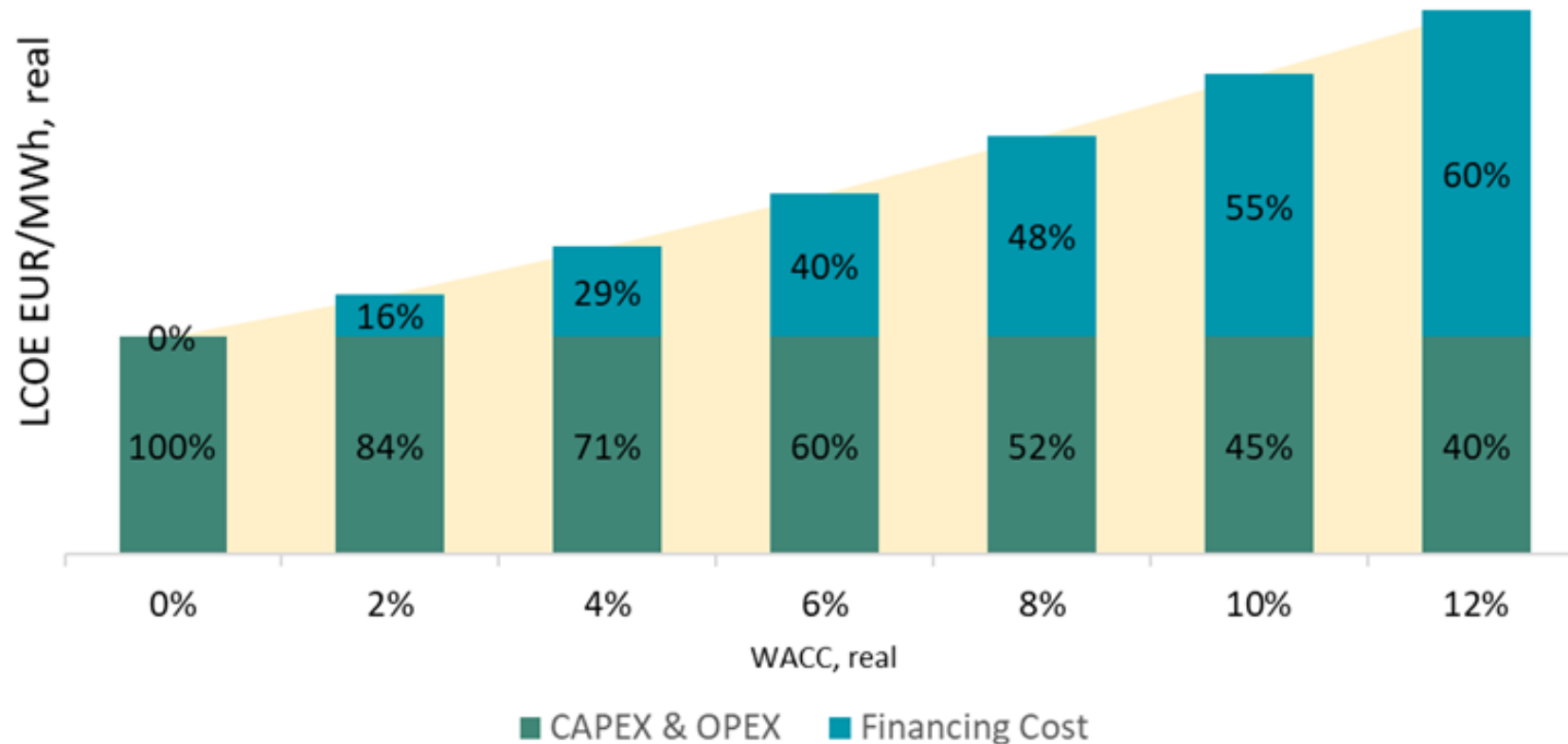
\*Quota with tradable green certificates (TGCs) omitted here

# Very large differences in WACC among EU member states

RE-Frame



# Wind energy projects very sensitive to changes in financing costs



\*calculation dependent on input assumptions

# Risks from auction designs could affect costs of capital and loan conditions

