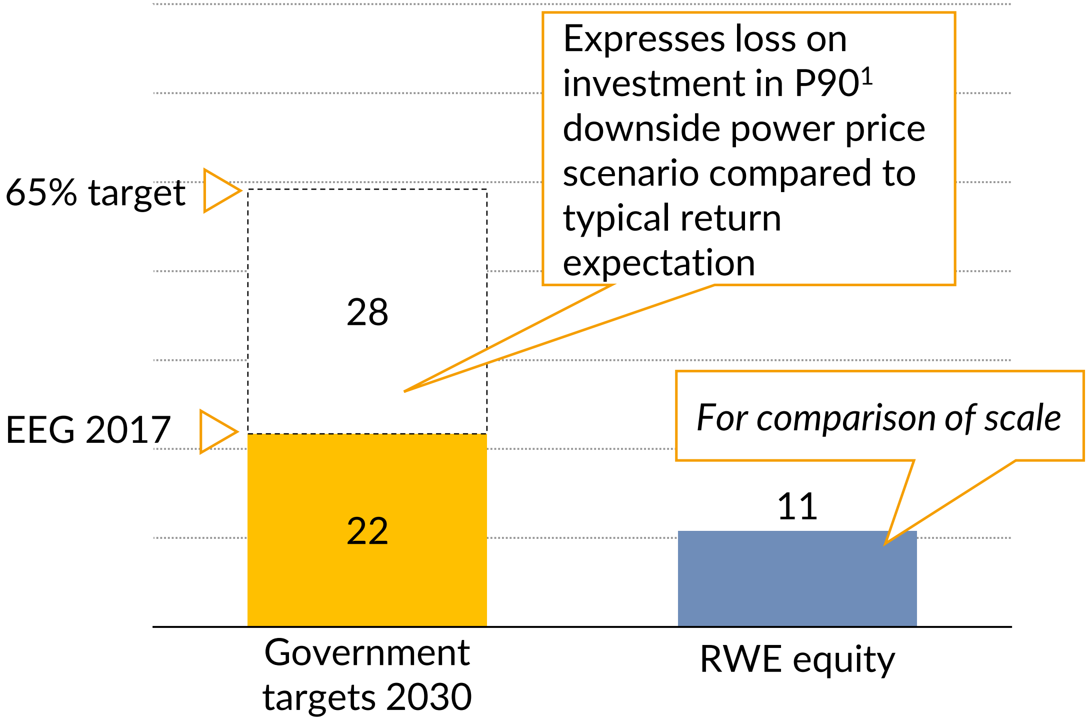
Can PPAs take the Energiewende to the next level? - the market of renewable PPAs in Germany

Berlin, 12. June 2019

Who can best carry the investment risk in the next phase of the Energiewende?

While on the brink of being competitive RES investments continue to bear significant Value at Risk

Cumulative value at risk of new builds until 2030
Billion EUR



Potential parties able to carry risk	Cost of Capital (WACC)
EEG – State guaranteed	3-5%
Corporate PPA	6-8%
Utility PPA	6-8%
Pure equity asset (*full merchant risk)*	9-12%

PPAs are a contractual tool to distribute risk and benefits to the most appropriate party

1) A P90 price scenario based on realistic changes of power price drivers, their correlation and their combined impact.

Source: Aurora Energy Research

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Examples of C&I[1] PPA off-takers and their rationales

Example companies	Perspective on PPA for power procurement	Reliable counter-party for debt finance
Google	• Electricity price has a tangible yet **limited effect on profitability** • Part of sustainable/**green branding** • **Scale** for competitive prizing	✓
DB	• **Guarantees price stability** for long-term demand • Electricity cost with high impact on overall results • Part of sustainable/green branding	✓
BASF The Chemical Company	• In addition to **own generation portfolio** • **Expertise in power sector** and market risks • Reducing price volatility of power demand	✓
METRO	• No or **lower credit rating** *(not investment grade)* • **Limited expertise in energy sector** and no own generation portfolio	✗

1) Commerce and industry

Source: Aurora Energy Research

PPAs aim to strike a deal between the energy production cost and a fair market value of the power delivered

Developers take the perspective of maximising returns during PPA negotiations…

In evaluating a corporate PPA deal, developers should consider:

1. What are the expected projects cost i.e. LCOE (levelized cost of electricity)
2. Do the terms increase project bankability, allowing to spread equity?
3. Do the terms increase project's profitability?

With declining subsidies, PPAs offer an opportunity to secure revenues for the project. This allows for debt financing, lowering the total project cost

VS.

…while off-takers focus on the perspective of the *fair market value* of power

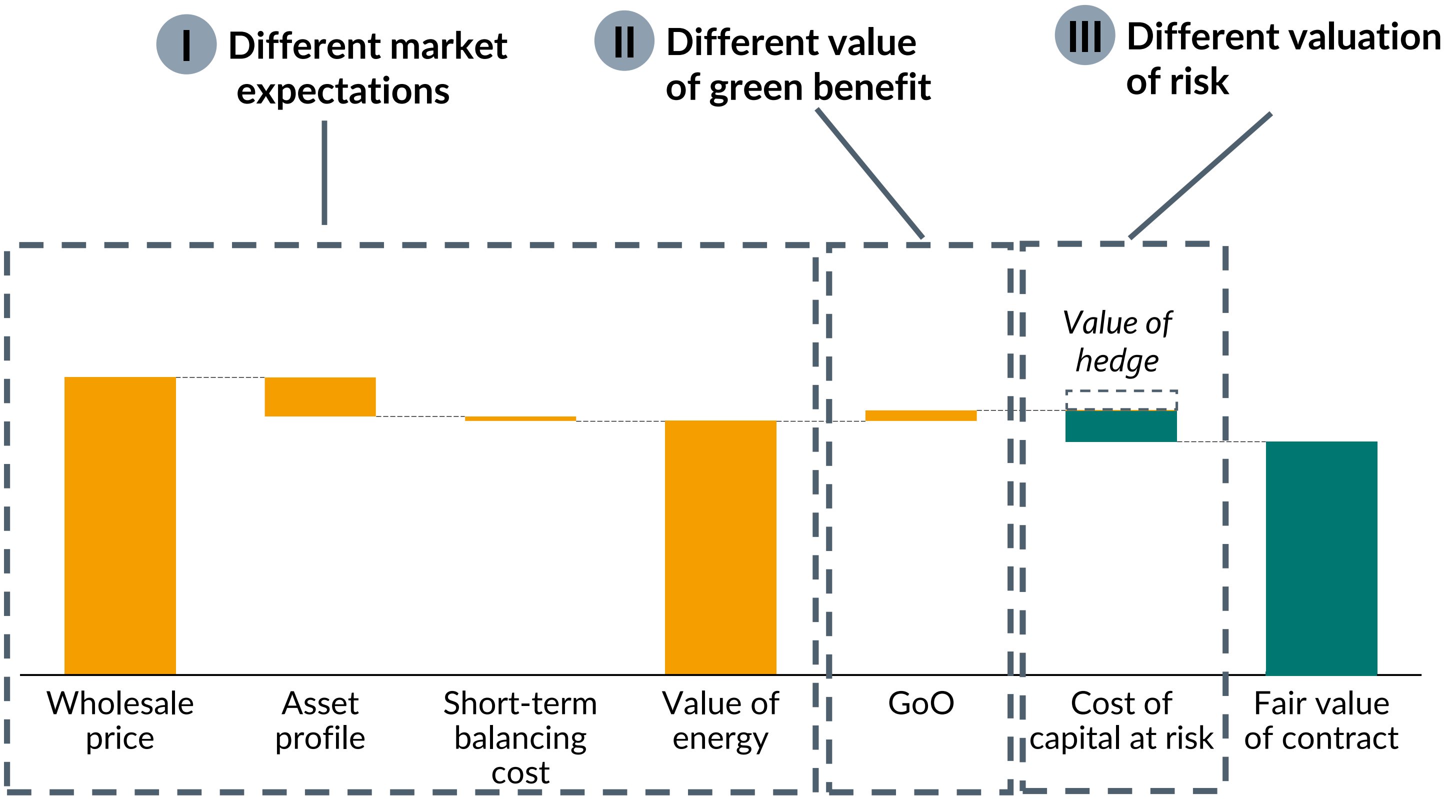
In evaluating a corporate PPA deal, off-takers should consider:

1. What is the fair value of the contract, given:
   - Cannibalisation and balancing costs
   - Cost of risk exposure
   - Hedging benefits
2. What is the value placed on green energy over conventional sources?

PPAs offer the opportunity for C&I power consumers to secure green energy supply. They can also guarantee price security

Source: Aurora Energy Research

A PPA contract is valued based on future power prices, the value of the green benefit and the valuation of the market risk



Natural parties to purchase PPAs have expectation of rising prices, high internal value of green benefit and the ability to absorb power price risk

Source: Aurora Energy Research

Corporate PPAs can cover 51 TWh or 13% of Germany's C&I power demand – a value of EUR 2 billion p.a.

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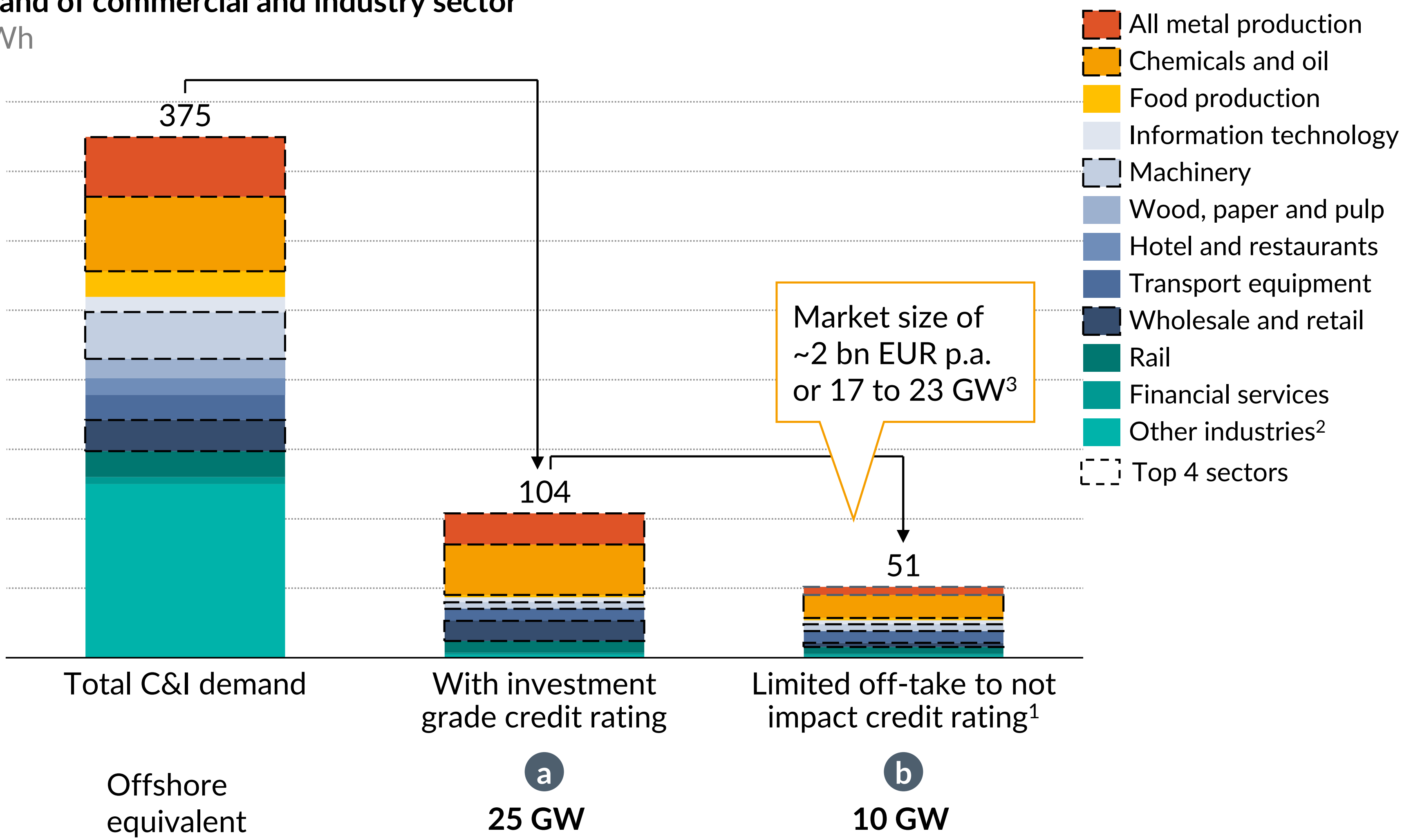
Demand of commercial and industry sector

In TWh



1)A synthetic approach for ratings based on interest coverage ratios was chosen and impact of risk on the ratio calculated. Risk could not exceed more than 30% of a rating range
2)Other industries include amongst others real estate (eg. LEG Immobilien), consulting (eg. KMPG), logistics (eg. Lufthansa, Fraport) & entertainment (eg. RTL). 3) Depending on RES portfolio

Sources: Eurostat, Monopolkommission, Moody's, various annual reports, Aurora Energy Research.

With the coal exit a total of 5 billion Euro of market risk leave the system, potentially allowing utilities to take on new risk

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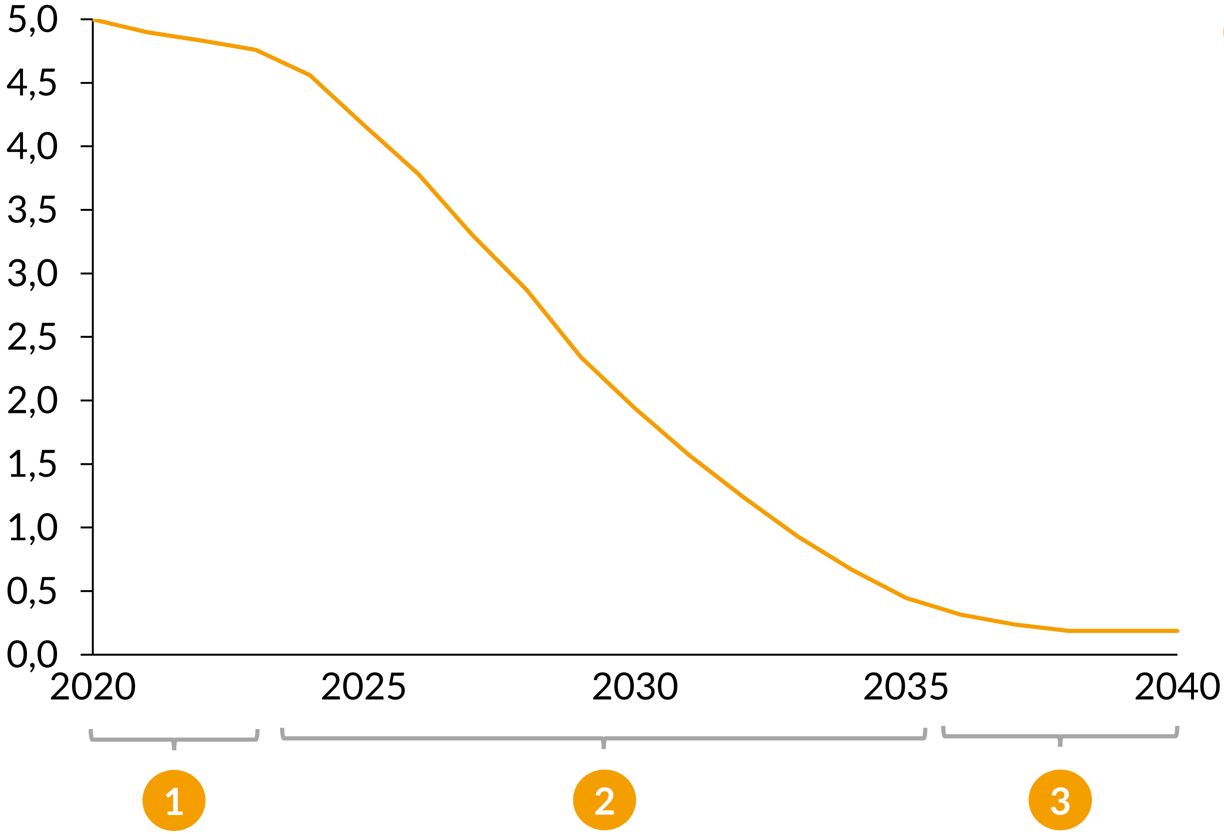
Cumulative Value at Risk of coal fleet between 2020 and 2040,
Billion EUR



1 Slow decrease
Total market risk declines as first plants approach closure

2 Steep slump
Succession of plant closures lead to rapid decline of remaing market risk

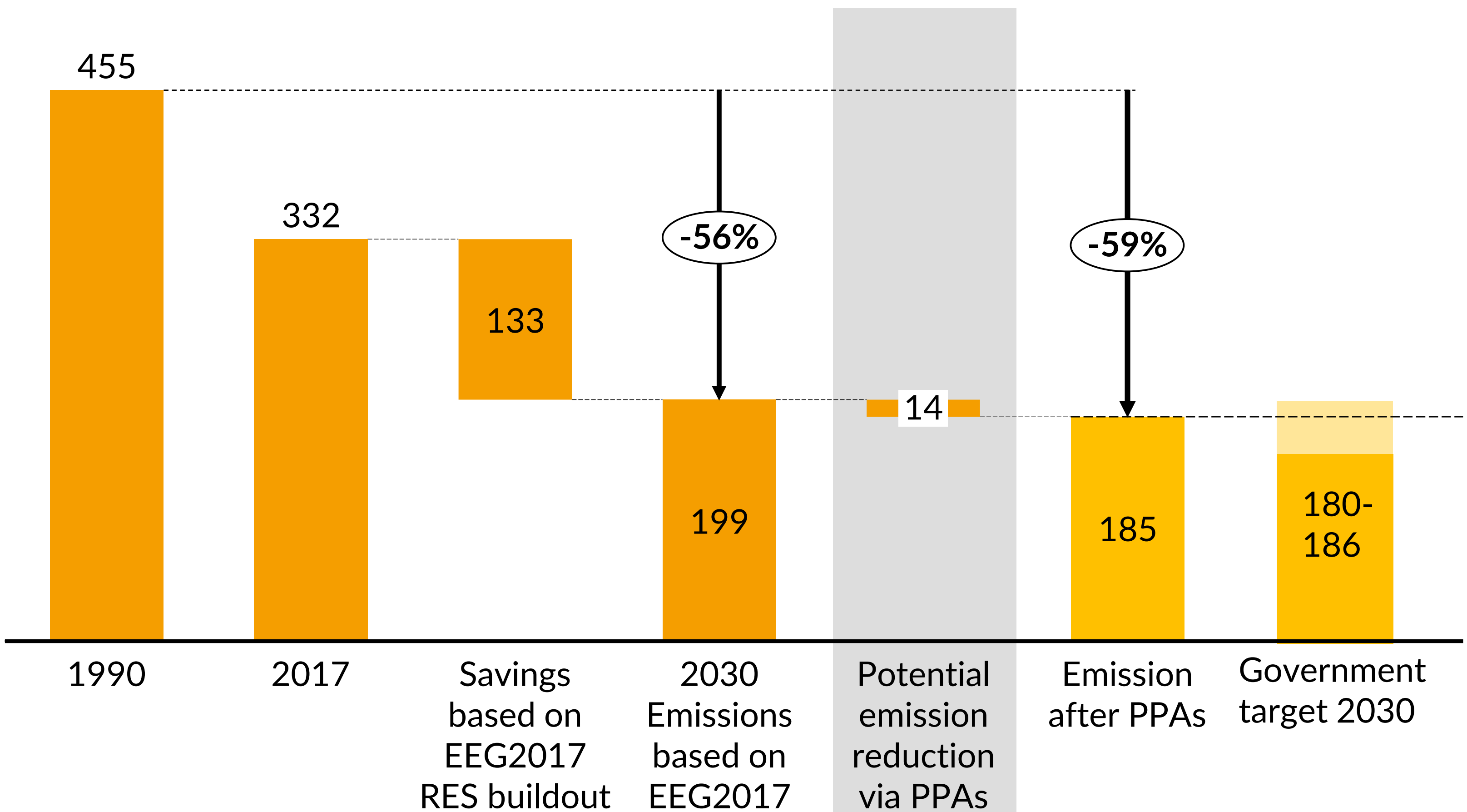
3 Coal exit complete
Last remaining plants shut down and market risk slowly approaches 0

Assuming an appropriate risk exposure in the current situation, the coal exit can free up the utilities' ability to take on further market risk through PPAs

Source: Aurora Energy Research

Additional[1] renewables financed through PPAs could be an additional building block in meeting the 2030 emission targets

Power sector emissions in Germany,
$MtCO_2e$ per year



1) In addition to subsidised renewable buildout under the EEG2017

Sources: Projektionsbericht 2017, Aurora Energy Research

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