



Modelling French Onshore Wind Auctions

enervis – WattaBase study

8th of November 2023 | Spreewindtage Potsdam



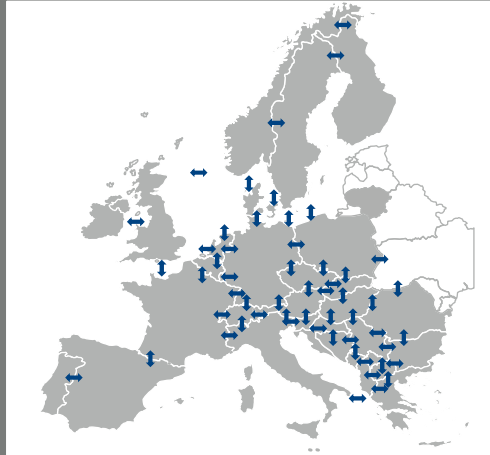
WattaBase



enervis - energy consulting since 2001

Core competencies

Modelling-know-how



- ☑ Model-based market analyses on all energy markets and for infrastructures (electricity, gas, heat)
- ☑ Long-term forecasting – prices & volumes
- ☑ Auction modelling (e.g. renewables, CHP)

Client Base



- ☑ European Utilities
- ☑ Investors, projects planners, banks, industry
- ☑ Investment evaluation - renewables, power plants, storage facilities
- ☑ Direct marketing, market value analyses

Policy Advisory



- ☑ For foundations, associations, public institutions
- ☑ Input for the assessment of energy policy developments
- ☑ Expert advice on policies and strategies



Content

1. Regulatory framework for French onshore wind tenders

2. Modelling of auction rounds – a data based forecasting approach

3. Defining the participating quantity structure – WattaBase database

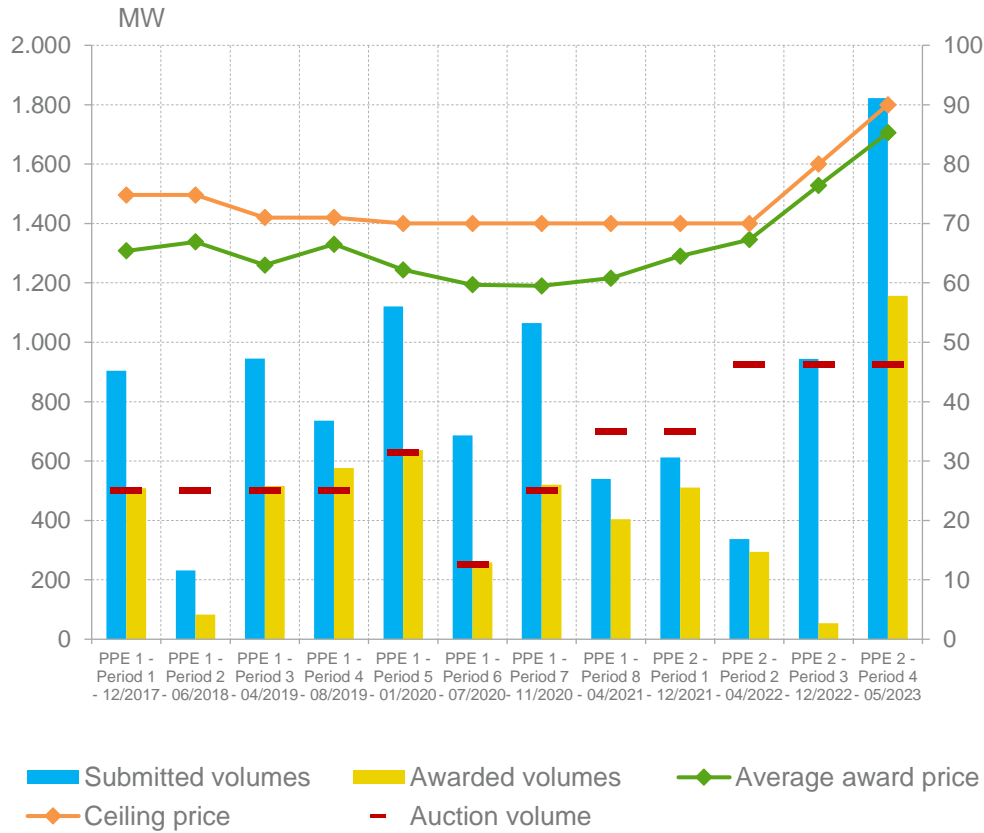
4. Modelling the resulting bid prices – enervis auction model

5. Conclusion & Outlook

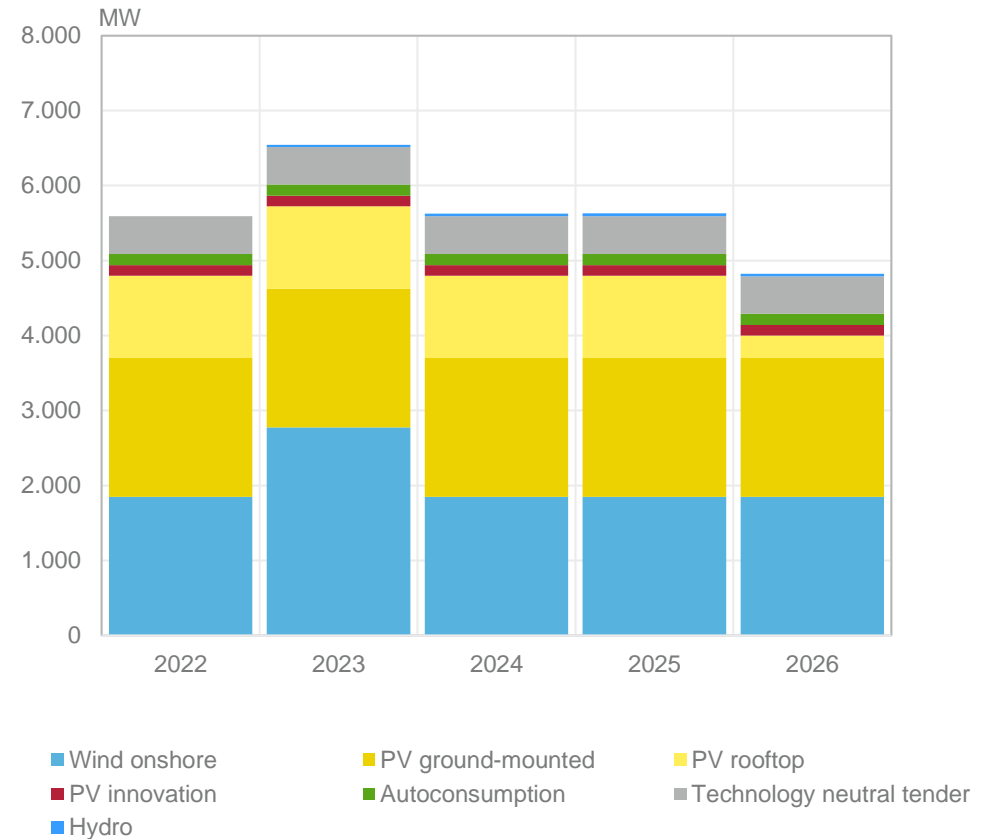
1. Regulatory framework for French onshore wind tenders

Completed tenders Wind Onshore

Historical tender results

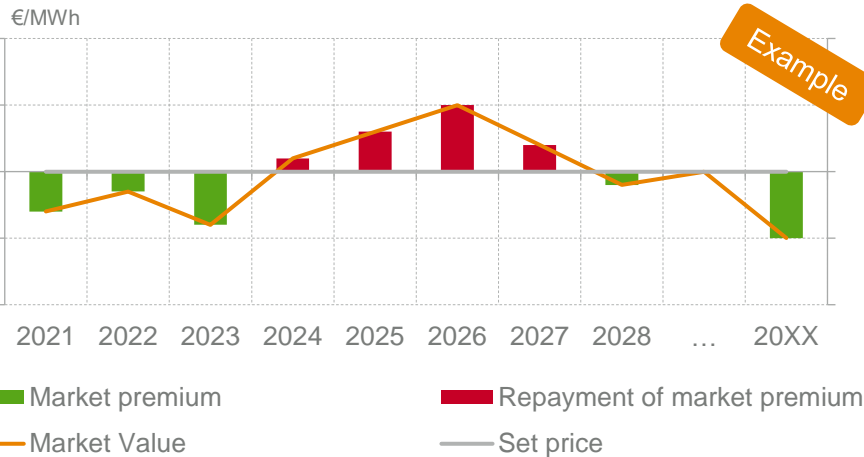


Tender volumes



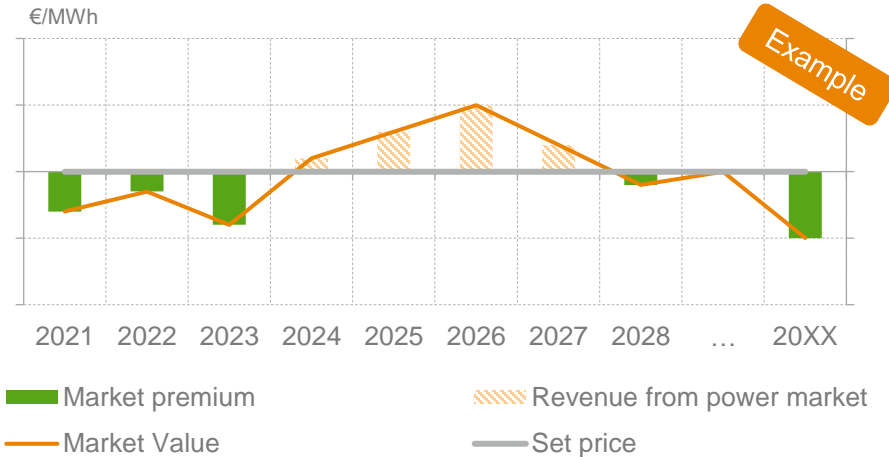
Symmetric vs. Asymmetric CfD

Contract for Differences (CfD)



- In the CfD scheme, a market premium is paid when the market value lies below the set price that was awarded during the tender
- However, if the market value is higher than the set price, the difference must be returned
- Operators have the advantage of long-term income predictability

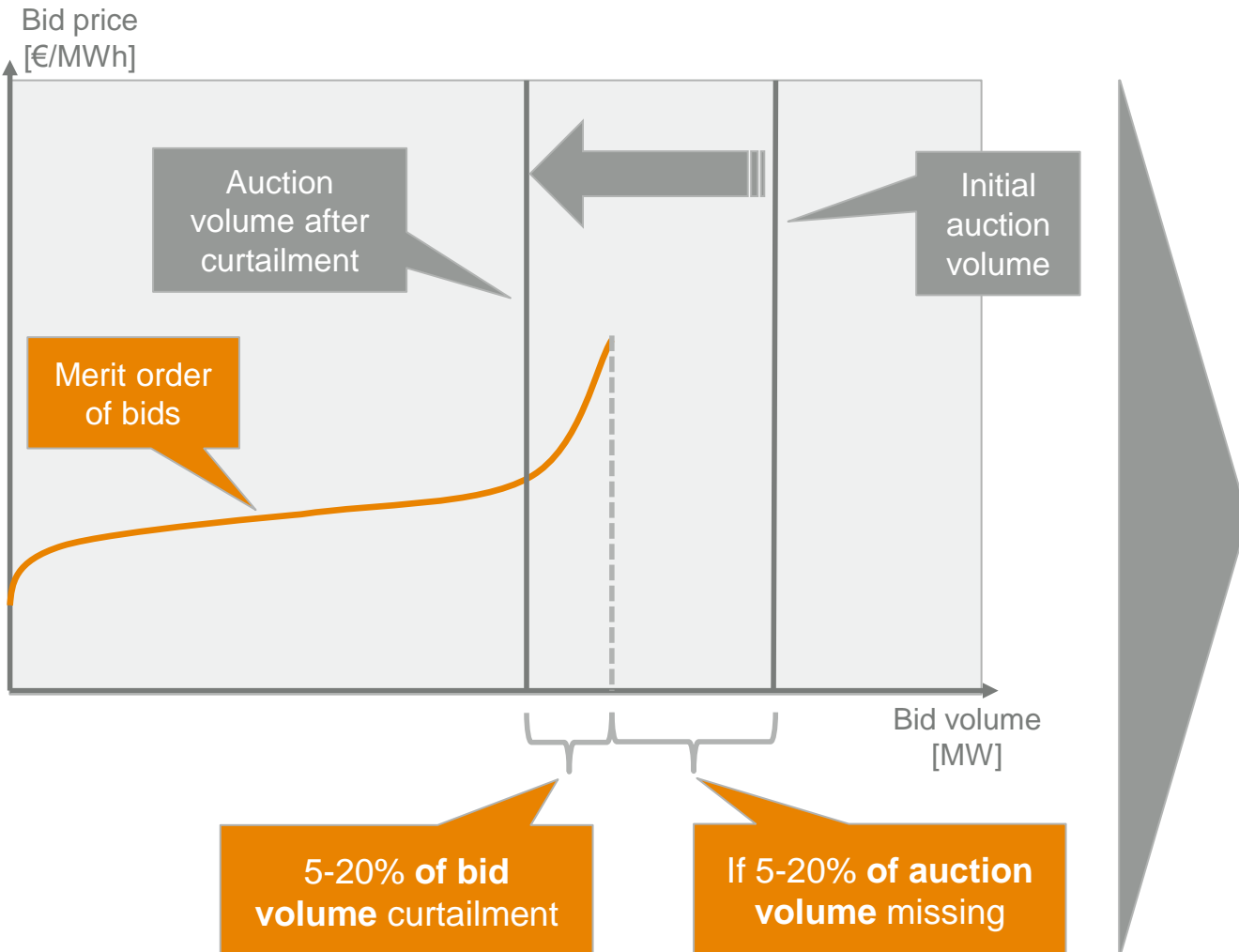
German Market Premium Model



- In the German model, the market premium is paid up to the set price. If revenues from power market exceed this price, additional profits are kept by the operator
- May incentivize to include additional revenues in the auction bid

Undersubscription : curtailment of tender volume

In contrast to the German volume curtailment system, a decrease of the tender volume is not announced before the bidding deadline.



- No announcement of curtailment before bidding deadline!
- Undersubscription always leads to curtailment that ensures exclusion of bids!
- The ceiling price is irrelevant for the curtailment volume.

Further tender specifications in France

Ceiling price

- To prevent tender manipulation the ceiling price is undisclosed
- Bidders have to estimate

Flexibility rules

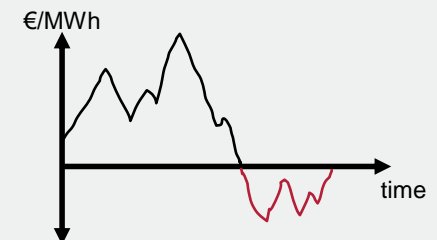
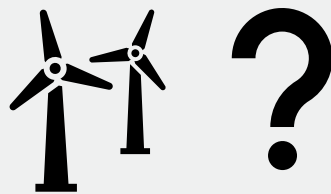
- + or – 20% flexibility of a projects permitted capacity (after award)
- +40% for projects with COD before 2025
- Leads to more uncertainty in costs

Indexation factors

- Two inflation factors to reduce risk
- K factor for CAPEX inflation
- L factor for OPEX inflation

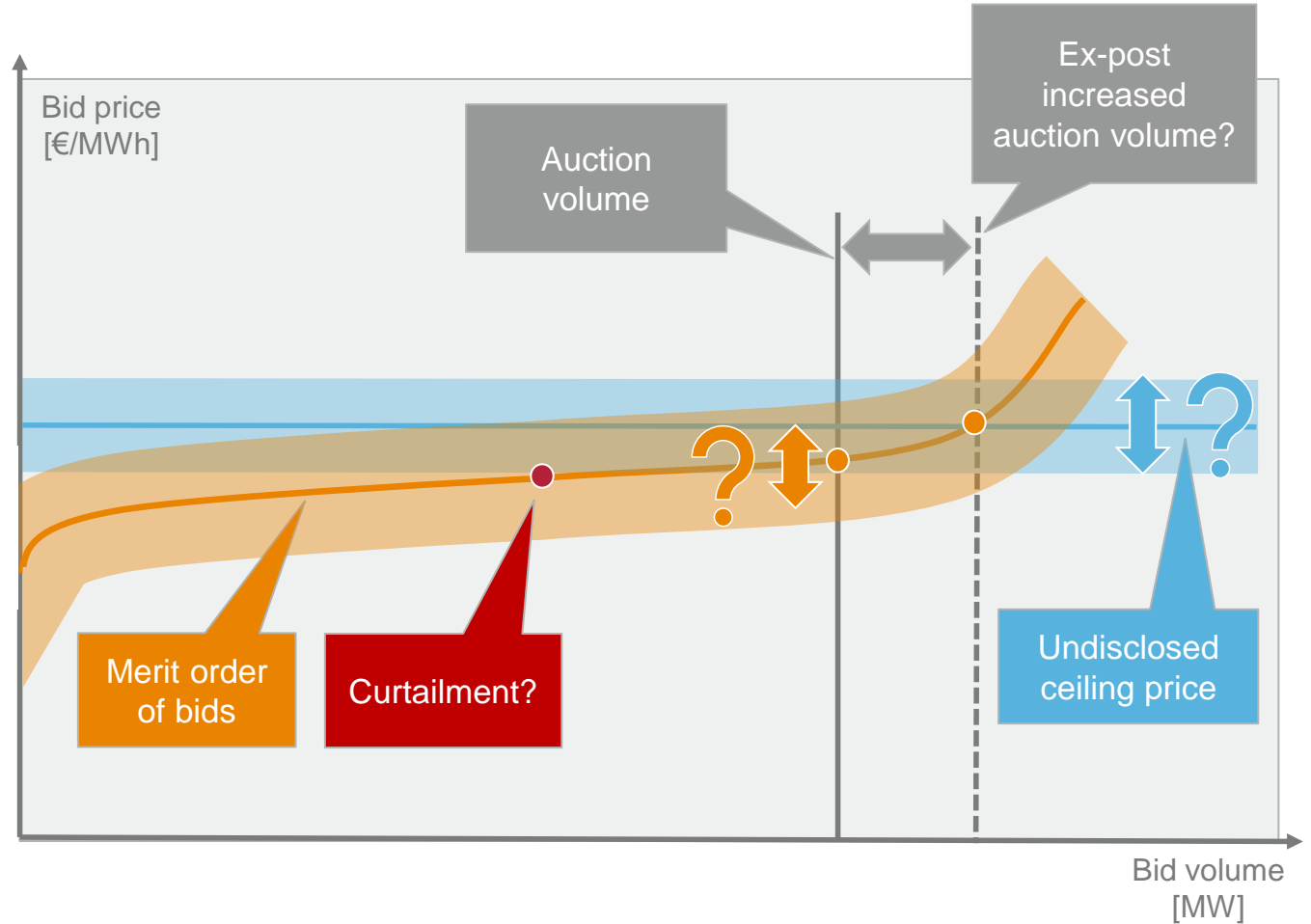
Negative power prices

- Obligation to stop
- No remuneration for first 20 hours with negative prices (per year)
- Beyond 20 hours: Bid Price x 35% x Nominal Capacity of the Wind farm



The past tender results as only reference!

Bidders face extreme **uncertainties** regarding the **ceiling price** and the participating volume and hence the **marginal bid price** and a possible curtailment. Even the **auction volume** might be changed afterwards.



2. Modelling of auction rounds – a data based forecasting approach

What answers does the auction model provide?

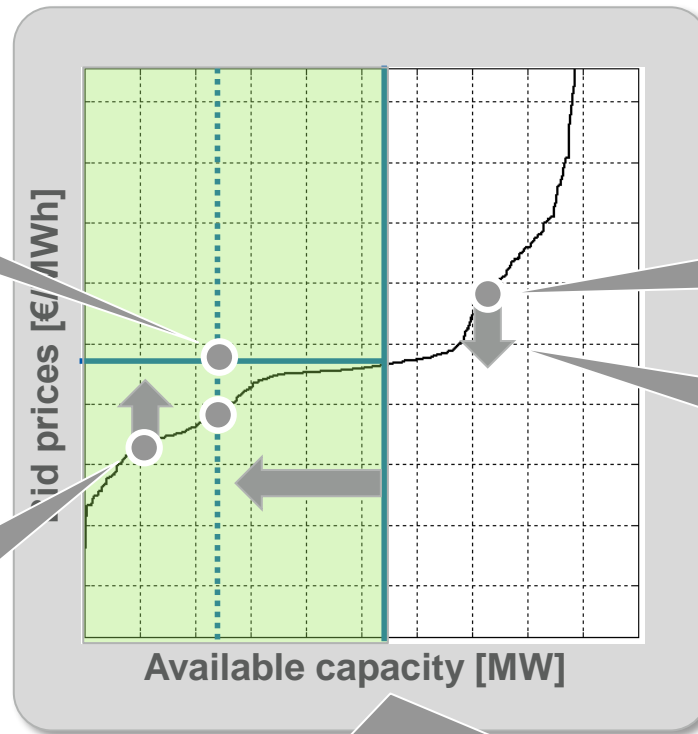


How many projects will take part? → high/low competition



To which price are they going to bid?

Price level /
marginal price



Bid awarded:
yes / no?

Cost reduction
necessary?

Upside potential /
bid optimisation

Expected supply quantity and
structure of supply (competition)

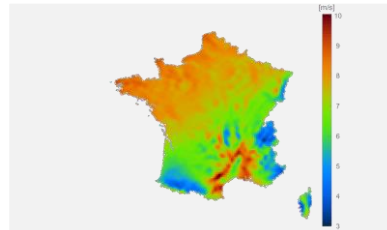
Auction modelling in two steps

Step 1: Modelling cost-based indifference bid prices

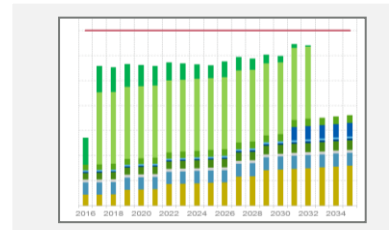
1 Capacity of permits
(WattaBase Database)



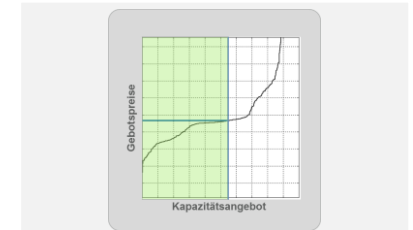
2 Energy yield data



3 Economic calculation

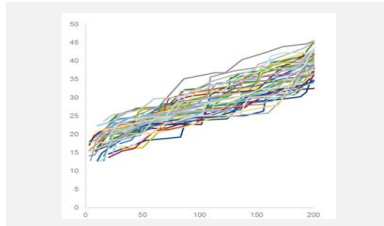


4 Auction model

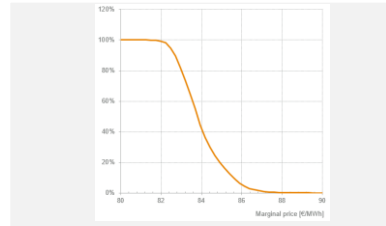


Step 2: Modelling bid prices including strategic bid markups – Monte Carlo simulation

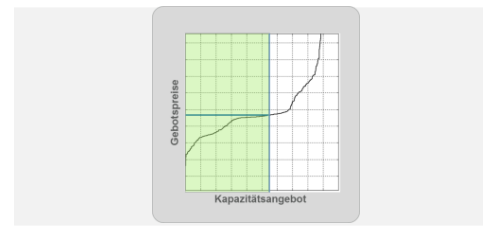
5 Market simulation



6 Bid optimisation



7 Auction model including strategic markups



3. Defining the participating quantity structure – WattaBase database

WattaBase onshore wind permits Database

- WattaBase collects and aggregates, into a single database, valuable information from administrative decisions for onshore wind in France (environmental permits and refusals)

Administrative decisions are decentralized:
published on administrative departments' websites

Valuable information is difficult to extract from
administrative decisions which are published
through scanned pdf files

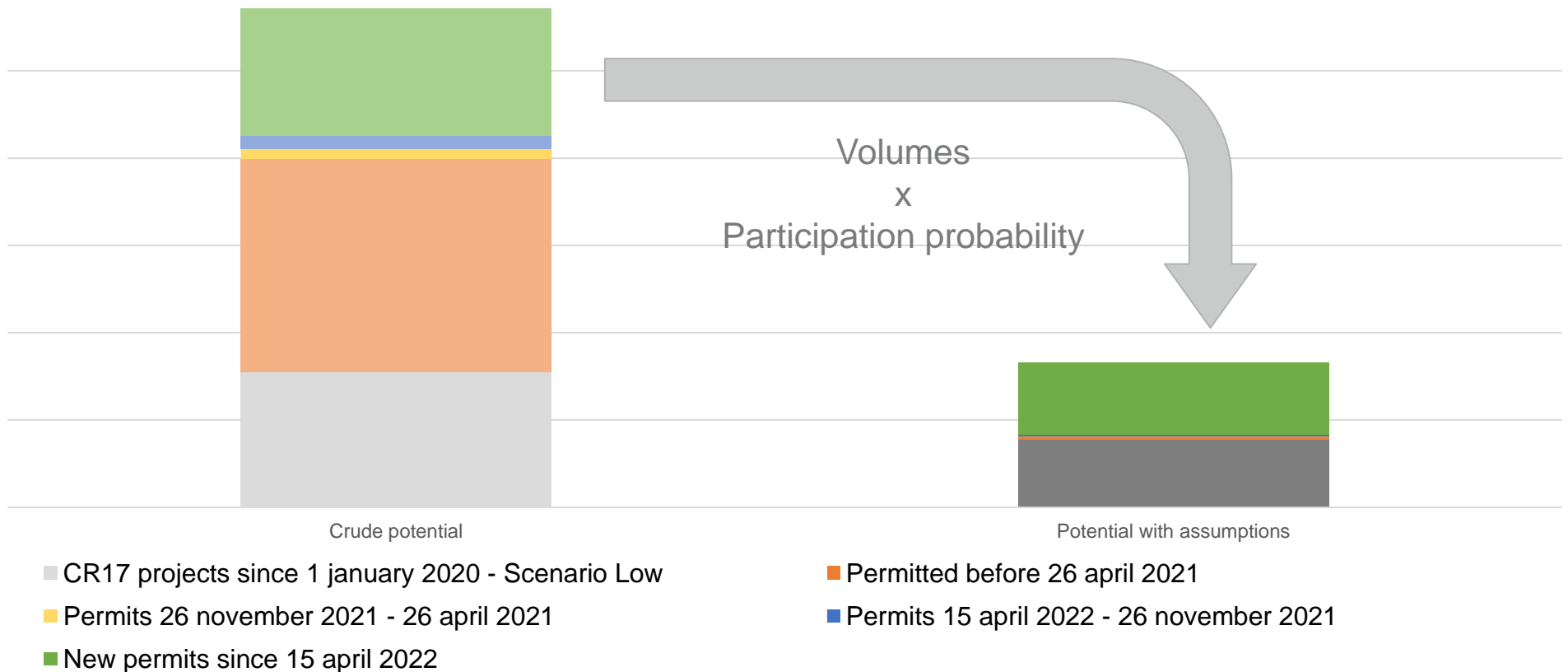
The screenshot shows the website of the Prefecture de la Marne. The header includes the logo and name of the prefecture, along with navigation links like 'Nous contacter' and 'Paramètres d'affichage'. A search bar contains the text 'Rechercher'. Below the search bar, there are several dropdown menus for navigation. The main content area displays a list of 'Dossiers ICPE - Autorisation- Domaine' with a sidebar on the left. The selected item is 'Dossiers ICPE - Autorisation- Domaine "éolien"'. The main content area shows a list of two entries: 'PARC EOLIEN DES QUATRE VALLEES IV (SAS Société d'Exploitation du Parc Eolien des Moulins du Puits)' and 'PARC EOLIEN CARNOT ENERGIES'. Each entry includes a small logo of the prefecture, the title, and a 'Publié le' date.

The screenshot shows a scanned PDF document from the Prefecture de la Marne. The header includes the logo and name of the prefecture, and the text 'Direction départementale des territoires'. The document is titled 'ARRÊTÉ PRÉFECTORAL portant REFUS d'autorisation unique d'exploiter une installation de production d'électricité utilisant l'énergie mécanique du vent'. It mentions 'SAS Société d'Exploitation du Parc Eolien des Moulins du Puits' and 'Parc éolien de Quatre Vallées IV à Le Meix-Tiercelin et Saint-Quem-Domprot (51)'. The document is signed by 'Le Préfet de la Marne, Chevalier de la Légion d'Honneur, Chevalier de l'Ordre National du Mérite'. The body of the document contains several paragraphs of text, including references to the code of the environment, the code of energy, and various decrees and arrêtés.

Quantity structure modelling and participation probabilities

Multiplying each cluster's volume by its own participation probability results in an expected bid volume

Supply potential: example of the volume reduction for the tender of May 2023

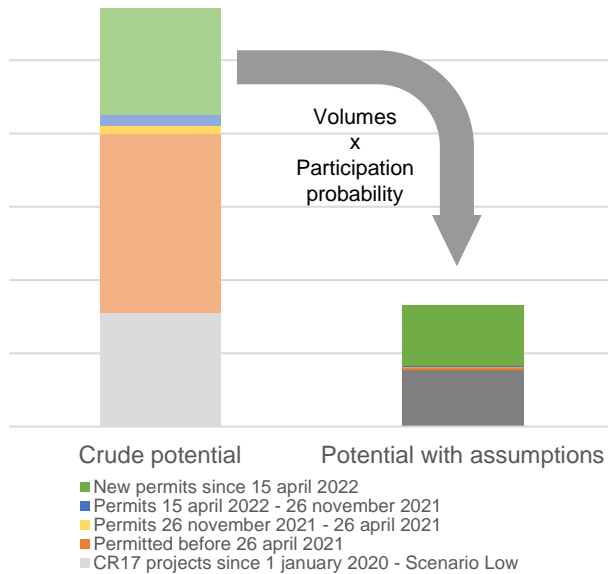


4. Modelling the resulting bid prices – enervis auction model

The auction study at a glance

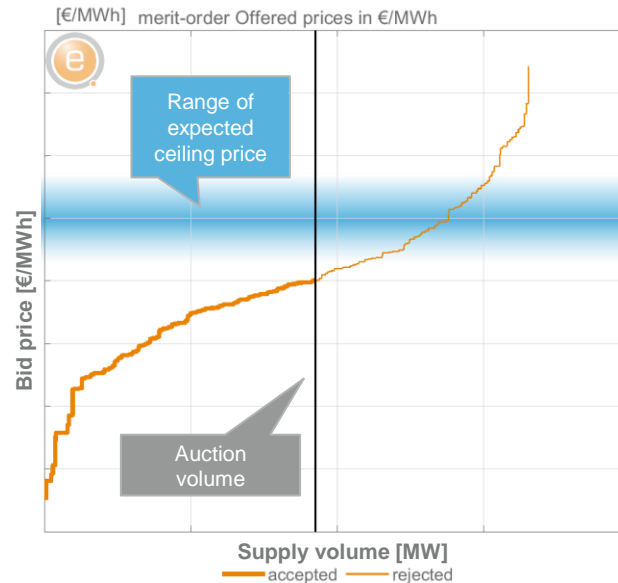
Slideset of around 120 slides in PDF format.

Quantity structure



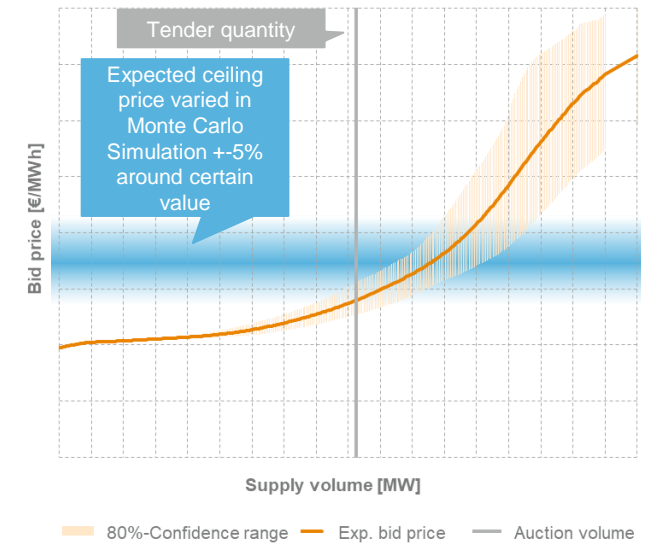
- Deduction of quantity structure
- Documentation of main uncertainties, assumptions & main regulatory framework

Cost-based bid price curve



- Market simulation of indifference prices
- Documentation of cost assumptions

Market simulation including strategic bid markups

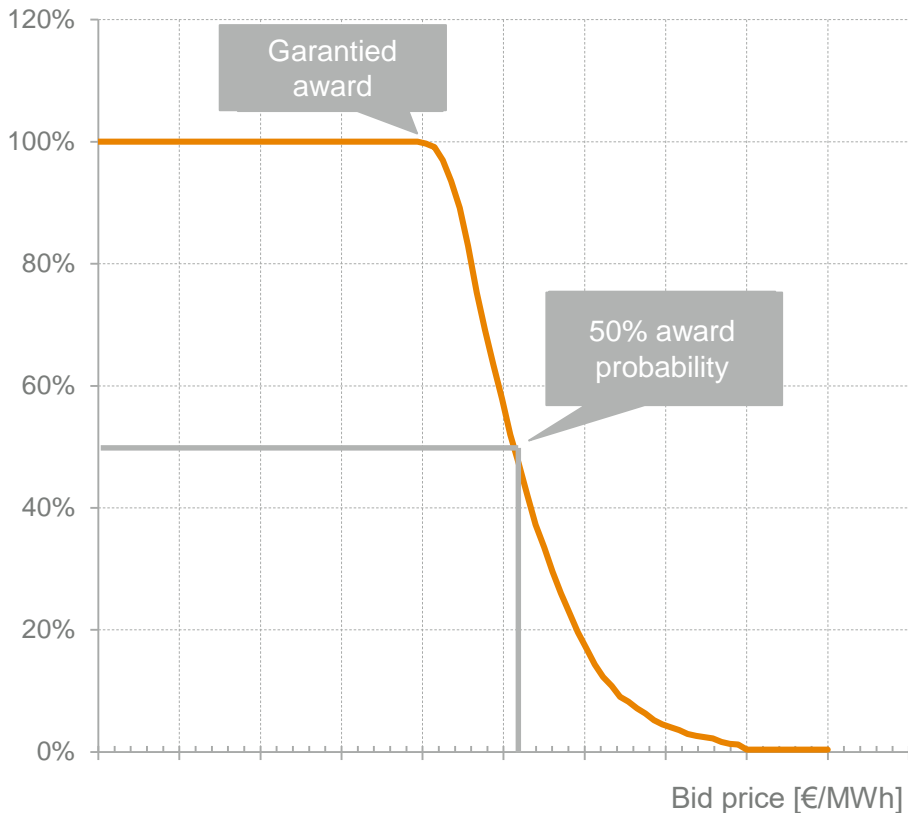


- Bid price simulation of upcoming tender
- Marginal & average prices
- Bidding strategy recommendation

How much risk are you willing to invest?

As a result of the Monte Carlo simulation every bid price is expanded with a probability of award.

Award probability



Explanation

- Based on the modeling, an expected award probability (for all plants) can be determined for different bid prices.
- Bidders should use this curve to estimate how much risk they are willing to invest.
- The range of the curve between 100% award probability and exclusion due to too high bid is very steep in the wind sector due to the comparatively small lot sizes (wind farms) of the bidders.
- In this example, a bid close to and above the maximum price (here 60 €/MWh) leads to a low probability of success or to a bid exclusion.

6. Conclusion & Outlook

Outlook

- **WattaBase** – **enervis** cooperation is going to be continued for upcoming auction rounds
 - Continuous update of project database by WattaBase
 - Implementation of further regulatory details into the model by enervis
 - Adaptation of additional scenarios to tender context
- **Upcoming tenders in 2023 → Context of high competition is expected:**
 - Tender in December 2022 was a failure and creates an oversupply for 2023
 - Projects having secured a revenue through a former auction round or CR17 tariff are in financial difficulties due to the inflationary crisis
 - Awarded CR17 projects might forfeit their secured tariff to secure a high award in current auctions with higher ceiling prices
 - For awarded projects of previous tenders the French administration is working on solutions to allow them to participate again without losing their financial guarantee.

Appendix

You still have questions about this topic?

Feel free to contact us!



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