

Toward Global Comparability in Renewable Energy Procurement

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Background

- Prices from winning bids of auctions and power purchase agreements (PPAs) are increasingly used as an indicator of project costs and financial performance
- Price data are often publicly available and represent a binding commercial commitment
- The face value price from renewable energy procurement and the (levelized) generation costs are rarely the exact same, which is often not accounted for
- Comparing procurement prices at their *face value* among different auction rounds and countries, technologies, and over time can lead to misrepresented results

Face value
of an auction or
PPA contract

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Lifetime revenues
and values obtained
by a project

Research Questions

How can procurement prices be compared like-for-like?

... Across jurisdictions and over time

... To financial performance metrics such as LCOE

How does the project revenue and value compare across global offshore wind projects?

Approach & Method (1/2)

1. Distinguish conceptually between financial performance metrics

	Known Parameter	Coverage
LCOE	Cost	<i>Total</i> project cost
System LCOE	Cost	<i>Total</i> power system cost
LRVE	Price	<i>Total</i> project revenue and (monetized) value
LPPA	Price	PPA revenue
HER	Price	Energy-based revenue

LCOE = Levelized Cost of Electricity

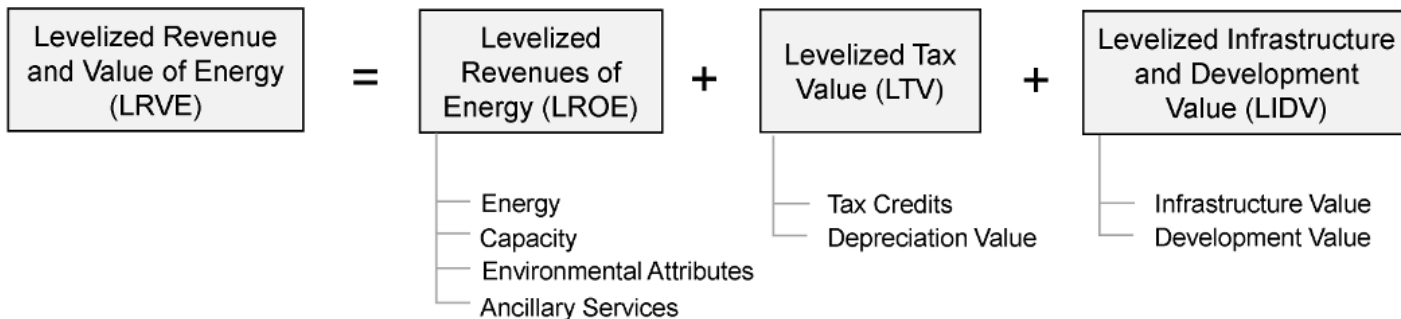
LRVE = Levelized Revenue and Value of Electricity

LPPA = Levelized Power Purchase Agreement

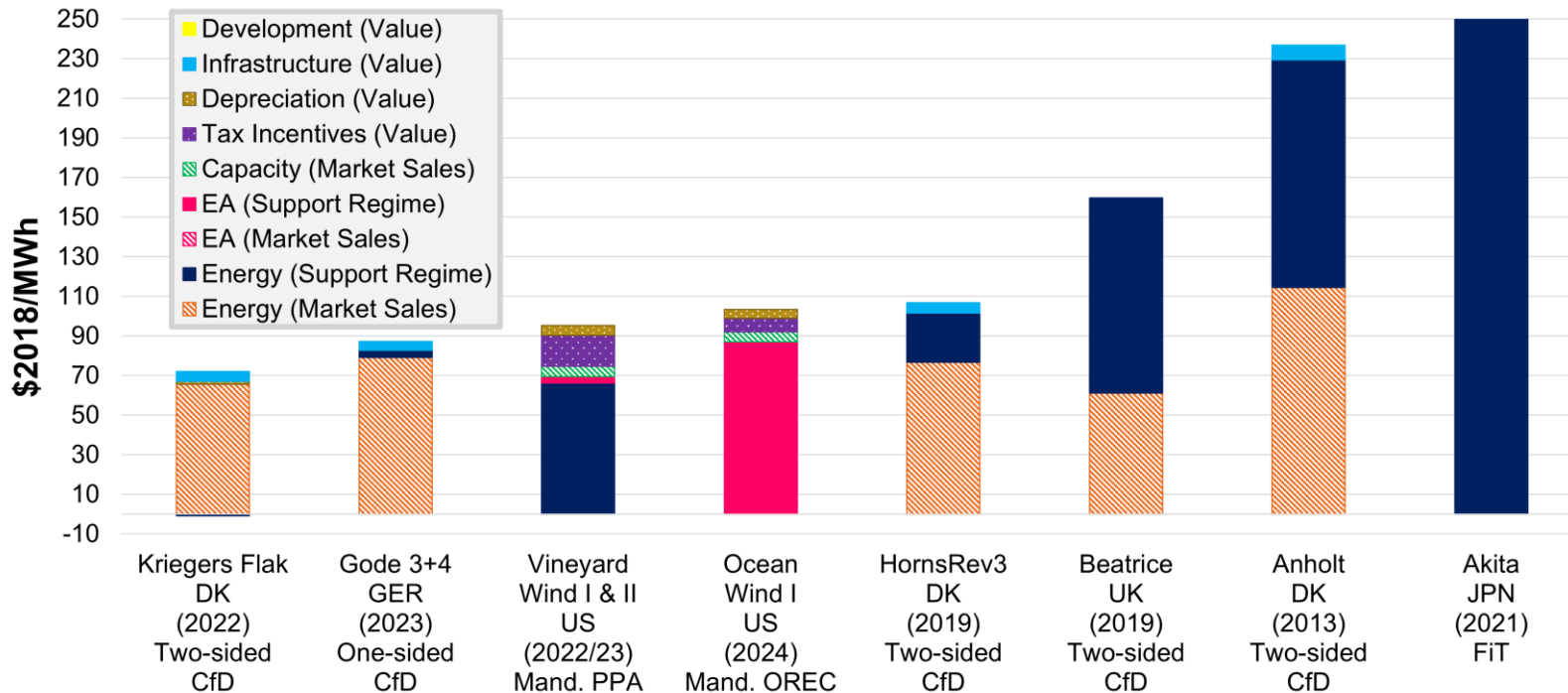
HER = Harmonized expected revenue (Jansen et al. 2021)

Approach & Method (2/2)

2. Represent project revenue and value holistically and levelized (\$/MWh) in a cashflow model, under consideration of the applicable support regime(s) (e.g., one-sided / two-sided Contract-for-Difference, PPA, feed-in tariff), market, tax, and regulatory environment



Findings

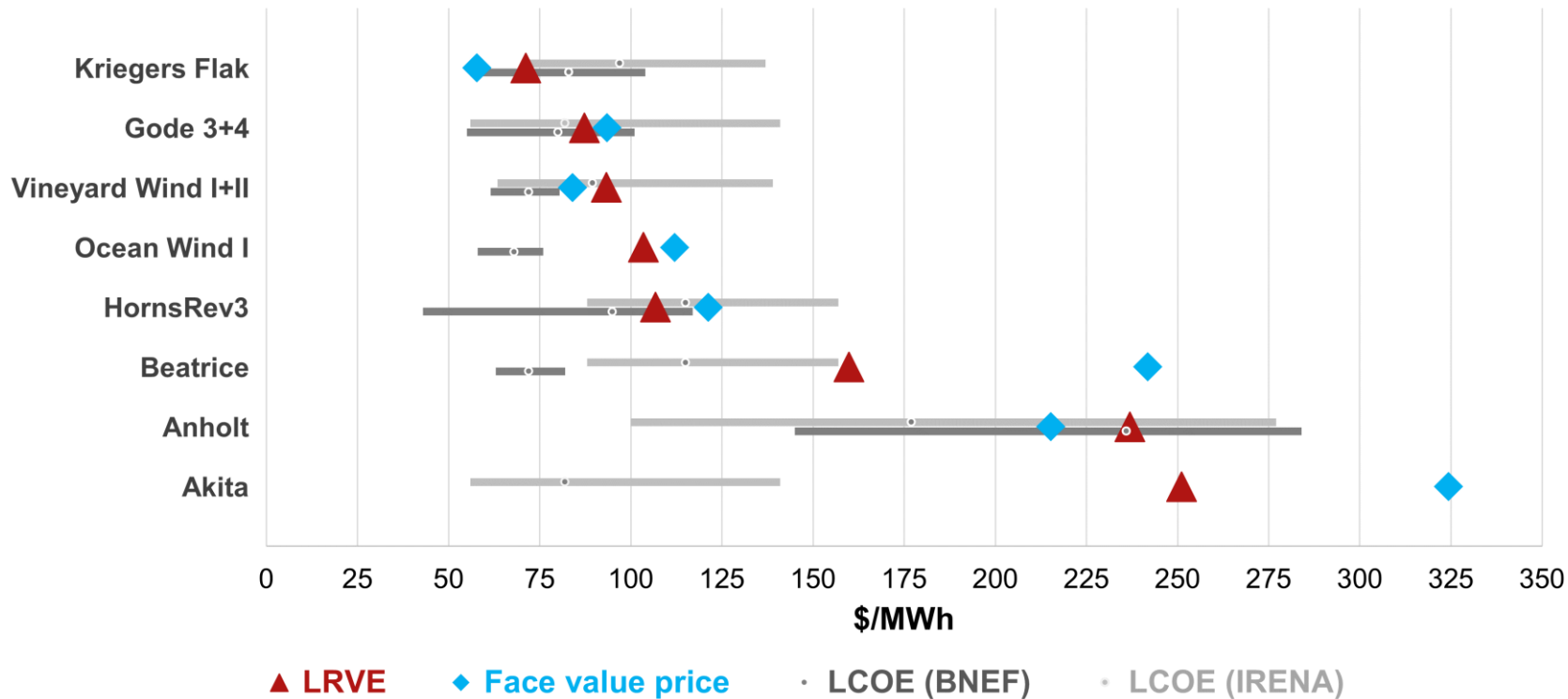


Levelized revenue and value of global offshore wind projects (LRVE)

EA = Environmental Attributes
 CfD = Contract-for-Difference
 PPA = Power Purchase Agreement

OREC = Offshore Renewable Energy Certificate
 FIT = Feed-in Tariff

Findings



Calculated LRVE compared with face-value prices and LCOE estimates

Findings

- Interpreting renewable procurement prices at their face value can be misleading
- New method shows how renewable procurement prices can be compared like-for-like and to LCOE
- The level and composition of offshore wind revenue and value varies globally; we hypothesize that the difference in LRVE level is due to:
 - Siting parameters and access to port and grid infrastructure
 - Local and experienced supply chain
 - Size of plant and turbine
 - Higher risk exposure from a support regime and market environment is associated with a higher risk premium levied as part of the auction or PPA bid
- Support regimes remain essential even when direct subsidy payments decline

Limitations and Future Applications

Limitations

- Conclusions drawn from eight offshore wind projects and a single set of price projections only
- Data availability might limit applicability of LRVE metric

Future Applications

- Validation of LCOE estimates through comparison with LRVE
- Extend metric to other power technologies
- Relative risk exposure
- Isolate individual factors from procurement prices
- Compare monetized project compensation (as reflected in LRVE) vs. market value

Thank you.

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Access our research here:

Beiter, Philipp, Lena Kitzing, Paul Spitsen, Miriam Noonan, Volker Berkhout, and Yuka Kikuchi. 2021. "Toward Global Comparability in Renewable Energy Procurement." *Joule Cell Press (in press)*. <https://doi.org/10.1016/j.joule.2021.04.017>.



References

Jansen, Malte, Iain Staffell, Lena Kitzing, Sylvain Quoilin, Edwin Wiggelinkhuizen, Bernard Bulder, Igor Riepin, and Felix Müsgens. 2020. “Offshore Wind Competitiveness in Mature Markets without Subsidy.” *Nature Energy*, July, 1–9. <https://doi.org/10.1038/s41560-020-0661-2>.

Schneider, U. (2020). “Offshore wind – Auction designs and why PPAs are only second best.” *Green Giraffe*. <https://green-giraffe.eu/presentations/offshore-wind-auction-designs-and-why-ppas-are-only-second-best>.