NERA
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GREEN PPAS AND RENEWABLES AUCTIONS
„TRUMP CARD“ OR LONG-TERM RISK?

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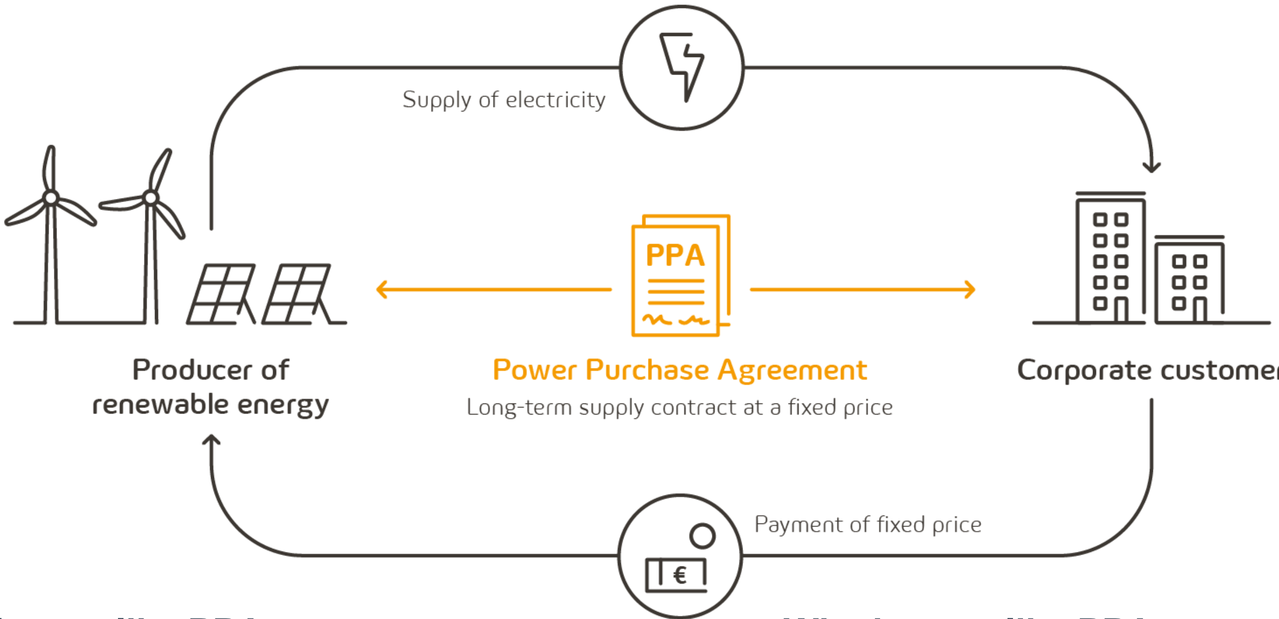
Insight in Economics™

Agenda

Principles of Green Power Purchase Agreements (PPAs)
Long-term contracts enabling subsidy-free RES investment



Why developers like PPAs

- **Certainty**– management of off-take risk and price certainty;
- **Bankability** – predictable and long-term income streams unlock additional financing options;
- **Access** – corporate PPAs can provide direct access to final customer

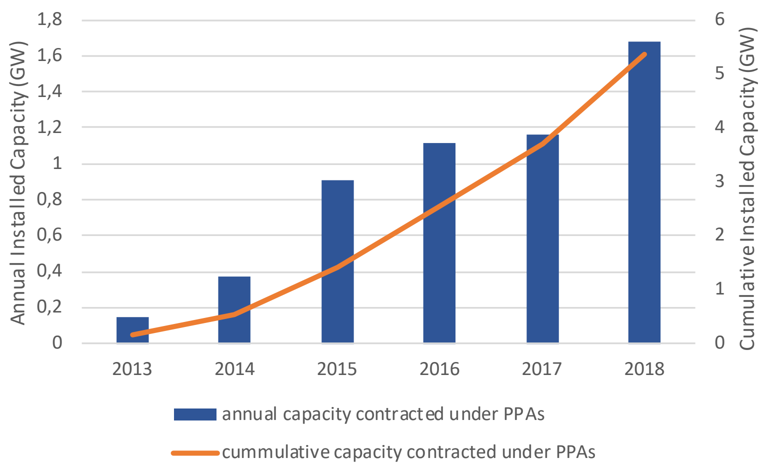
Why buyers like PPAs

- **Certainty** – long-term cost stability and improved price visibility;
- **Portfolio Optimisation** – long-term element that otherwise requires self-generation;
- **PR** – (regional) green energy purchases as a marketing / branding tool

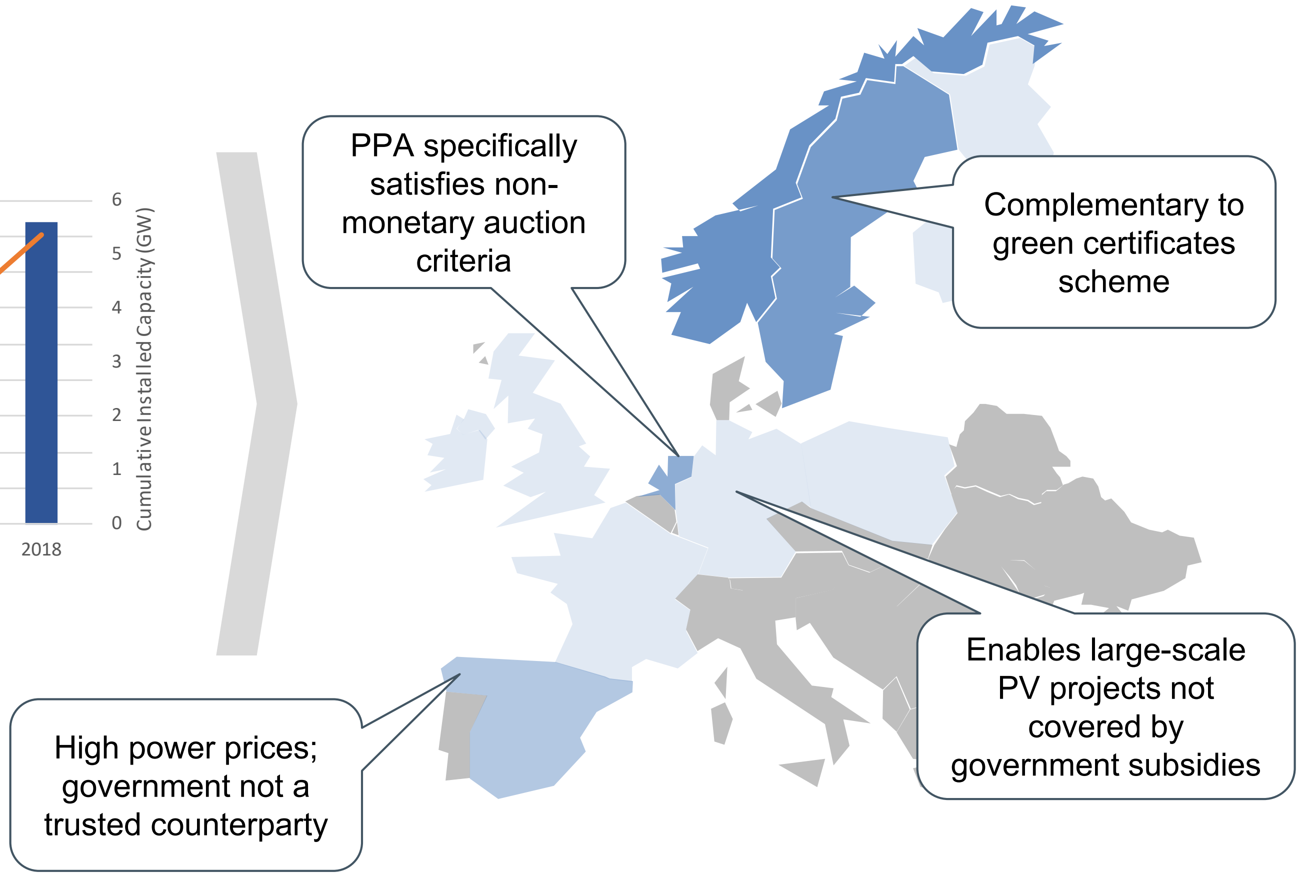
Source: NERA based on Innogy SE materials

PPAs can boost chances in auctions or help circumvent them
Generally less viable in countries with government-backed CfDs

PPA contract capacity grew 10-fold over past five years



Geographic distribution of PPAs unevenly distributed across EU



PPAs can directly influence outcome of RES auctions
Factors like risk mitigation decisive for award in NL “zero subsidy” auctions

Auction selection criteria

- Cost-Efficiency (40%)
- Risk Analysis (20%)
- Knowledge and Experience (4 factors) (4x10%)

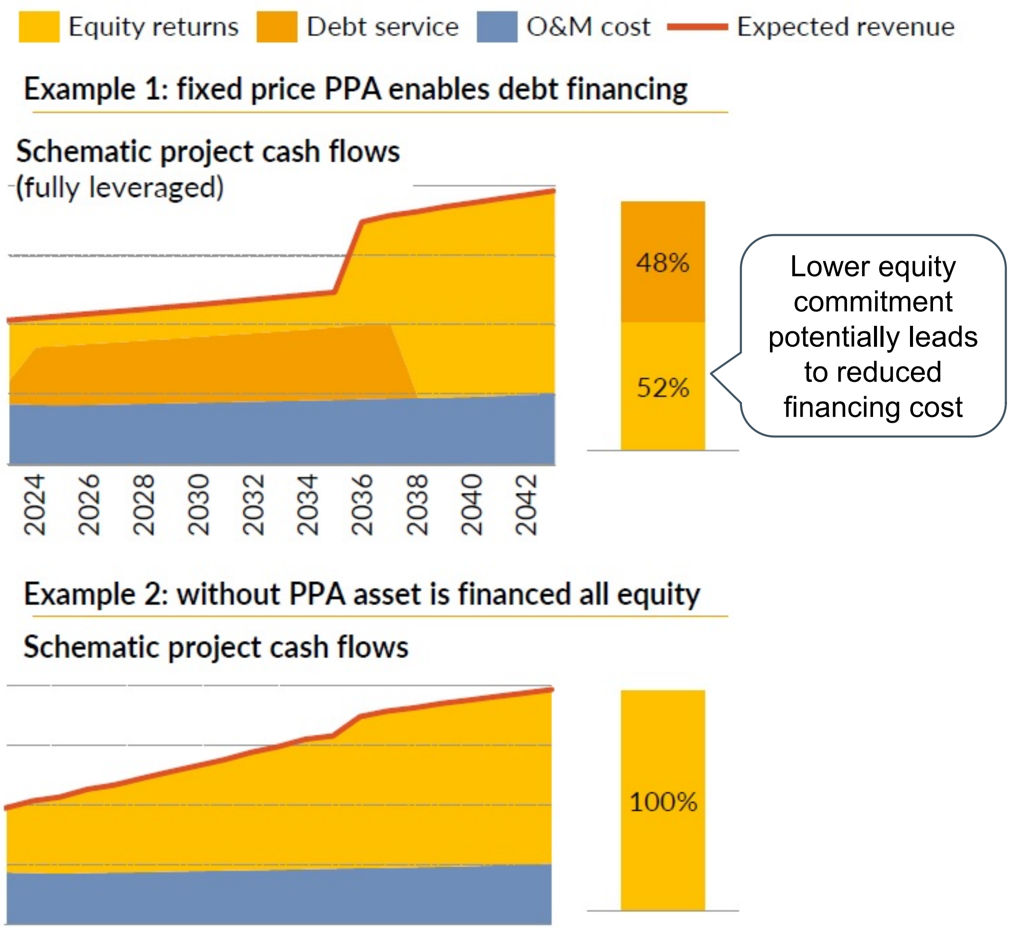
Sub-Criteria

- Electricity Price / Certificate Value Risk
- Construction Risk
- Operating Risk

"At the end Nuon-Vattenfall was the best in putting the risks of the electricity prices and guarantees of origin outside their project,"

– RVO

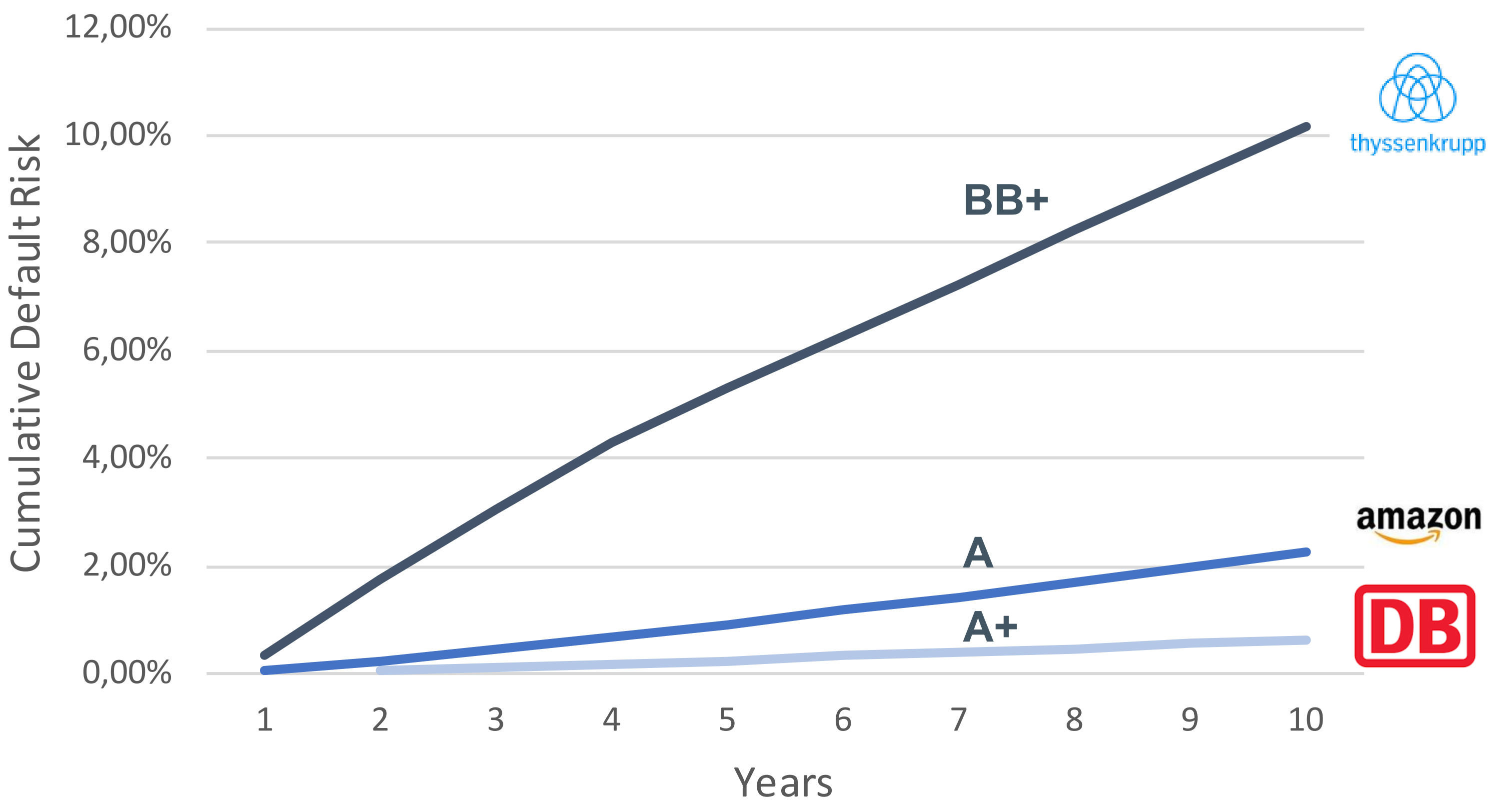
PPAs can indirectly influence outcome of RES auctions
PPAs enable lower project finance costs thereby improving competitiveness



- Rating agencies consider subsidy-free RES to be an increasingly viable alternative
- Projects will be concentrated in developed power markets where developers require lower rates of return
- While investment-grade ratings for merchant projects are possible, PPAs reduce necessary requirements (e.g. required debt-service coverage decreases from ~1.7x to ~1.3x)

Source: Strommarkttreffen January 2019; Aurora Energy Research Presentation.

…but your bid needs to account for long-term risks around the PPA
Even highly rated buyers accumulate default risk over time

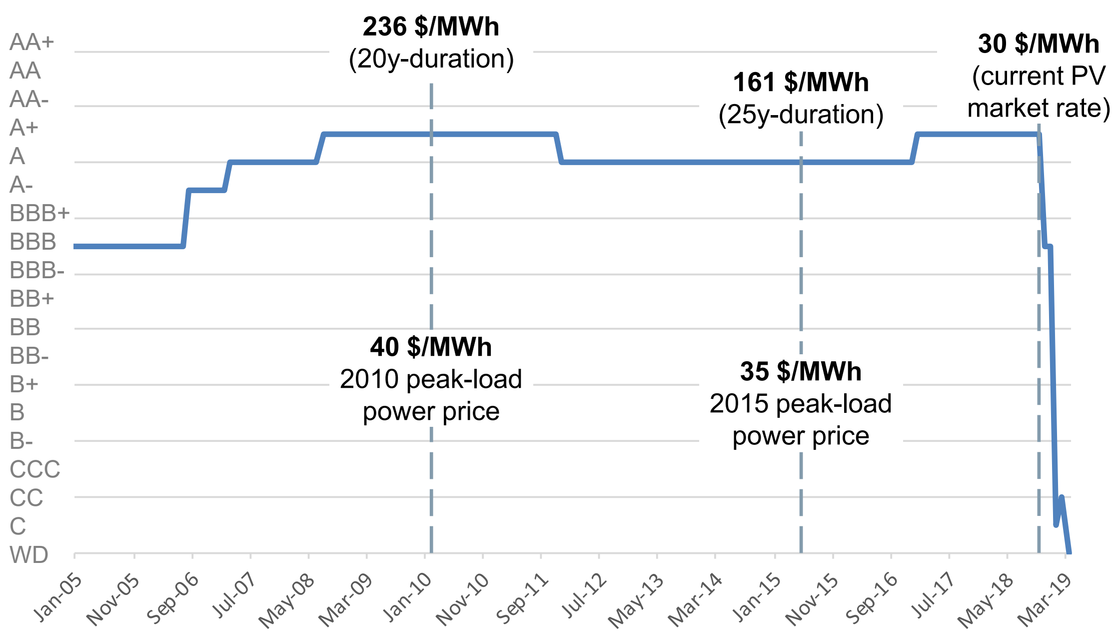


Note: Amazon.com, Inc. is rated between A+ and A- by different rating agencies. We thus present the average of these ratings.

Case study PG&E: The fate of California's RES programme
Defaults can cause large losses if market prices moved in meantime

- Californian utility PG&E acts as the counterparty for renewable PPAs totalling over $37 billion in commitments.
- In January 2019 PG&E filed for bankruptcy after facing damage claims of ~$30 billion for allegedly causing forest fires
- Treatment of PG&E's renewable PPAs during bankruptcy remains a controversial topic

PG&E's PPAs exposed to large risks due to contract/market price spreads



Arbitration risk for PPAs increases if contracts become unbalanced
Disadvantaged parties might seek ways to re-open unbalanced contracts

Reason to seek arbitration	Possible Arguments	Argumentative Requirements
PPA "out of the money" for one party	**Frustration of contract argument** "Changed market circumstances cause hardship under contract"	There were substantial changes in market environment These changes were not foreseen when contract was concluded These changes cause hardship for the party
	Competition argument "Counterparty abused dominant position to influence contract design in its favour"	Counterparty had dominant position in relevant market when contract was concluded Counterparty abused dominant position to influence e.g. pricing or contract provision

Less relevant in context of renewable corporate PPAs

Note: NERA does not offer legal advice. We offer economic expert advice for arbitrations, working alongside legal Counsel.

Summary
As PPAs for RES become widespread, novel risks need to be addressed

- PPAs can significantly increase your chances of successfully bidding in an auction
  - **directly** (e.g. if the award informed by "performance" factors); and
  - **indirectly** (e.g. by changing financing costs through bankability).

- But your PPA valuation needs to take account of currently under-appreciated long-term risks:
  - **Off-taker default risk**
  - **Arbitration risk**

- Do your due diligence. In the absence of established contract structures there is scope to manage the economics of those risks

About Us

Your Speakers

Dominik Huebler

- Associate Director in the Energy, Environment, Communications & Infrastructure Practice in Berlin
- 11 years of experience in consulting for infrastructure companies, investors, law firms and public institutions, e.g.:
    - Regulatory and market due diligence for off-shore wind projects, cogeneration and regulated networks in Germany and Europe
    - Advice on economic questions regarding the German Renewable Energy Act (EEG) and Combined Heat and Power Act (KWK-G) for different clients
    - Economic consulting in legal, arbitration and regulatory proceedings, e.g., on WACC estimation, the German nuclear moratorium and gas storage contracts
    - Several publications in energy economics, e.g., on §24 Renewable Energy Act (reduction of the support in the case of negative prices), evaluation of incentive regulation, etc.
- Economist with degrees from the Universities of Oxford and Cambridge

Georg Arndt

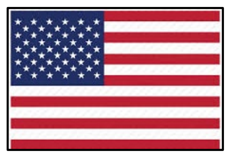
- Consultant in the Energy, Environment, Communications & Infrastructure Practice in Berlin
- 5 years of experience in consulting for energy companies, law firms and public institutions, e.g.:
    - Arbitration support for price adjustments under long-term gas supply and storage contracts, as well as damage claims following the 2011 German nuclear moratorium
    - Analysis of regulatory risks and opportunities associated with investments in offshore wind parks, including an in-depth examination of regulatory changes and their economic implications for potential investors.
    - Assessments of German electricity market regarding renewable energy expansion targets and subsidies, current market structure and recently discussed policy changes.
- Economist with a master’s degree from the University of Maastricht

Selected NERA experience with green PPAs

- Advice to a bidder in the context in the Dutch “zero subsidy” offshore wind auction covering
  - Experience with green PPAs in different countries
  - Impact of PPAs on bankability and likely financing cost
  - Overall investor appetite for co-investments under different PPA structures

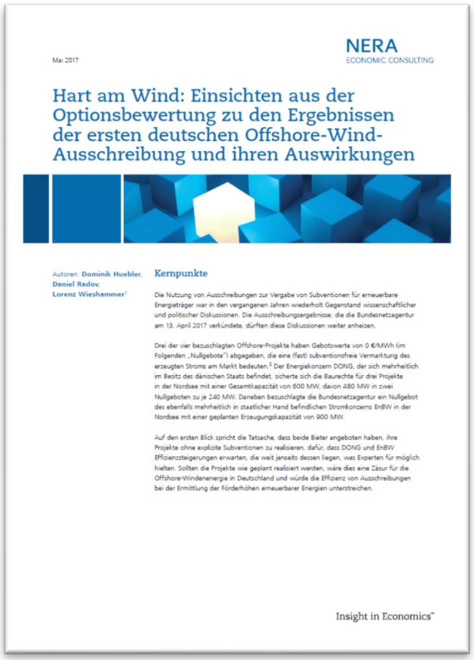
- Advice to an off-taker of various green energy PPA contracts in the Irish electricity market covering:
  - Analysis and modelling of correlation between wind farm output and power prices today and under increasing penetration of wind going forward
  - Evaluation of the commercial viability of different contract types
  - Pricing of different contract specifications e.g. reference prices, different floor specs, etc

- Advice to an Asian national power company on options for green energy tariffs including
  - Review of international experience with PPAs, mandatory and voluntary REC schemes
  - Analysis of the PPA market and implications of local implementation barriers



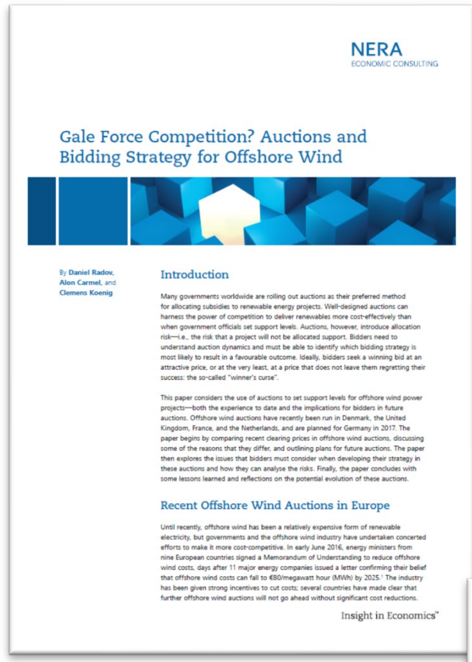
- Expert witness on behalf of a wind farm owner in litigation over an out-of-market PPA and attempted early termination, including
  - Benchmarking to price and non-price terms of long-term PPAs currently being executed in the market
  - Estimation of short-term spot market sales revenues using generator LMP for energy, RTO capacity and state-level green certificate revenues
  - Testimony on breach-of-contract damages and reasonableness of PPA interpretation

Want to know more? - NERA experts have published widely on the topic
Contact us if you want to receive our upcoming publication on green PPAs



https://www.nera.com/content/dam/nera/publications/2017/PUB_Offshore_EMI_German_A4_0417.pdf

https://www.nomos-shop.de/Spieth-Lutz-Bachmann-Offshore-Windenergierecht/productview.aspx?product=28510



https://www.nera.com/content/dam/nera/publications/2016/PUB_Offshore_Wind_A4_0916.pdf

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Thank you for your attention!

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