Auctions for Wind Energy Projects in Germany and France

Bidding Strategies in Renewable Energy Auctions

Berlin, 16 October 2018

Office franco-allemand pour la transition énergétique
Deutsch-französisches Büro für die Engergiewende

David Heinze (dh@teamconsult.net)

TEAM CONSULT

Gas. Power. Experience.

Agenda

1 **Bidding Strategies in Renewable Energy Auctions**

2 About Team Consult

TEAM CONSULT

Gas.Power.Experience.

Funding for onshore wind energy in Germany is determined by pay-as-bid auctions with special privileges for Citizens' Energy Projects

Brief summary of the framework for German onshore wind energy auctions

- Four pay-as-bid auctions (with price limit) per year, tendered capacity 700 MW per auction

- Capacity restrictions in Northern Germany

- General requirements:
  - Official permit according to the Federal Immission Control Act
  - Financial security payment

- Implementation deadline of 2.5 years (penalties after 2 years)

- Privileges for Citizens' Energy Projects ("Bürgerenergieprojekte"):
  - Uniform pricing
  - Implementation deadline extended by 2 years (only 2017 auctions)
  - Bid permissible without official permit (only 2017 auctions)

- Additionally: Two cross-technology auctions (wind and solar) per year (200 MW per auction)

TEAM CONSULT

Gas.Power.Experience.

Timing and bidding strategy are key factors for a successful bid

1

| Project development | Bidding time window | Bidding strategy | Bid price |

time period available to bid
in one or several auction(s)

Image credit: Sarah / Creative Stall / lastspark / Nithinan Tatah from the Noun Project

A long time window helps to optimize the trade-off between award price and award probability

Example: Two auctions, 20% success probability* with 5 ct/kWh bid, 75% chance with 3 ct/kWh bid

Time window *Auction 1* *Auction 2* *Expected value*

Strategy A — 5 ct
- 20% → award
- 80% → no award → n/a

20% × 5 ct/kWh =
1 ct/kWh

Strategy B — 3 ct
- 75% → award
- 25% → no award → n/a

75% × 3 ct/kWh =
2.25 ct/kWh

Strategy C — 5 ct
- 20% → award
- 80% → no award → 3 ct
  - 75% → award
  - 25% → no award

20% × 5 ct/kWh +
60% × 3 ct/kWh =
2.8 ct/kWh
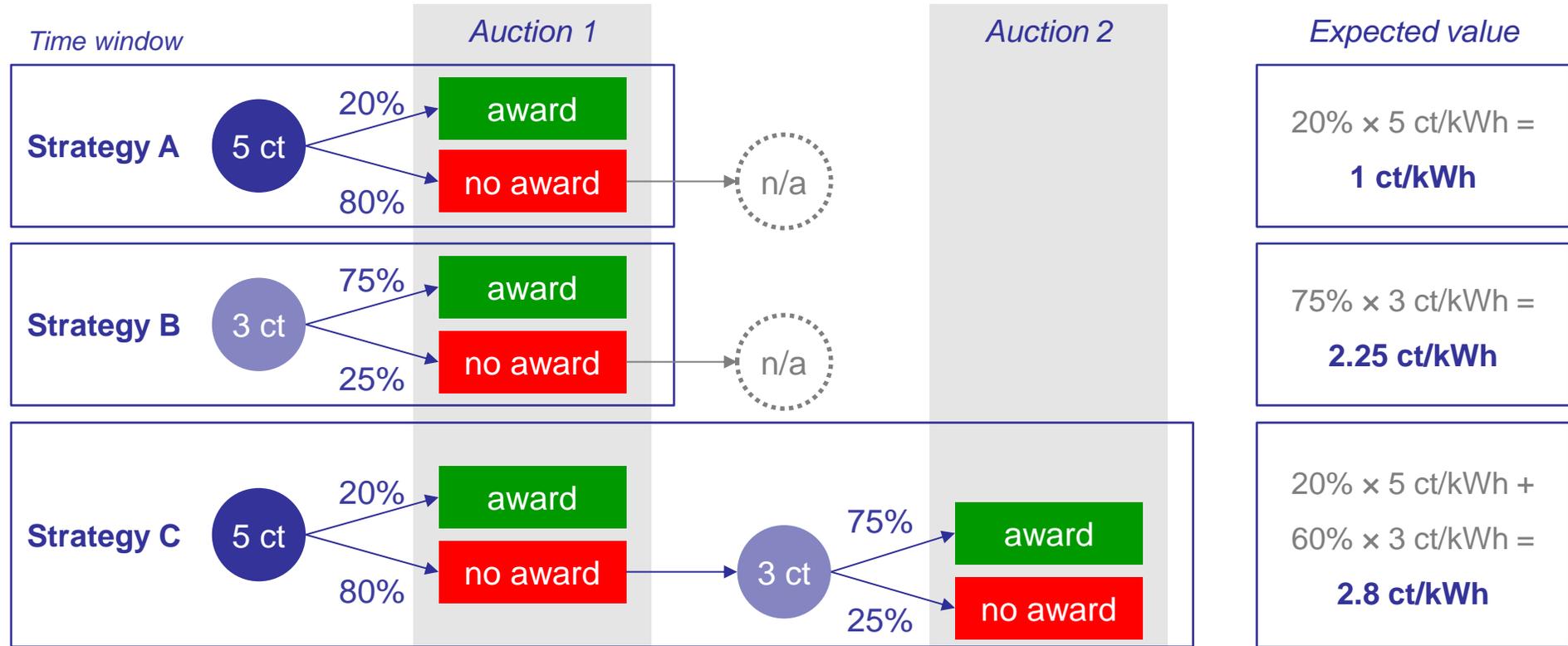
* Probability generally differs for every auction. For simplification, a constant success probability is assumed in this example.

TEAM CONSULT
Gas.Power.Experience.

The time window is defined by internal and external factors

Internal factors	External factors

Internal factors

- Expiration date of permits

- Loan commitments

- Options in procurement contracts

- Resource availability (e.g. construction personnel and machinery)

- Delivery obligations

- ...

External factors

- Expiration of current legal framework

- Changes to regulatory terms

- Thresholds (e.g. maximum capacity/number of awards per year)

- Available auction dates

- …

Negotiate for maximum flexibility

Observe and react

TEAM CONSULT

Gas.Power.Experience.

Depending on market environment and cost competitiveness, a customized bidding strategy can be determined

Initial situation	Strategy	Appropriate if…
Stable market and competitive environment Uncertain market and competitive environment	High bid value in first auction, decrease value in next auction if necessary	… no immediate award is required to implement project in due time
Expectation of falling cost for competitors' projects Short time window for project implementation	Immediate auction participation with low bid value	… wind park has to be operational as soon as possible
Expectation of improving competitiveness in later auctions	Wait and participate when competitiveness has improved	… one of the following can be expected: • decreasing number of participants • increasing costs of competitors • advantages due to regulatory changes

TEAM CONSULT

Gas.Power.Experience.

Legislative changes may be one of the factors influencing the bidding strategy

1

Number of bids and clearing price at the German auctions for onshore wind energy

5.78

4.29

sufficient for realization?

3.82

5.28

6.28

6.30

clearing price (€ct/kWh)

217

169

171

87

110

96

87

number of other bids

64

39

22

15

4

number of Citizens' Energy bids

2017

2018

2019

July 2017
Bill passed to restrict privileges
for Citizens' Energy Projects

Jan 2018:
Restriction of privileges comes into effect
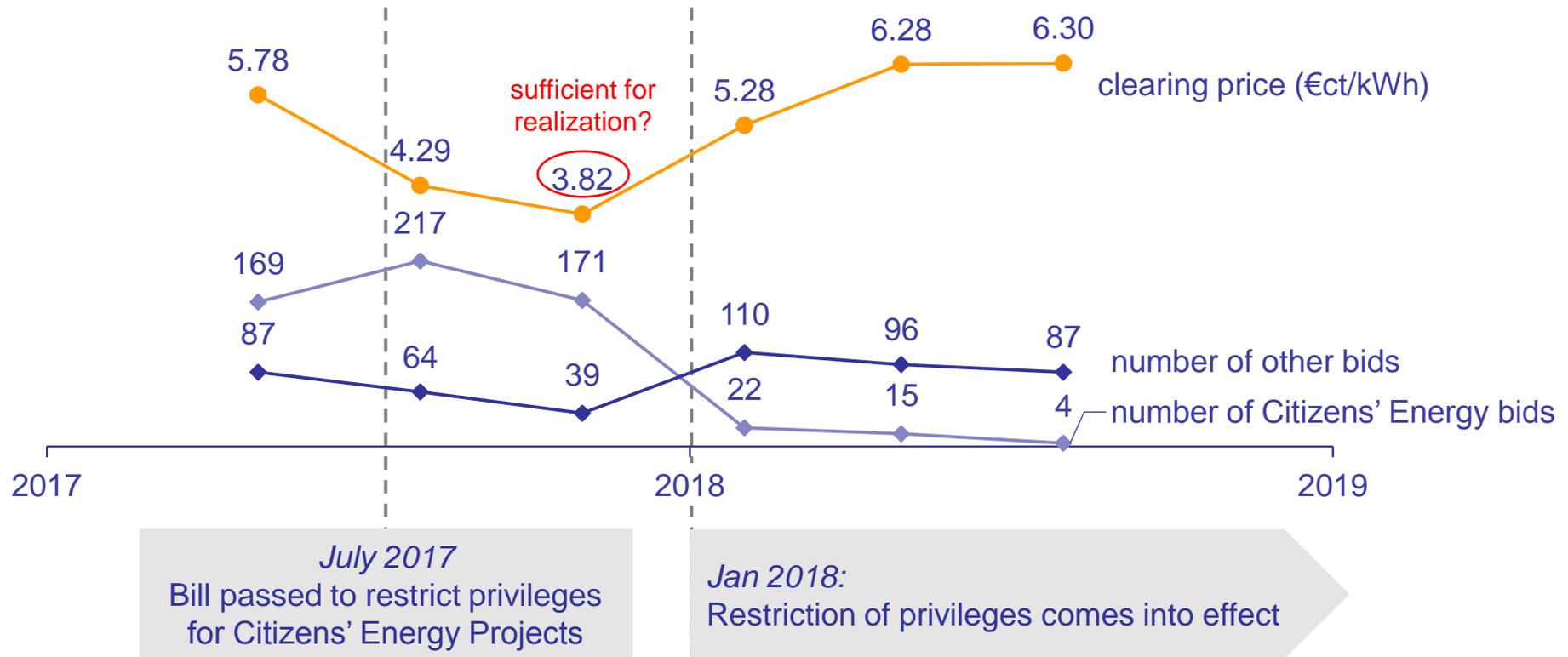
Source: Bundesnetzagentur, TEAM CONSULT analysis

Ideally, the own bid price is the highest bid to receive an award

1

- Capital expenditures
- Operational expenditures
- Cost of capital

▼

| Minimum bid price (e.g. net present value = 0) | **+** | Potential premium | **=** | Actual bid price |

▲

- Expected electricity price
- Expected load factor
- Expected life span

Available time window

▼

Award probability, depending on

- Number of competing projects
- Cost competitiveness of own project
- Bidding strategy of competitors

low bid price → *increasing profitability, decreasing probability* → high bid price

An analysis of the market environment helps to gauge the bid price range

1

Factors to consider:

- Current and future investment costs

- Costs of capital (WACC)

- Site-specific load factors

- Machine life time

- Operating costs

Average total installed costs ($€_{2016}$/kW)

Germany

France
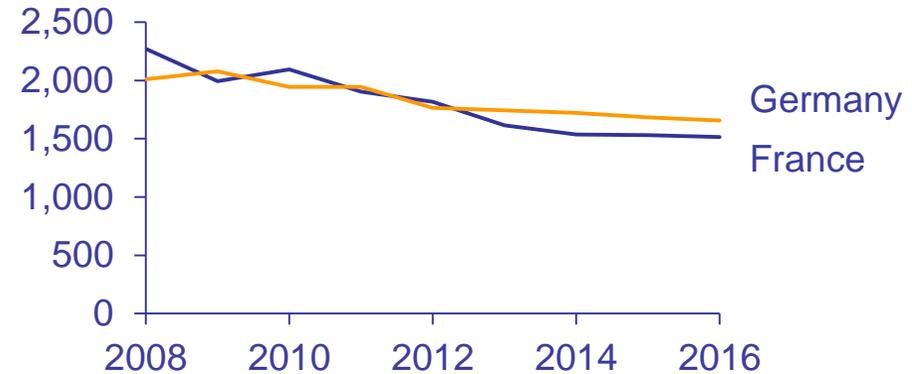
Weighted average cost of capital (WACC)

6.0%

6.9%

3.5%

3.9%

Germany   France
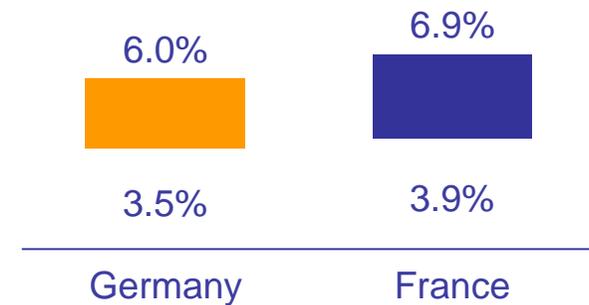
Source: IRENA, DiaCore, TEAM CONSULT analysis

TEAM CONSULT

Gas.Power.Experience.

Renewable energy auctions are not a game of pure chance
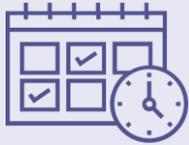
A long **time window** helps to optimize the trade-off between award price and award probability.

Depending on market environment and cost competitiveness, a customized **bidding strategy** can be determined.

Ideally, the own **bid price** is the highest bid to receive an award. A market analysis helps to gauge the bid price range.

TEAM CONSULT
Gas.Power.Experience.

Agenda

1 Bidding Strategies in Renewable Energy Auctions

2 **About Team Consult**

TEAM CONSULT – Expert for the energy sector

2

Reliability through expertise

- Consulting for the energy sector for 30 years.

- Founded in Hamburg, office in Berlin since 2004

- Experts with background of the energy sector

- International and national projects

- Cooperative partnership with the industry on eye-level

TEAM CONSULT

Gas.Power.Experience.

Team Consult is a strategic business consultancy focusing on the power and natural gas/LNG sectors

Business Unit	Focus
NATURAL GAS	Natural gas business along its pipeline-based value chain, incl. procurement, transport, storage, gas-to-power, gas sales and trading
LNG	Importance of liquefied natural gas as global supply source, incl. new and small-scale applications (e.g. LNG as fuel in the transport sector)
ENERGY TRANSITION	Transition of the energy sector and design of the future energy system, in particular role of renewable and conventional power generation
ENERGY STORAGE	Role of new energy storage solutions (such as batteries and Power-to-X technologies) as missing element in order to reach goals of the energy transition ("Energiewende")

TEAM CONSULT
Gas. Power. Experience.

Our consultancy services are flexibly tailored to the requirements of our clients

2

Service	Expertise
ARBITRATION	Support in arbitration proceedings in different roles and with different services
STRATEGY DEVELOPMENT	Development of company, business unit and optimization strategies, support of cooperation agreements and investment and divestment decisions
STUDIES & REPORTS	Conduct of market studies as well as expert reports on individual questions in the energy sector, including support on investment decisions, M&A transactions and due diligence
REGULATORY MATTERS	Design of policy instruments and regulatory measures and assessment of the consequences of changes in regulation
TENDERING PROCEDURES	Energy purchase, tendering of natural gas and renewable energy
CONTRACT MANAGEMENT	Negotiation of new and existing contracts including price reviews

TEAM CONSULT

Gas.Power.Experience.

Team Consult's analytical modules for the German and European energy markets

2

Demand & supply

- Demand under different policies and technologies
- Medium to long-term demand:
  – By region
  – By segment
  – By energy
- Medium to long-term supply (production, LNG, pipeline, PtG)

Power & heat

- Existing and future projects:
  – Technical: fuel, capacity, efficiency, CHP, location etc.
  – Commercial: ownership, commissioning, marginal costs etc.
- Merit Order and Spark Spread model
- Decommissioning forecast
- Investment models for plant expansion (capacity, storage, CHP)

Transport & distribution

- Gas TSOs & DSOs:
  – Technical: system length, diameter, compressors, entry/exit points etc.
  – Commercial: tariffs, revenues, investments, EBITDA, ROE etc.
- Absolute and specific indicators
- Benchmarking

Gas storage

- Existing and future projects:
  – Technical: type, working gas volume, rates, filling level etc.
  – Commercial: ownership, bookings, transport fees etc.
- Tariff calculator
- Benchmarking
- Storage demand model
- Merit order model

Power-to-X

- Pilot project facts
- Investment model and sensitivity analyses (utilization, power price, investment costs etc.)
- Key performance indicators: NPV, ROI, IRR, LCOE
- Benchmarking to other storage technologies

LNG

- Existing and future projects:
  – Technical: capacity, storage, rates, ship size etc.
  – Commercial: ownership, terms, bookings, grid fees, port fees etc.
- Tariff calculator
- Benchmarking
- LNG contract data base
- Global and regional supply/demand

TEAM CONSULT
Gas.Power.Experience.

Disclaimer

Copyright

This presentation has been prepared by TEAM CONSULT G.P.E. GmbH (Team Consult) for the DFBEW Conference "Ausschreibungen für Windprojekte in Deutschland und Frankreich". It is in its entirety the intellectual property of Team Consult, and is thus protected by copyright.
The presentation was prepared for conference attendants. Disclosure of to any third party is only permissible as a whole document including this disclaimer.

Non-liability

This presentation is based, among other things, on information, the validity and completeness of which is not the responsibility of Team Consult. Therefore Team Consult cannot assume any liability for the completeness, accuracy and up-to-date nature of the data used in this presentation.
This presentation should only be evaluated by the recipient in connection with oral comments on the date of presentation.

TEAM CONSULT

Gas.Power.Experience.

Contact details:

TEAM CONSULT G.P.E. GmbH
Robert-Koch-Platz 4
10115 Berlin
Germany

T.: +49.30.400 556 0
F.: +49.30.400 556 99

info@teamconsult.net
www.teamconsult.net