- CONFIDENTIAL -

The role of Power Purchase Agreements in reaching Net Zero

26 April 2023

Building a better working world

Introductions – Phil Dominy – EY

Phil Dominy

Director

Strategy and Transactions – Energy

pdominy@uk.ey.com

+44 7786197352

Agenda

1. An introduction to corporate PPAs – the “What?”
2. The context for corporate PPAs – the “Why?” and the “When?”
3. The application of corporate PPAs – the “Where?” and the “Who?”
4. Differing models of corporate PPAs – the “How?”
5. And finally… what are the risks as well as the benefits?
6. Q&A – Open Discussion

Appendices – Further Information

1. An introduction to corporate PPAs – the “What?”

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A corporate PPA is a direct contract between corporate & generator

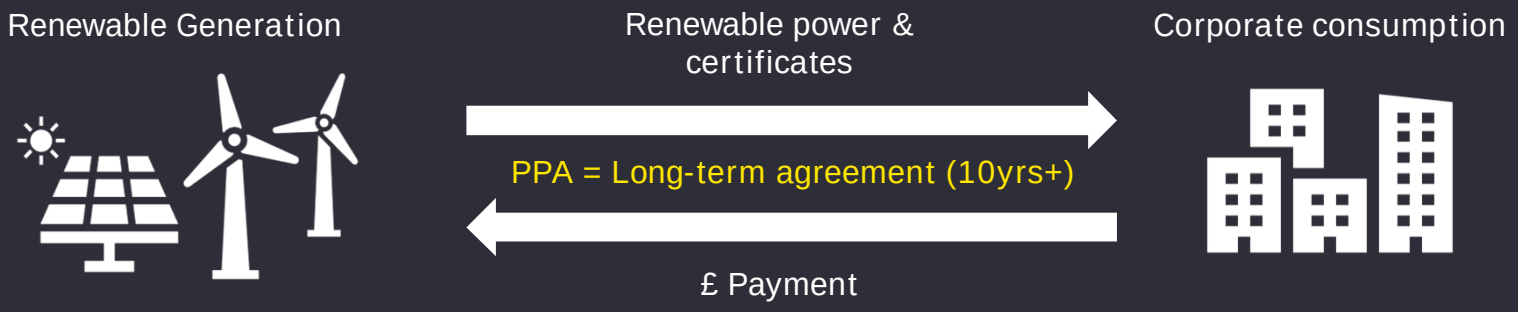
A Corporate Power Purchase Agreement is a long-term contract for a business to purchase electricity directly from a generator – either off-site or on-site

Characteristics of a corporate PPA

1. Direct relationship between corporate and the solar/wind project
2. Verifiable via renewable certification
3. Corporate PPA revenue enables the financing of the project - "additionality"

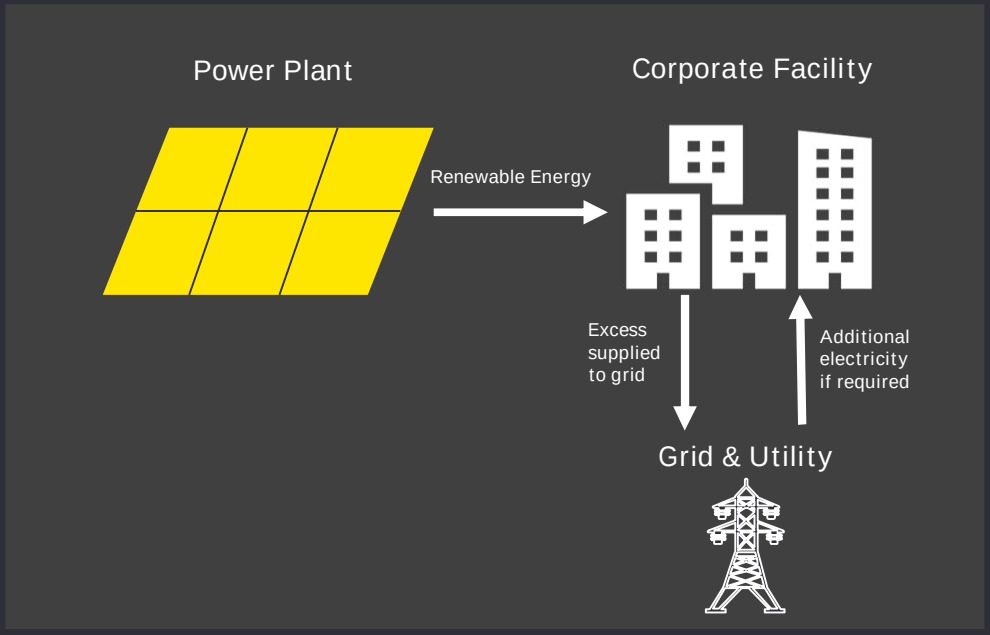
What are the key benefits for a corporate consumer?

1. To meet carbon/renewable targets
2. To reduce exposure to volatile power markets
3. To achieve savings versus Business as Usual
4. To demonstrate 'Good Corporate Citizenship'



Offsite PPAs achieve scale whereas Onsite PPAs are more visible

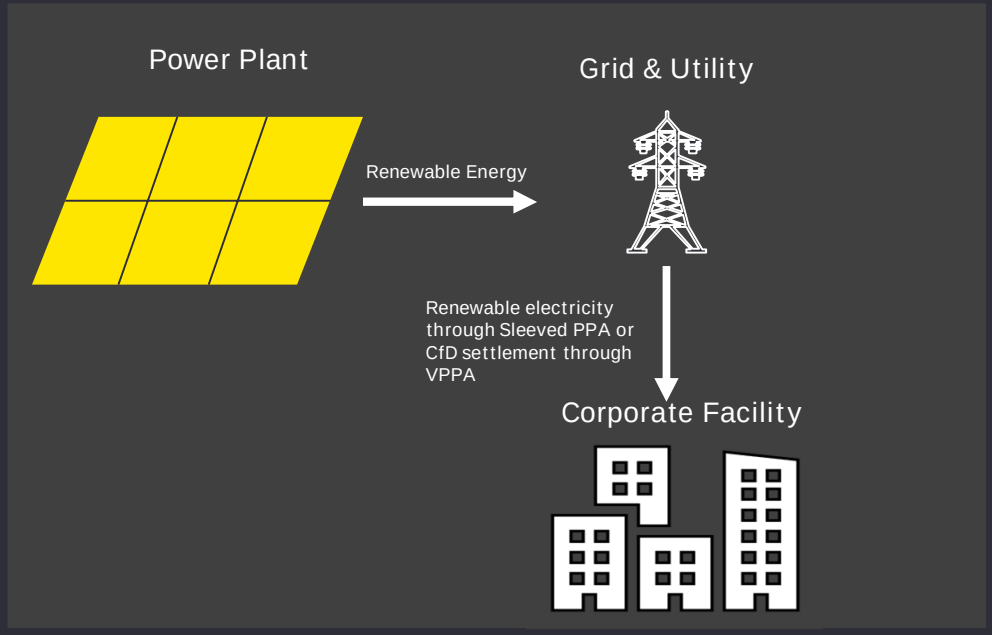
Onsite PPA - Overview



- Needs space on corporate's site or neighbouring land. This limits the scale of this solution.
- Developer covers the system installation and upkeep costs and retains ownership of the system.
- Contracts are longer term 15-25 years.
- Developer sells the electricity produced through direct wire to the corporate facility at a low fixed rate, saving non-commodity transmission-based costs.
- Corporate facility is also connected to the grid. It can sell any excess electricity to the grid (with a spill agreement)

Greater savings per unit of power but limited scale

Offsite PPA - Overview



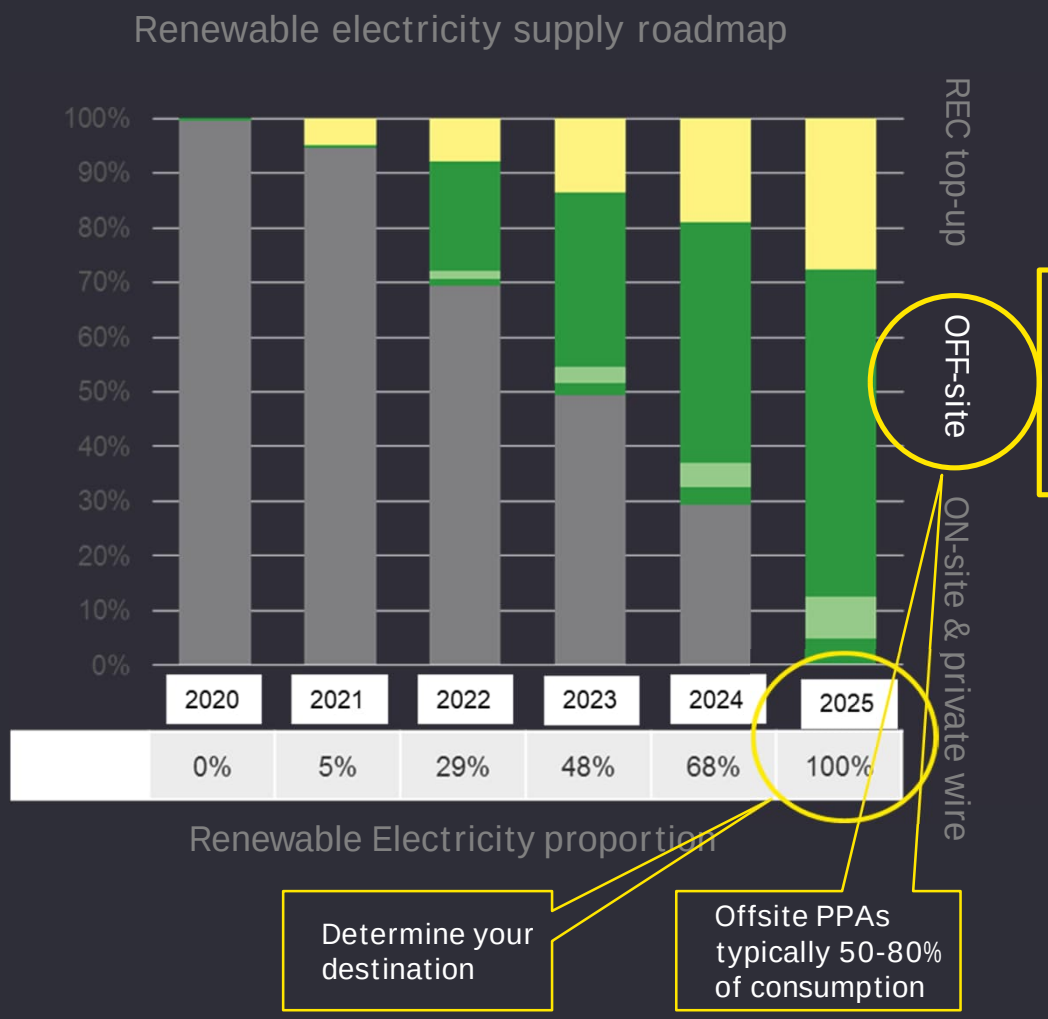
- No need to co-locate generation with the corporate facility.
- Offsite PPAs constitute a greater share of volume in greening corporate renewable energy portfolio.
- Developer covers the system installation and upkeep costs and retains ownership of the system
- Contract terms are mostly 5-15 years.
- Developer sells the electricity produced through the grid to the corporate facility at a price that's generally lower than wholesale price. (Non-commodity transmission-based costs still have to be paid.)

Lower savings per unit of power but greater application

Off-site PPAs play a key role in the hierarchy of low carbon measures

Corporates tend to set their destination first, establishing a renewables goal

A portfolio of options are typically needed to achieve stated targets



Option	Description	Benefits
Green Tariffs or Environmental Attribute Certificates (EACs)	▸ Purchase of unbundled EACs (e.g. GOs or RECs) or in a 'green' tariff from a utility. Flexible, short-term. ▸ Typically used to top-up PPAs to 100% but an extra operating expense ▸ Certificates may not be traceable to a specific asset.	Financial Carbon Reputation Additionality
Offsite PPAs	▸ Purchase of green power directly from third party generators through long-term sleeved or virtual PPA. ▸ Clear 'additionality' and reputation benefits and potential to achieve large-scale savings & price security.	Financial Carbon Reputation Additionality
Onsite generation	▸ Long-term undertaking to build and operate renewable energy generation on/near-site ▸ Could be via PPA or investment ▸ Visibility of project does benefit reputation, but typically only small scale (<10%) carbon and financial benefits	Financial Carbon Reputation Additionality

2. The context for corporate PPAs – the "Why?" and the "When?"

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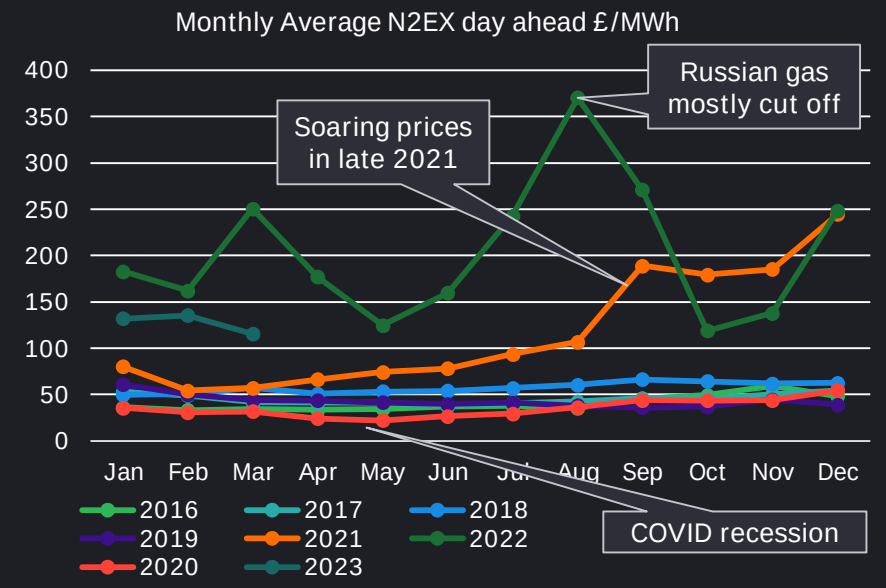
A PPA protects against commodity price volatility and provides advantage as a long-term hedge against high power prices

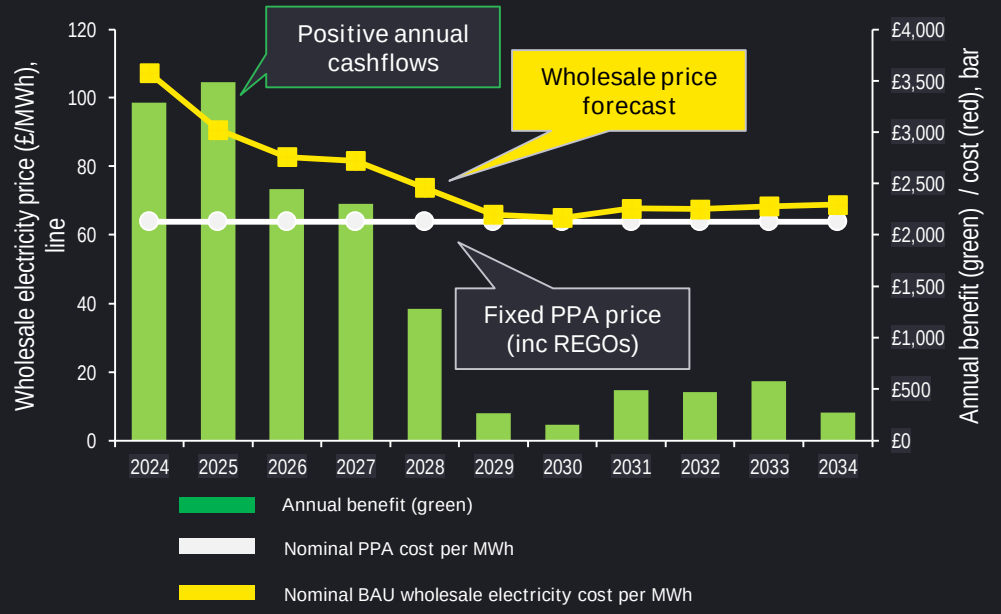
Protecting against long-term energy commodity price volatility…



Source: www.nordpoolgroup.com UK day-ahead N2EX

- There's been significant recent volatility in UK markets
- Driven by gas and carbon prices, intermittent renewables, and Ukraine invasion
- Rises and greater recent volatility in late 2021, 2022 and 2023 led near-term and long-term power prices to unprecedented highs
- Volatility in global equity markets added to the bullish sentiment

Low fixed PPA price provides +£11m UK cost savings for a large offsite PPA of 130 GWh…



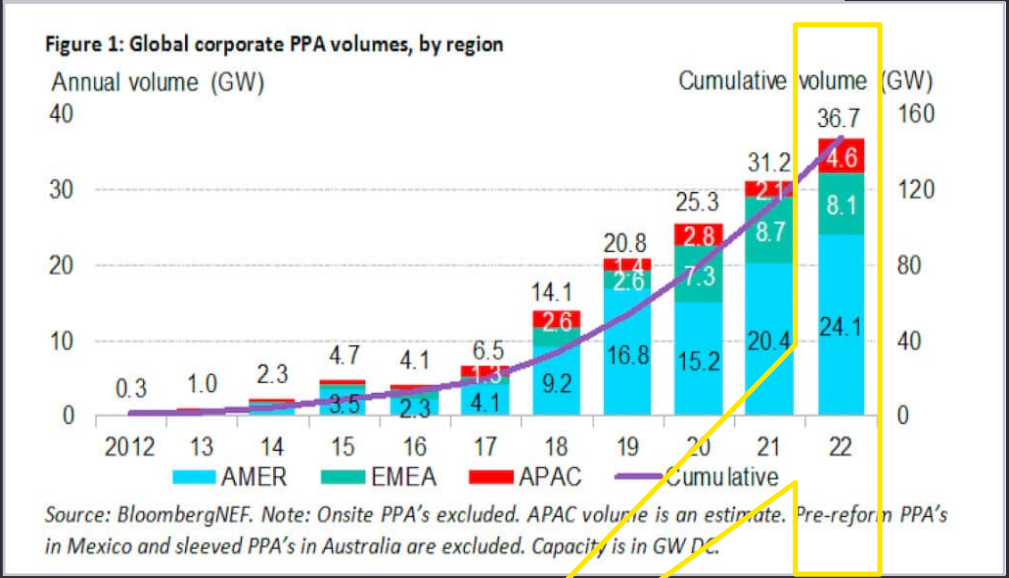
Source: EY analysis (from expected UK PPA 130 GWh wind technology project)

- Estimated NPV (Central price forecast scenario) = + £11m
- Total Carbon Saving Over 10 years = c.280,000 tonnes CO2

- Major commitment for 10 years, c.£83m in PPA power costs
- Significant benefits & risk management require an experienced advisor

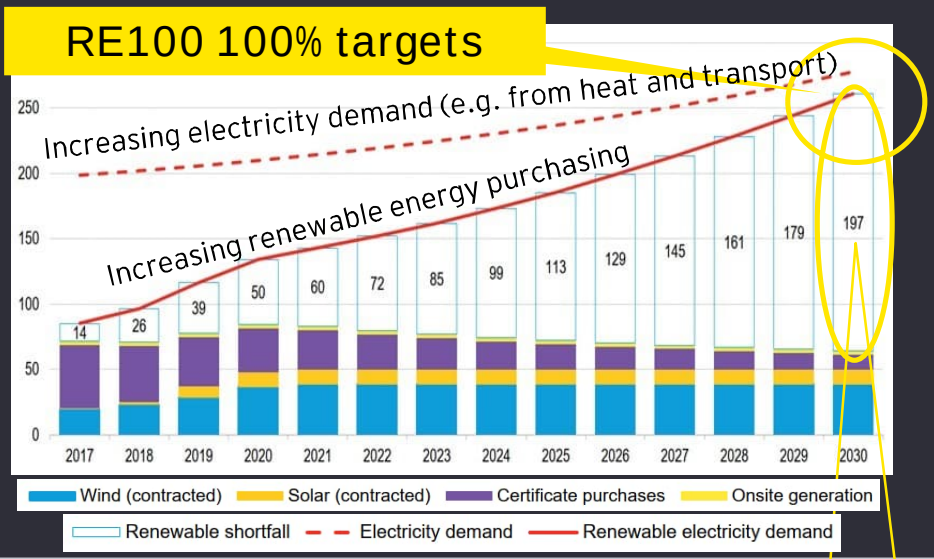
There is strong global corporate PPA growth and the need for more…

Global corporate PPAs – by Region



Source: Bloomberg NEF

Global projected renewables shortfall for the RE100



Sources: Bloomberg NEF, Bloomberg Terminal, The Climate Group, RE100 company sustainability reports
Certificate purchases are expected to decrease c.10% p.a.

PPAs expected to fill this gap

- 2022 data illustrates the strong growth of corporate PPAs and increasing spread from Americas (blue) into EMEA (green) and less rapid into APAC (red)

- The purple bar (above right) tracks the decline in 'unbundled' renewable certificate purchases (i.e. on their own without PPA) against the steadily increasing corporate demand for renewable electricity (red line)

Given the relatively small contribution from onsite generation and existing contracted PPAs, the resulting "gap" – a massive 197TWh by 2030 - will need to be filled by new corporate PPAs

3. The application of corporate PPAs – the “Where?” & the “Who?”

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2021 was a record-breaking year for European PPAs – but macro economic volatility in 2022 made the market more challenging

2022 witnessed 6.6GW of PPAs across 14 countries, with Spain still the lead market

More Solar PPAs signed than ever before:

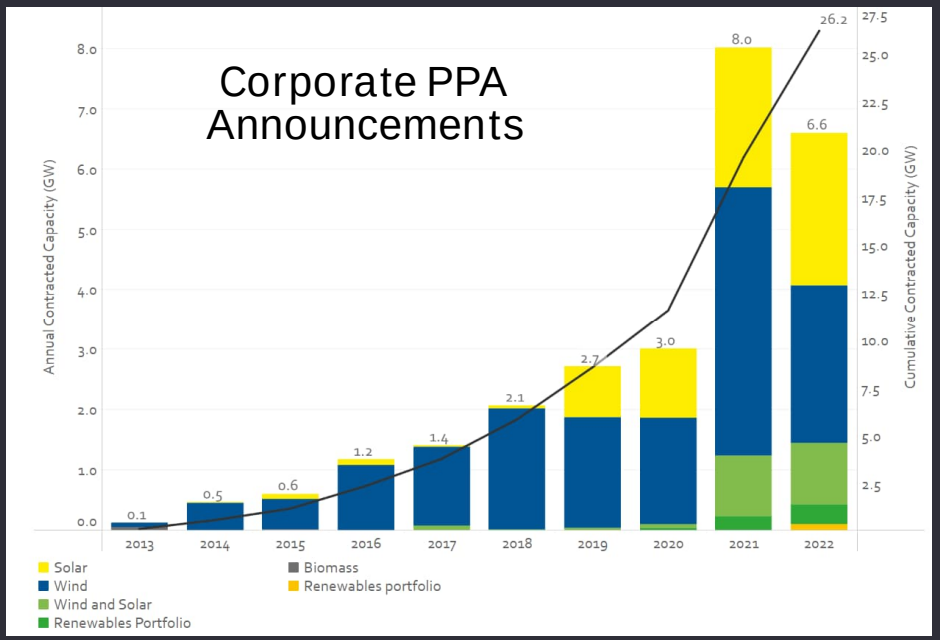
- 2022: a record 2.6GW of PPAs were signed – slightly more than 2.3GW in 2021.

More sectors entering the market:

- 2022: PPAs were signed by 16 sectors across the EU, led by ICT & Heavy Industry

Solar and Wind dominate the PPA market:

- 2022: solar captured 39% while wind got 41% of total PPA contracted capacity.



Source: RE-Source (Jan 2023).

European PPA markets – to Dec 2022

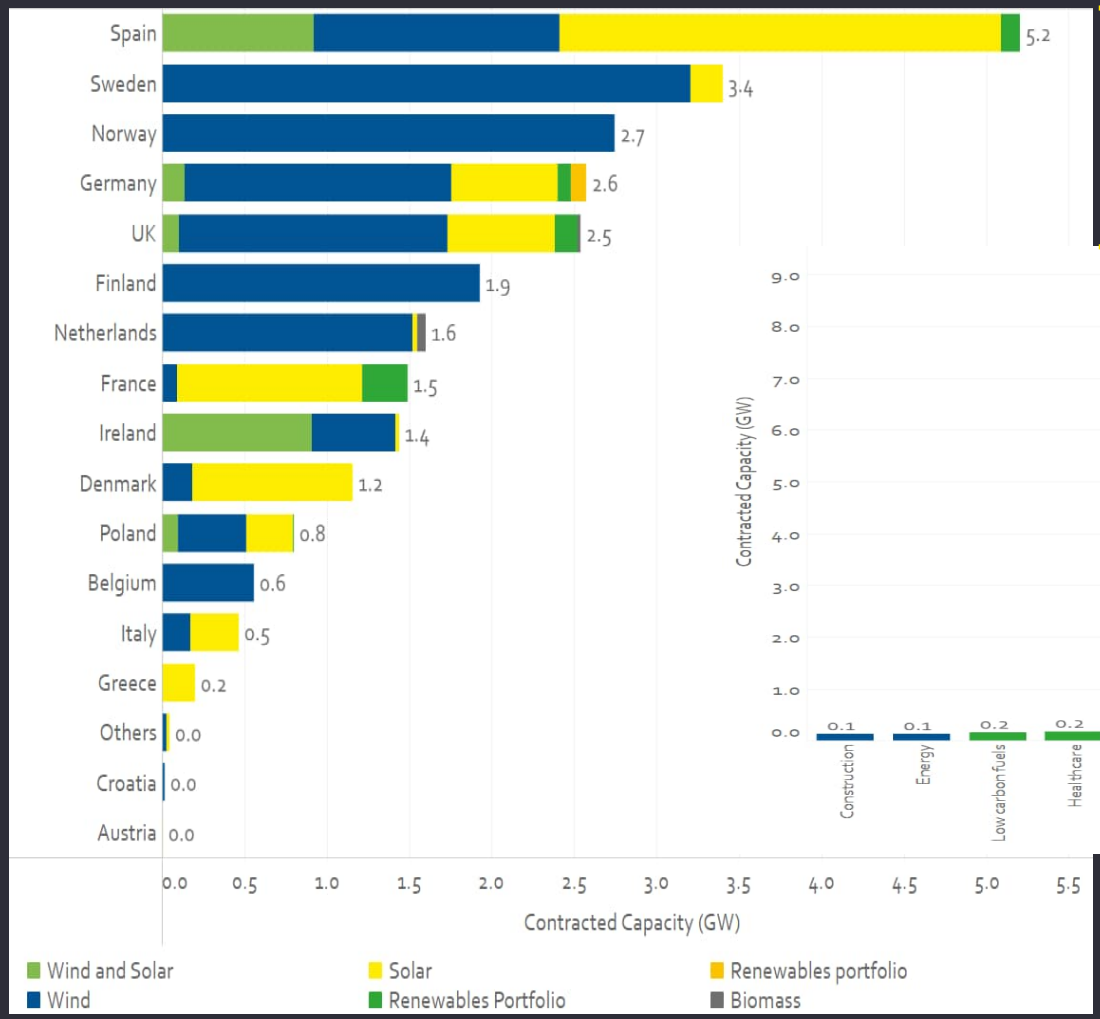
Cumulative Corporate PPAs (MW)

Source: RE-Source (Jan 2023).

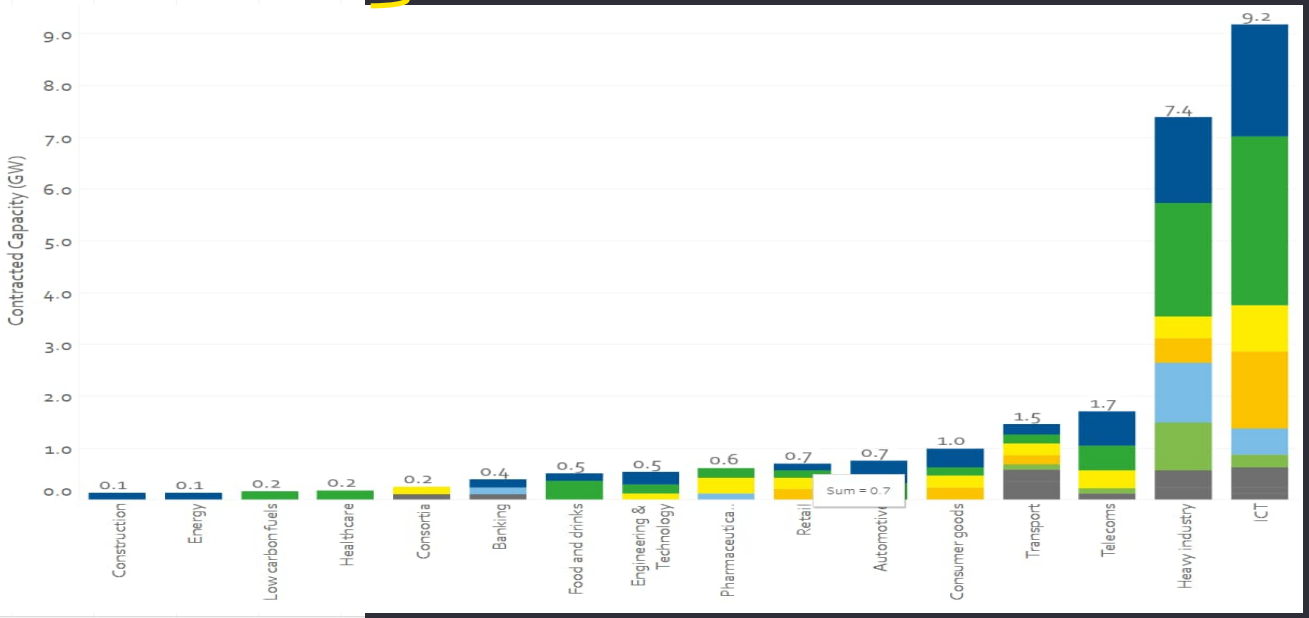
Check out data from RE-Source's Buyers' Toolkit:

- https://resource-platform.eu/buyers-toolkit/

Corporate PPAs – are now across multiple countries and sectors



Top 5 Countries:
Spain, Sweden, Norway, Germany, & UK



Top 5 Sectors:
ICT, Heavy Industry, Telecoms, Transport, Consumer Goods

Source: RE-Source (Jan 2023).

4. Differing models of corporate PPAs – the “How?”

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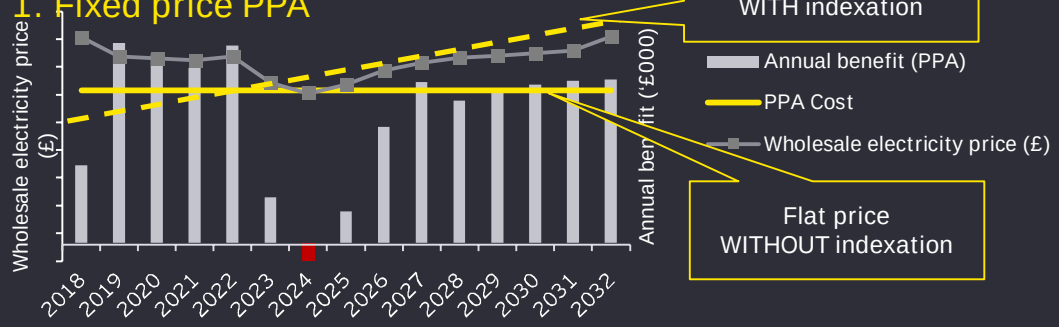
Options for PPA pricing: fixed, floating or hybrid, but fixed dominates

Wholesale electricity price (€/MWh in real terms)

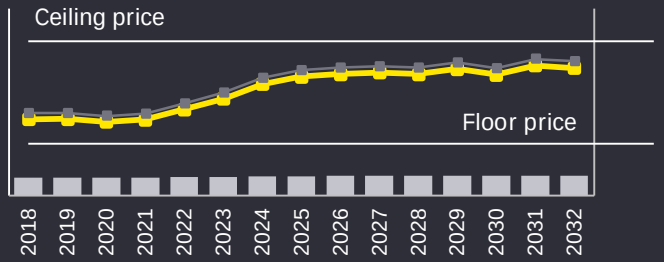
1. Fixed price PPA



Fixed price structure considerations

- ✓ Price security/certainty with significant potential cost savings (assuming wholesale power prices rise in real terms)
- ✓ Most appealing structure to developers
- × PPA can become 'out of the money' if markets fall below fixed PPA price

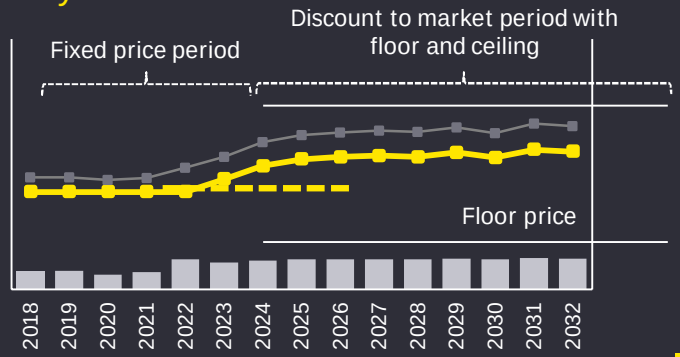
2. 'Floating' (Discount to market) with a cap and a floor



Floating structure considerations

- ✓ Energy costs will track the market, likely in line with competitors
- ✓ Annual savings likely to remain fairly similar year-to-year
- × Corporate is exposed to volatile wholesale market prices
- × Overall savings generally lower over the life of the project compared to fixed price savings

3. Hybrid structure



Hybrid structure considerations

- ✓ Provides price certainty in the short term whilst not committing corporate to a fixed position in the long term
- × Corporate is exposed to volatile wholesale market prices after the fixed price period
- × More complex, so potentially more difficult to negotiate/agree and manage over time

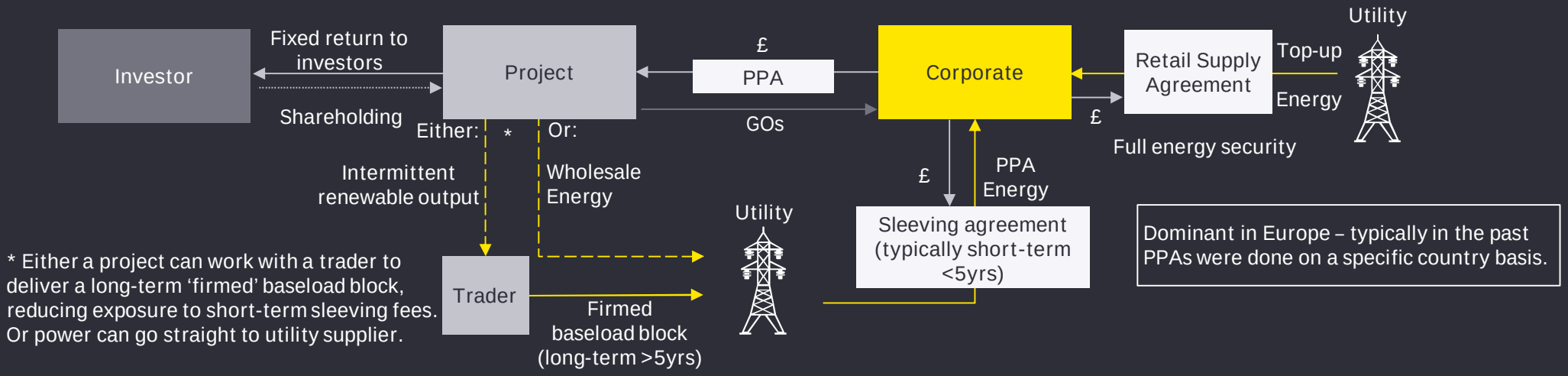
- More detail can be found in June 2021 report by EY and WBCSD:
- Pricing structures for corporate renewable PPAs

CPPA Overview - Sleeved/physical PPA

Sleeved PPAs offer a straight forward accounting treatment and were the dominant form of CPPA in the past

Sleeved PPA structure

Purchasing directly from a renewable project: some contractual complexity but simple accounting treatment



Key positives

- Closer association with generating asset
  - Buying energy 'directly' from a specific project
- Flexible price structure:
  - Floating (discount-to-market); or
  - Fixed (index-linked)
- More straight forward accounting treatment
- Generally not a lease or financial instrument

Potential downsides

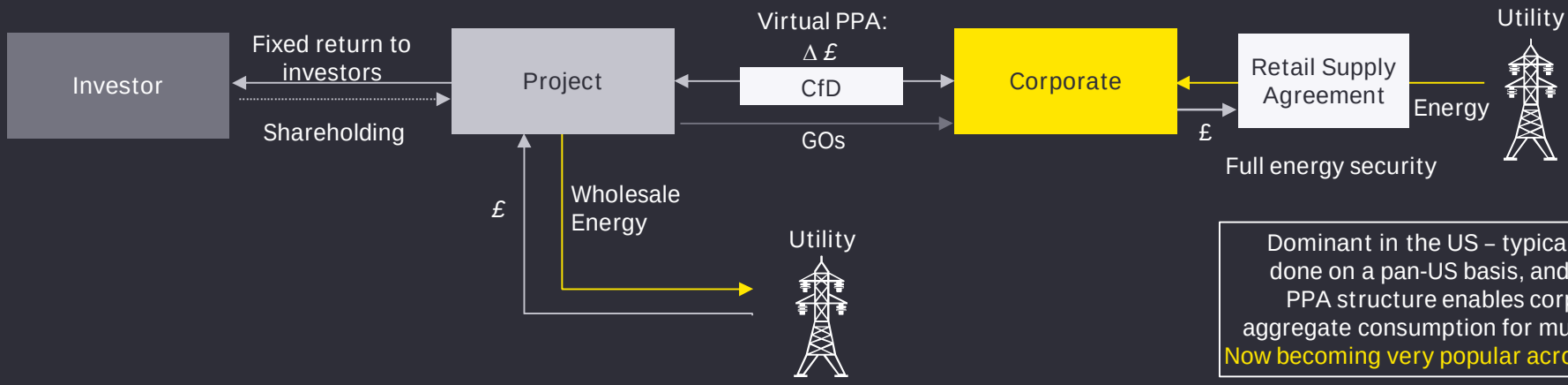
- Potentially more complicated up-front and setup costs can be greater
  - Two back-to-back PPA contracts
- Exposure to sleeving costs
- Balanced power depends on actual asset performance
  - i.e., volume of top-up 'balanced' power influenced by actual project's PPA output

CPPA Overview - Virtual PPA

Virtual PPAs offer a much simpler structure, which is quicker to execute, and is becoming the dominant structure in the UK & Europe

Virtual PPA structure

Continuing with existing supply arrangements, the VPPA is a financial derivative – a "Contract for Difference". Legally simpler, there may be some settlement risk and accounting complexity involved



Dominant in the US – typically PPAs are done on a pan-US basis, and the Virtual PPA structure enables corporates to aggregate consumption for multiple regions. Now becoming very popular across Europe & UK

Key positives

- Simpler structure, with fewer contracts compared to a sleeved/physical PPA
- No balancing responsibility (if have agreed to pass on to the Generator / project owner)
- PPA is independent of Retail Supply Agreement renewals
- Can cover consumption which is even under landlord billing control

Potential downsides

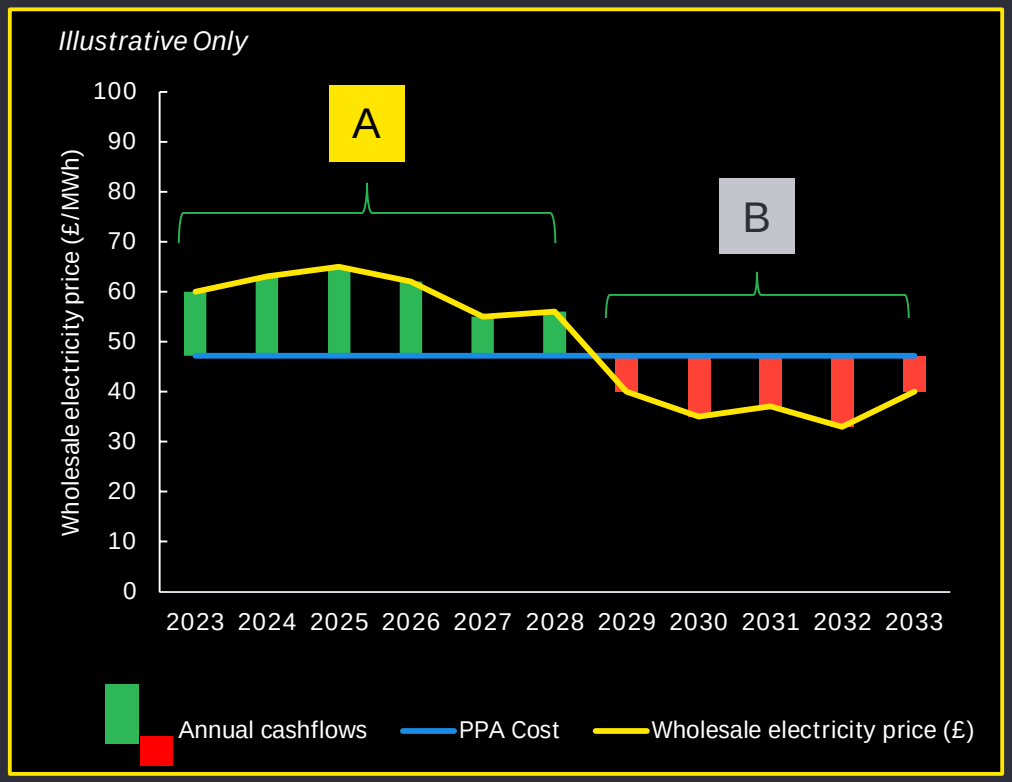
- Not perfect price security if Generator's wholesale energy market is different to Corporate's retail energy market, resulting in a mismatch and lack of correlation
- Only permits a fixed price structure
- Accounting treatment can be more difficult (considered a financial instrument)
- Delta cashflows can be volatile on a short-term basis, but mostly net off in the longer term

Illustration of VPPA payment flows

Virtual PPA is a Contract-for-Difference (CfD) financial settlement. Cash flows on the CfD offset higher/lower payments under the retail supply agreement

Virtual PPA Cashflows

The graph is a visual representation of a cashflow profile for a Virtual PPA.



A Time period

- Market price >PPA price
- Generator pays corporate
- Corporate is “in the money”
- But corporate benefit usually offset by higher retail prices fo physical electricity supply

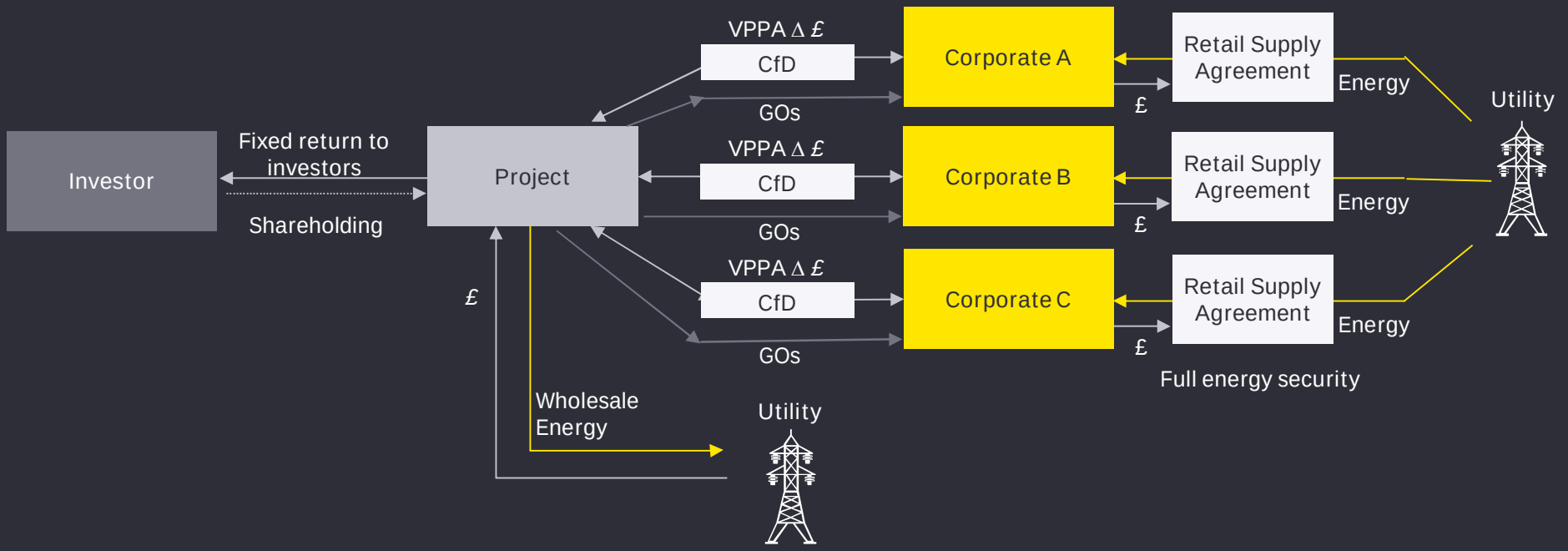
B Time period

- Market price <PPA price
- Corporate pays generator
- Corporate is “out of the money”
- But cost to corporate usually offset by lower retail price for physical electricity supply

Virtual PPAs are easier to facilitate ‘clubbed’ multiple smaller corporates

Virtual PPA ‘clubbed’ structure

Continuing with existing retail supply arrangements for each corporate, the separate VPPA contracts can layer into a single renewables project



Physical and Virtual offsite PPAs: Demystifying the structures

A virtual PPA structure has similar characteristics to a physical structure in terms of duration, pricing, additionality & sustainability claims, however differs on price settlement, electricity supplier involvement and accounting treatments

Physical PPA

Electricity delivery

"Direct" delivery of power through the electricity supply contract

Contract structure

Two PPA contracts, one with the generator and one (back-to-back) with the electricity supplier – hard to 'club' multiple corporates

Balancing and shaping

For Pay-as-Produced structures, volume is usually balanced and shaped to baseload by the electricity supplier or an aggregator

Accounting treatment

Simple accounting treatment, as volume is sleeved directly in the supply agreement, and so is seen as an executory contract

Virtual PPA

Electricity delivery

Standard supplier electricity delivery, but on Day-Ahead purchasing, while the vPPA "sits" on top of the supply agreement as a financial instrument.

Contract structure

One PPA contract with the generator – easy to 'club'

Balancing and shaping

No balancing responsibility (if passed on to the Generator / project owner), but some basis / profile risk consideration from intermittency against settlement prices

Accounting treatment

More complex accounting treatment is needed, as vPPA acts as a derivative financial instrument

Shared characteristics

Additionality from new-to-ground projects

Additionality implies the buyer's investment is credited with creating new, clean sources of energy. Both Physical and Virtual PPA structures can equally been leveraged by renewable generators to receive financing support from institutions and enable project construction.

Renewables credibility

Both structures are fully aligned with renewable pledges including RE100 and SBTi targets and are backed by the issuance and delivery of Energy Attribute Certificates

Electricity flows

Both structures will have physical power flowing to the electricity network


5. And finally... what are the risks as well as the benefits?
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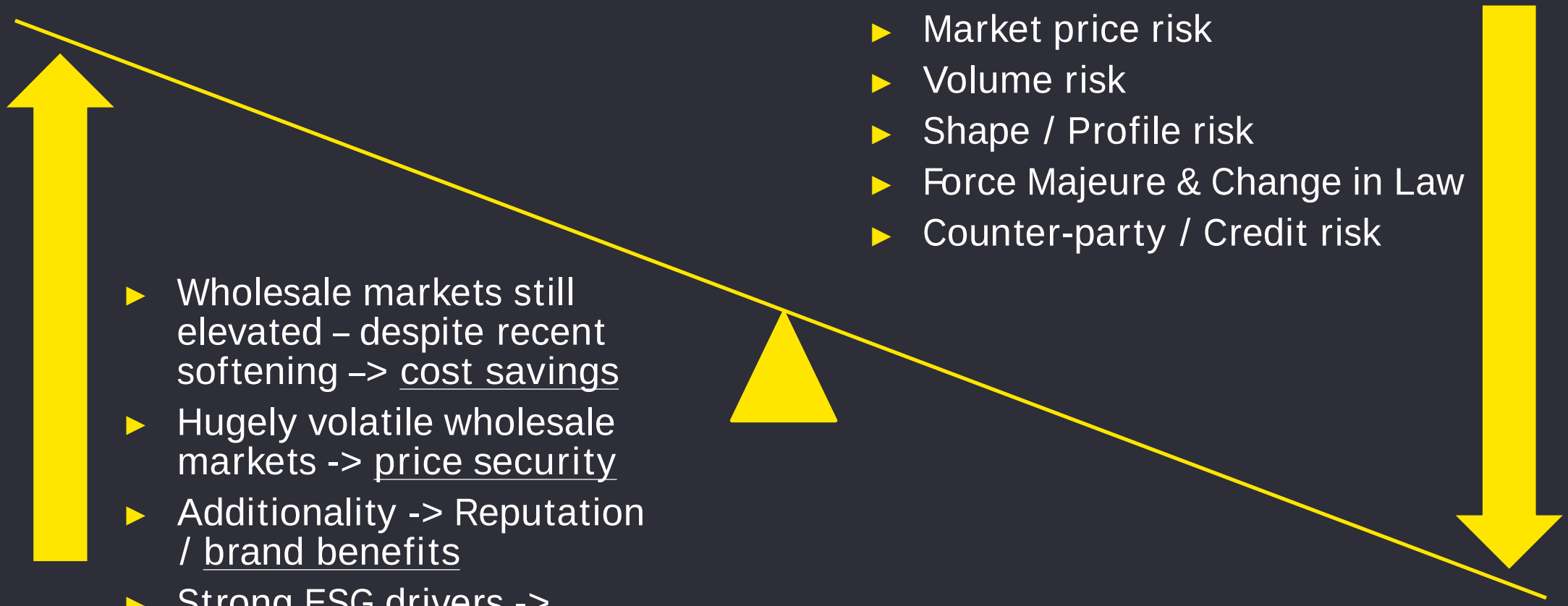
What's the balance between benefits and risks for corporate PPAs?

Benefits Vs Risks



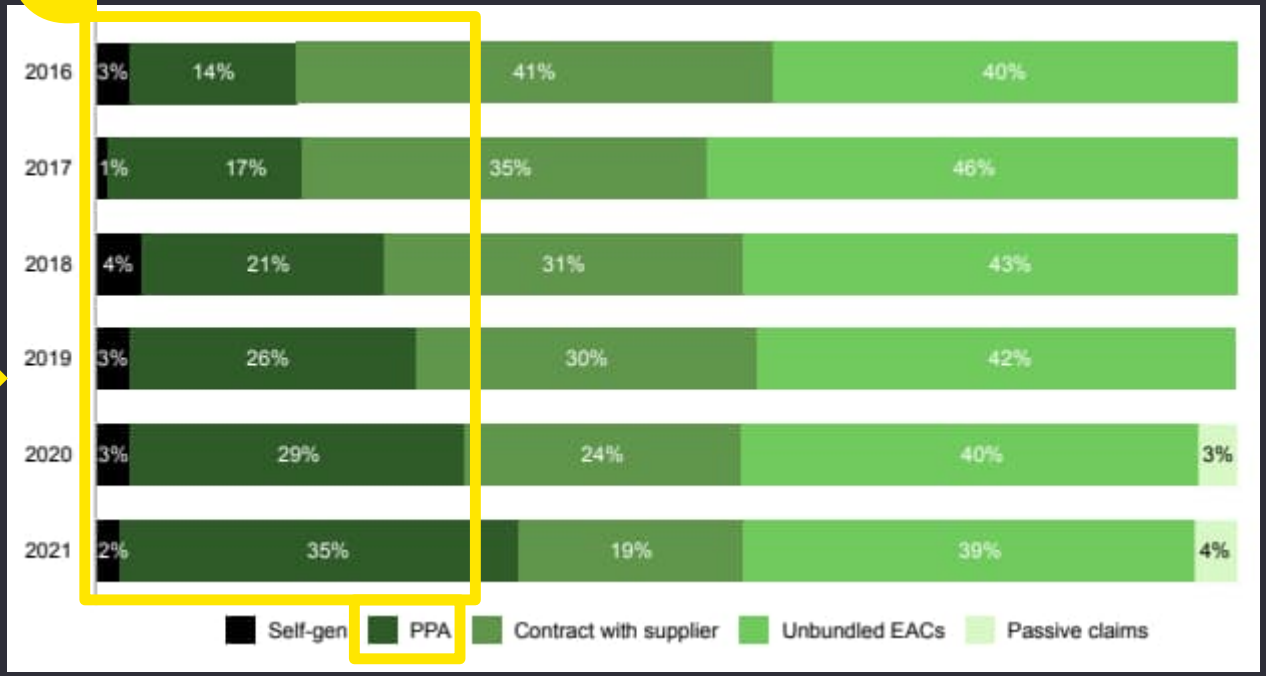
- Market price risk
- Volume risk
- Shape / Profile risk
- Force Majeure & Change in Law
- Counter-party / Credit risk

- Wholesale markets still elevated – despite recent softening –> cost savings
- Hugely volatile wholesale markets -> price security
- Additionality -> Reputation / brand benefits
- Strong ESG drivers -> reach Net Zero targets

Let's discuss…

Q & A

Corporate volume for PPAs has risen from 14% to 35% in 5 years for RE100 members



Source: The Climate Group: RE100 Annual Disclosure Report (January 2023)

Appendices:

1 – Market leading PPA research

2 – Co-authorship of leading PPA reports

3 – City of London & EY Case Studies

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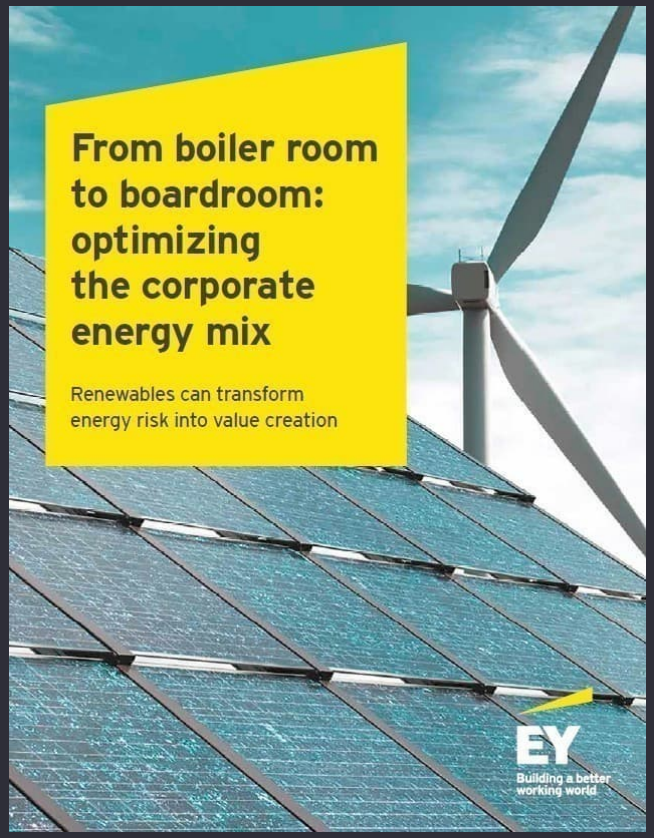
A.1: EY has published market leading research on renewable energy and corporate energy strategy

Published insights – Renewable energy markets

Renewable Energy Country Attractiveness Index (RECAI)
Leveraging our transaction market experience, sector knowledge and global reach, the RECAI ranks 40 countries on the attractiveness of their renewable energy investment and deployment opportunities.

From boiler room to boardroom: optimising the company energy mix
EY commissioned a global survey of 100 energy-intensive companies to identify the key strategic energy issues facing C-suite executives among corporations with US$1bn or more in revenues.



www.ey.com/recai

https://www.ey.com/en_uk/power-utilities/renewable-energy-strategy-and-power-purchase-agreements

A.1: EY's new Corporate PPA Index: Nov 2022 www.ey.com/recai

Renewable Energy Country Attractiveness Index
Corporate Power Purchase Agreement (PPA)

PPA Index

November 2022 | 60 edition

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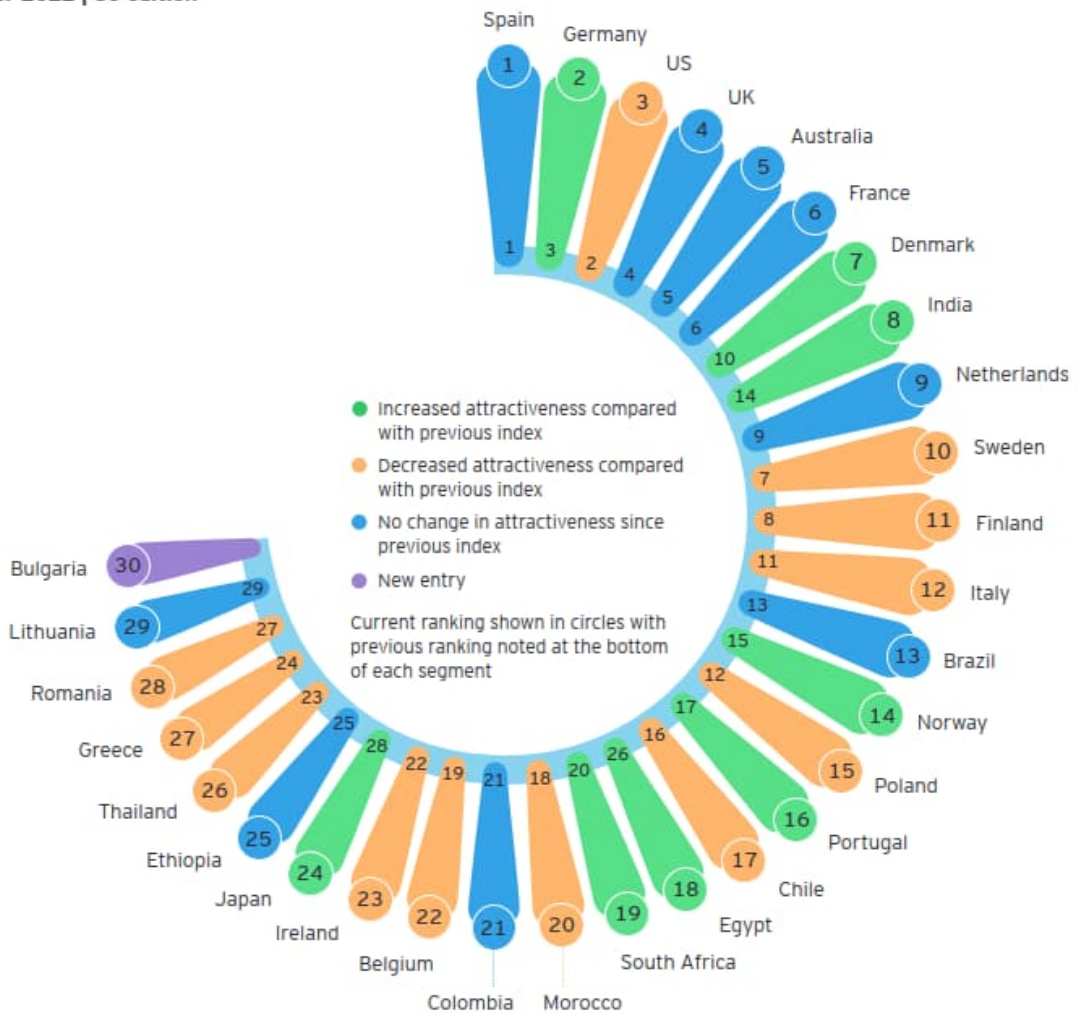


Germany

The market is seeing a distinct increase in PPAs for operational and repowered post-EEG subsidy assets. The current high price environment is allowing larger PPA revenues to compensate for maintenance or repowering costs accrued by the generator.

India

Previous struggles in the PPA market have taken a positive turn with the Green Access Rules, issued in July, aiming to provide long-term clarity with respect to open access costs and relaxing the eligibility limit to allow a greater range of offtakers to access the market. It also allows greater offtaker flexibility with respect to purchasing and consuming energy.

Japan

The market has phased out full feed-in tariffs in favor of a feed-in premium that is sensitive to market price fluctuations, creating a consumption gap to be filled by PPAs. Following the first Japanese corporate PPA between Amazon and Mitsubishi in 2021, there has been steady growth in the market, with a number of corporates – including Seven-Eleven and NTT – entering into an array of off-site and on-site offtake arrangements.

South Africa

The first large-scale corporate virtual PPA in South Africa was signed recently between SOLA Group and mining and processing company Tronoz for a 200MW solar project. Other large industrial players in the market, including Sasol and Air Liquide, are in the process of procuring PPAs, reflecting the momentum building in the space.

Methodology

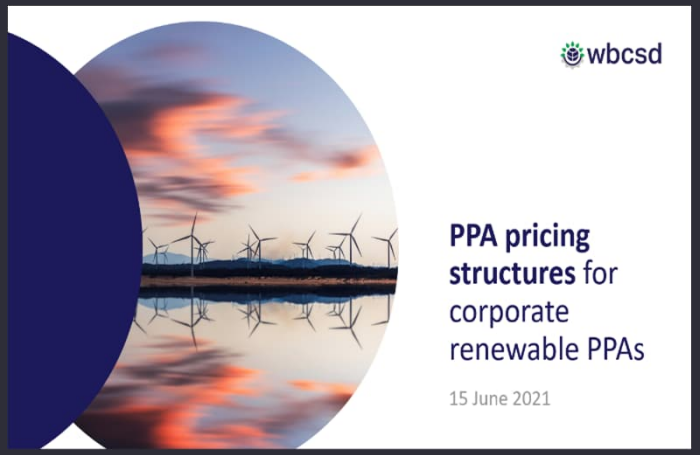
See page 3 for PPA methodology.

A.2: EY has co-authored various reports on corporate PPAs

- Corporate Renewable PPAs: Scaling up globally
- http://www.wbcsd.org/Clusters/Climate-Energy/Resources/Corporate_Renewable_PPAs_Scaling_up_globally

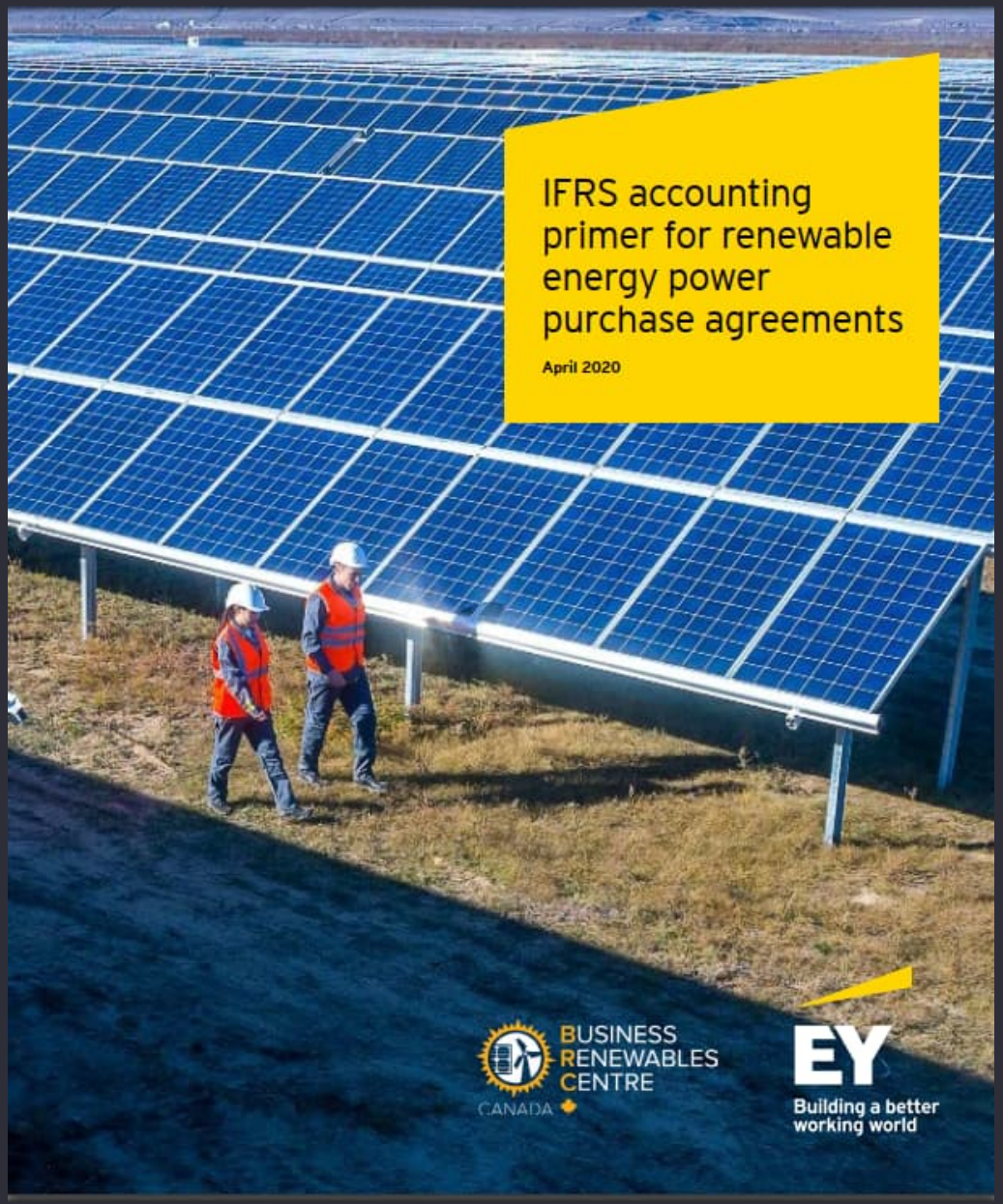
- Risk mitigation for corporate PPAs
- https://windeurope.org/intelligence-platform/product/risk-mitigation-for-corporate-renewable-ppas/

- Introduction to Corporate Sourcing of Renewable Electricity in Europe
- https://resource-platform.eu/wp-content/uploads/files/statements/RE-Source-introduction-to-corporate-sourcing.pdf



- Pricing structures for corporate renewable PPAs
- https://www.wbcsd.org/Programs/Climate-and-Energy/Energy/REscale/Resources/Pricing-structures-for-corporate-renewable-PPAs

A.2: EY PPA IFRS Accounting Treatment Paper



Content

A3: EY PPA case study

City of London Corporation – Renewable energy strategy and offsite PPA implementation

Project summary and objectives

- The CoL was exploring options to procure an off-site renewable PPA (Power Purchase Agreement)
- The PPA was to achieve environmental benefits (carbon reduction) and economic benefits (protecting against long-term energy commodity price volatility and achieving long-term cost savings)

Approach

EY was responsible for:

Phase 1 – Renewable PPA strategy and Business Case

- Analysis of energy usage profile – A load analysis of annual consumption (on a monthly basis) to assess how it varies by month and day: baseload and peakload.
- Analysis of existing PPA opportunities already presented to CoL – utilising our PPA cost model vs. BAU to quantify the expected incremental costs/savings. Also described the various risks and mitigating actions
- Assessment of wider market opportunities – utilising same PPA cost model
- Business Case presentation – summarising costs and benefits via a report describing the commercial Business Case as well as describing the various risks and broader PPA options for existing and wider opportunities.

Phase 2 – Renewable PPA implementation

- Conduct a market test with developers – to confirm appetite for a long-term PPA
- Meetings with CoL retail supplier – to discuss sleeving arrangements
- Build PPA specification, based on results of soft market testing exercise
- Establish the appropriate OJEU compliant procurement process, financial evaluation, evaluation criteria and forms of contract for the PPA
- Assist with SQ and ITT document preparation

Value delivered to client

- EY led various meetings with the client at its offices in London to confirm and challenge aims, objectives and constraints, as well as assisting with further stakeholder engagement.
- EY delivered a highly bespoke and comprehensive report on the Business Case for an offsite PPA, within a strategy to meet the stated goals.
- EY delivered advice that was relevant and specific to CoL. As well as describing the various costs and benefits, a key objective of the project was also to describe any uncertainties and risks around the various renewable energy PPA options.
- EY went on to help CoL deliver the PPA procurement via an OJEU framed process.

Key Deliverables:

- The key deliverable of Phase 1 was an in-depth report to understand the specific costs and benefits of various large offsite renewable PPA options.
- The first part of Phase 2 delivered a soft market testing exercise that covered the appropriate parameters and disseminated the opportunity widely to relevant contacts.
- The second part of Phase 2 delivered key SQ and ITT documents, as EY worked jointly with a Legal Advisor.

A.3: EY's own PPAs – "we walk the talk!"

Through our own VPPA strategy, EY contributes directly to the creation of new renewable energy projects in the US and the UK:

- US – 2 VPPAs started in 2020 - large-scale Texas-based wind farms
- UK – 1 VPPA started in 2021 – small-scale Norfolk-based solar farm

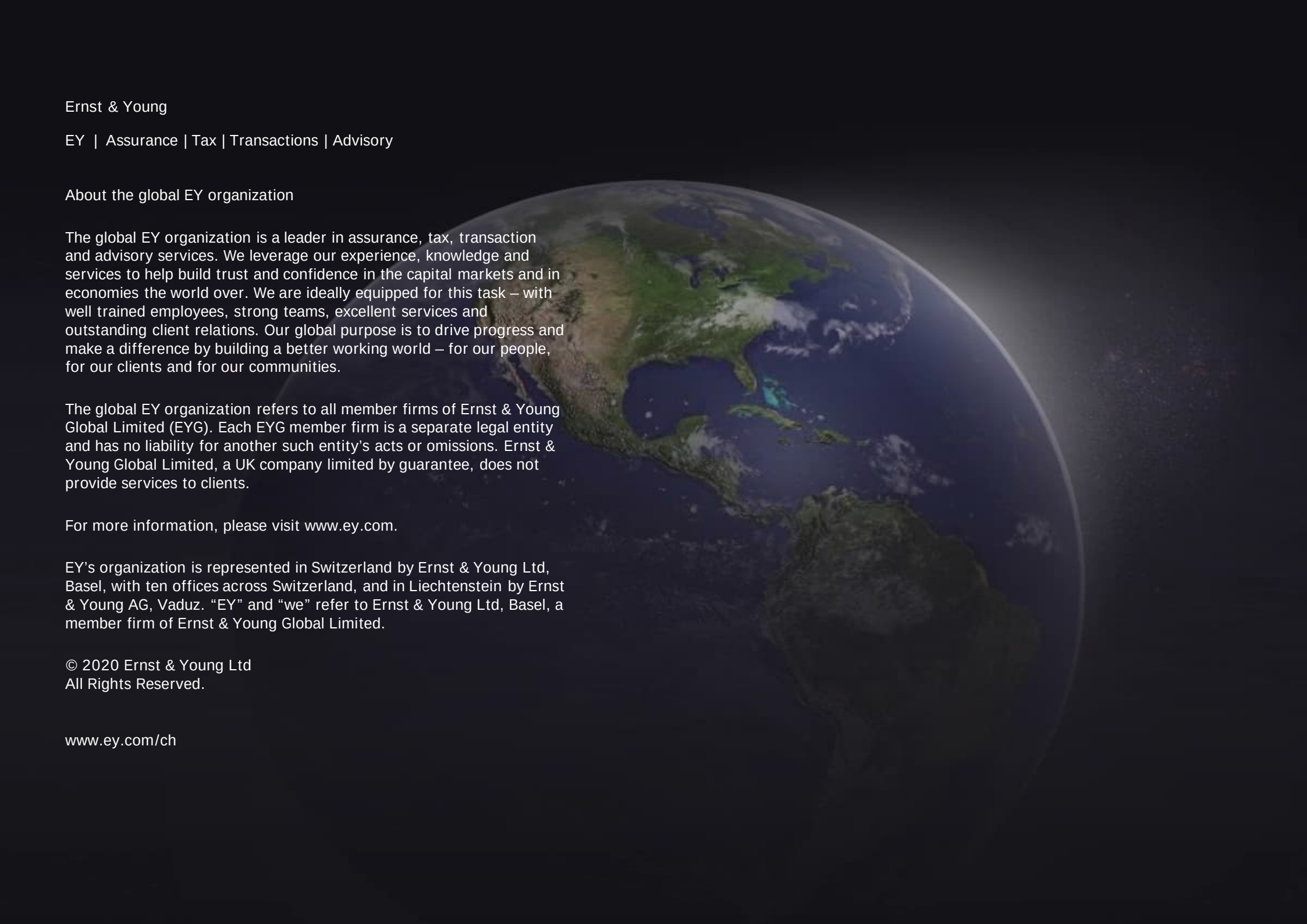
UK PPA - Location	Thornham, Norfolk
Developer	Lightsource bp
Total output	21.3GWh p.a.

Output for EY	13.0GWh p.a. (61%)
Commercial Operations Date	1st October 2021
PPA duration	10 years

"

EY has the potential to become a world leader in sustainable business.

Steve Varley
EY Global Vice Chair – Sustainability



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The global EY organization is a leader in assurance, tax, transaction and advisory services. We leverage our experience, knowledge and services to help build trust and confidence in the capital markets and in economies the world over. We are ideally equipped for this task – with well trained employees, strong teams, excellent services and outstanding client relations. Our global purpose is to drive progress and make a difference by building a better working world – for our people, for our clients and for our communities.

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www.ey.com/ch

City of London

First Public sector Off-Taker PPA

Graeme Low - *Head of Energy and Sustainability*
Corporation of London

City of London Corporation - Physical PPA

- The project
- Why?
- How?
- Lessons learned
- Multi Off-taker PPA

The Guardian

18th November 2020

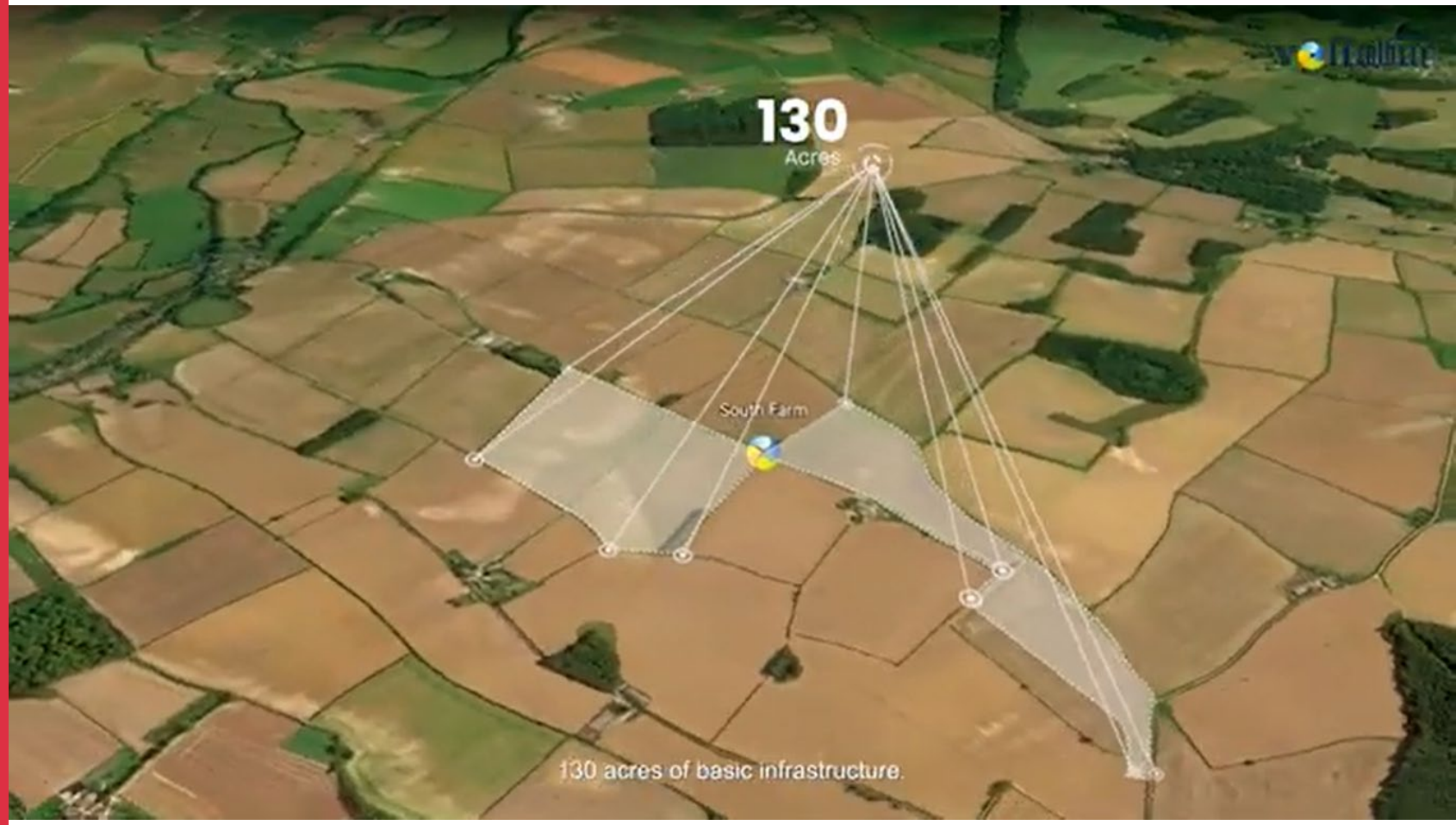
Commercial Operation
1st January 2023

City of London buys into new Dorset solar farm to help power Square Mile

City Corporation signs £40m deal with French renewables firm Voltalia to ensure green energy supply

South Farm

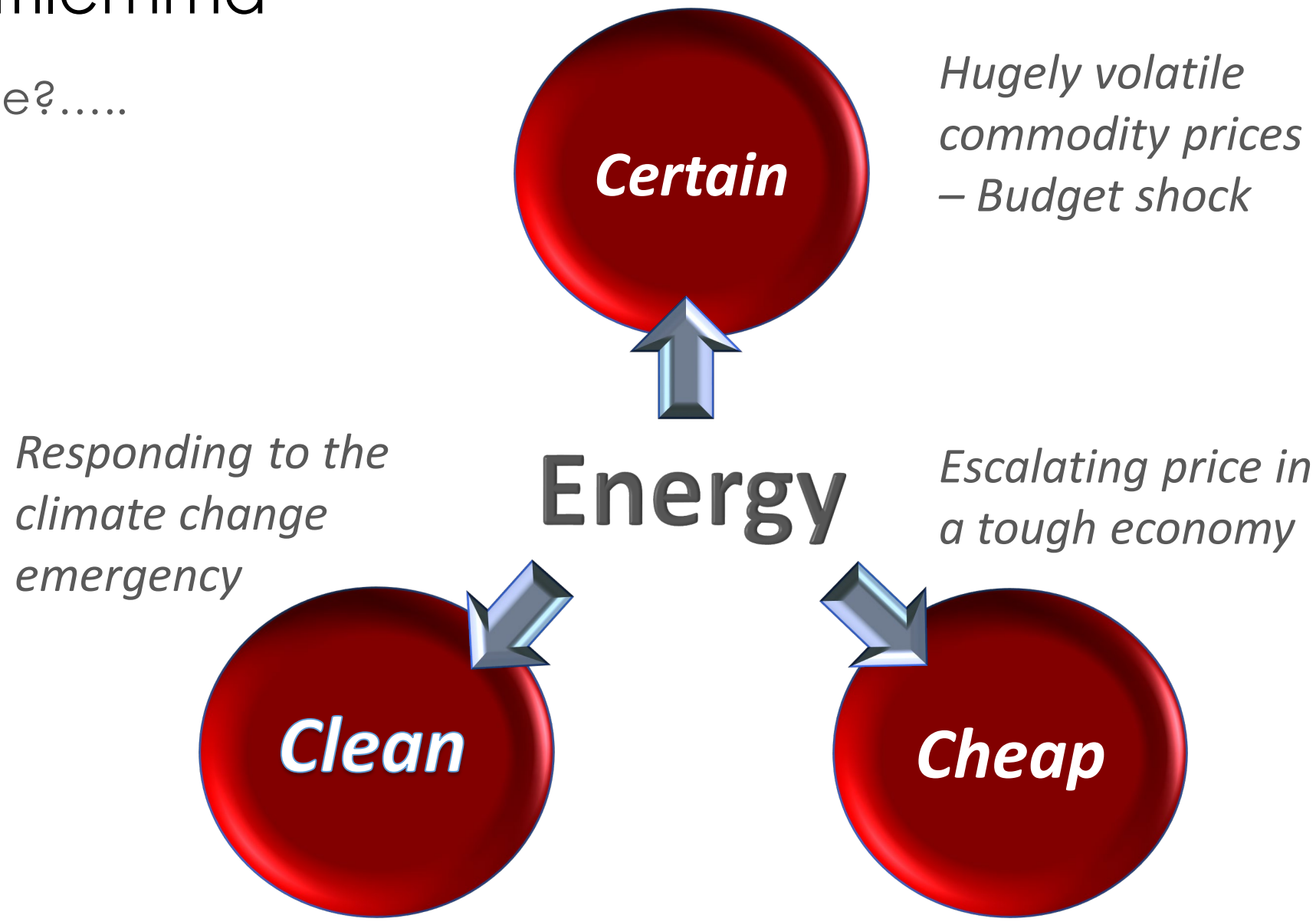
- 130 acres
- 93,000 panels
- 50MW
- 50%+ of the City's power
- 74kT CO2 grid removal



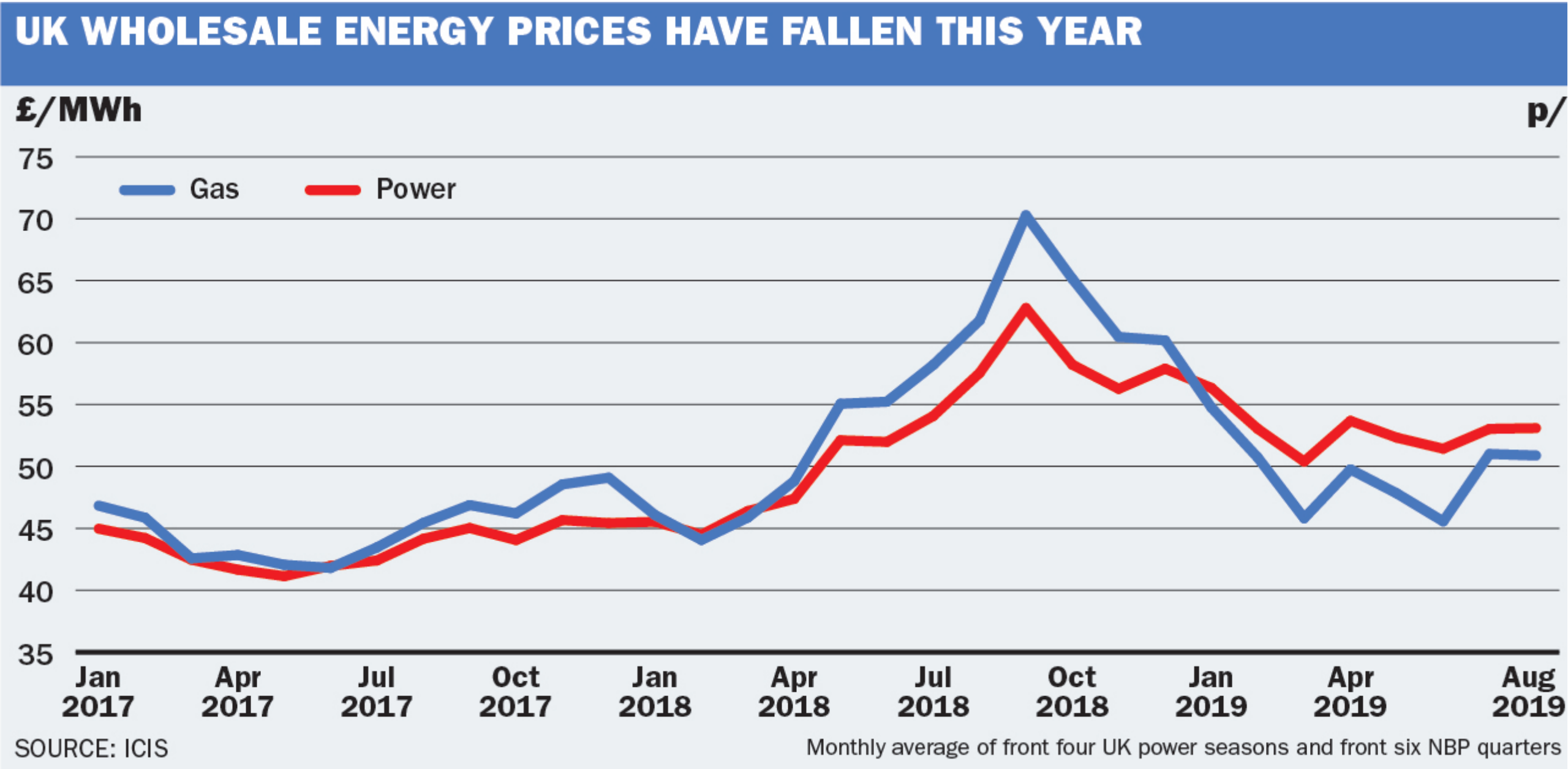
Why?

Energy Trilemma

Pick any one?.....



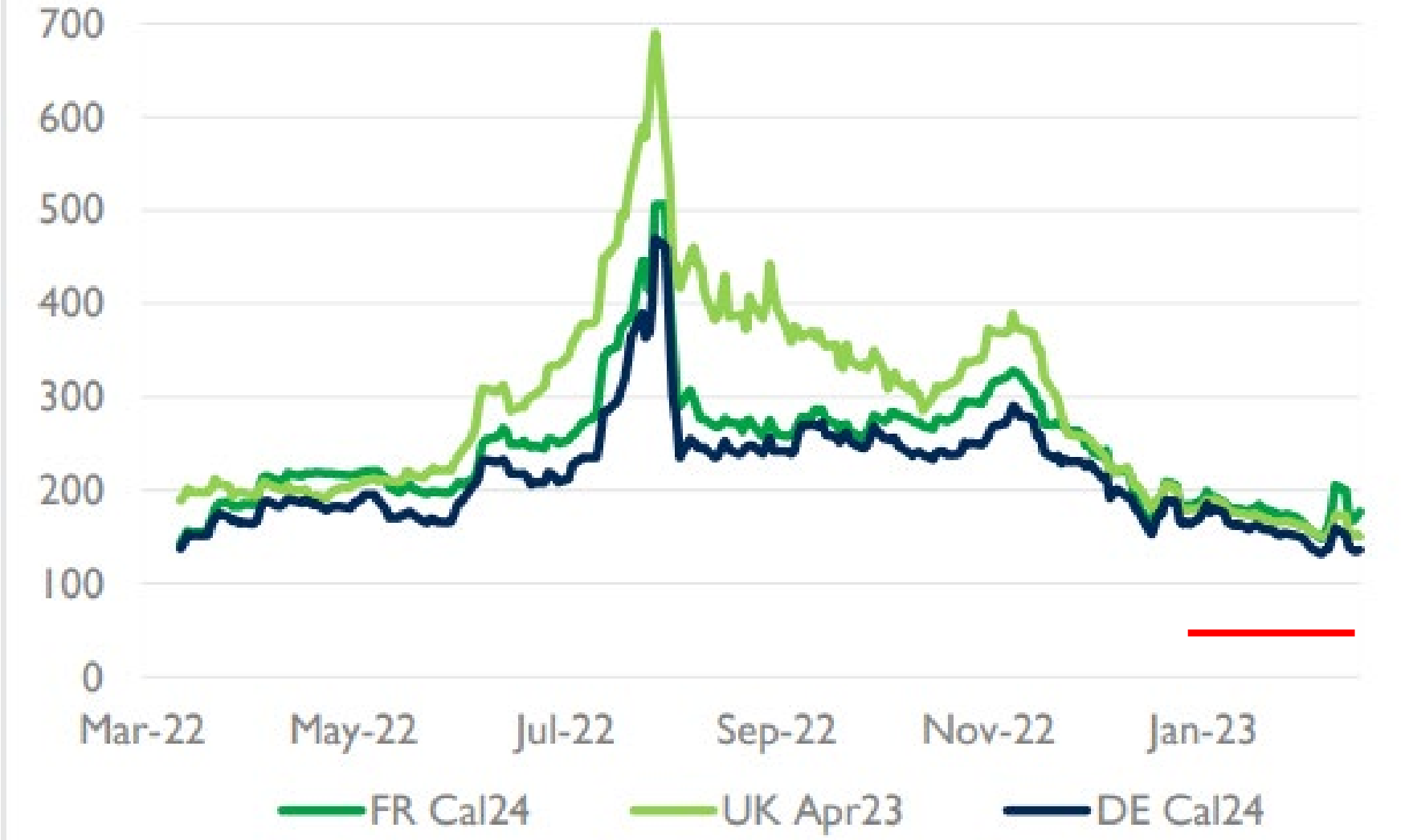
Energy grid price – A high risk environment



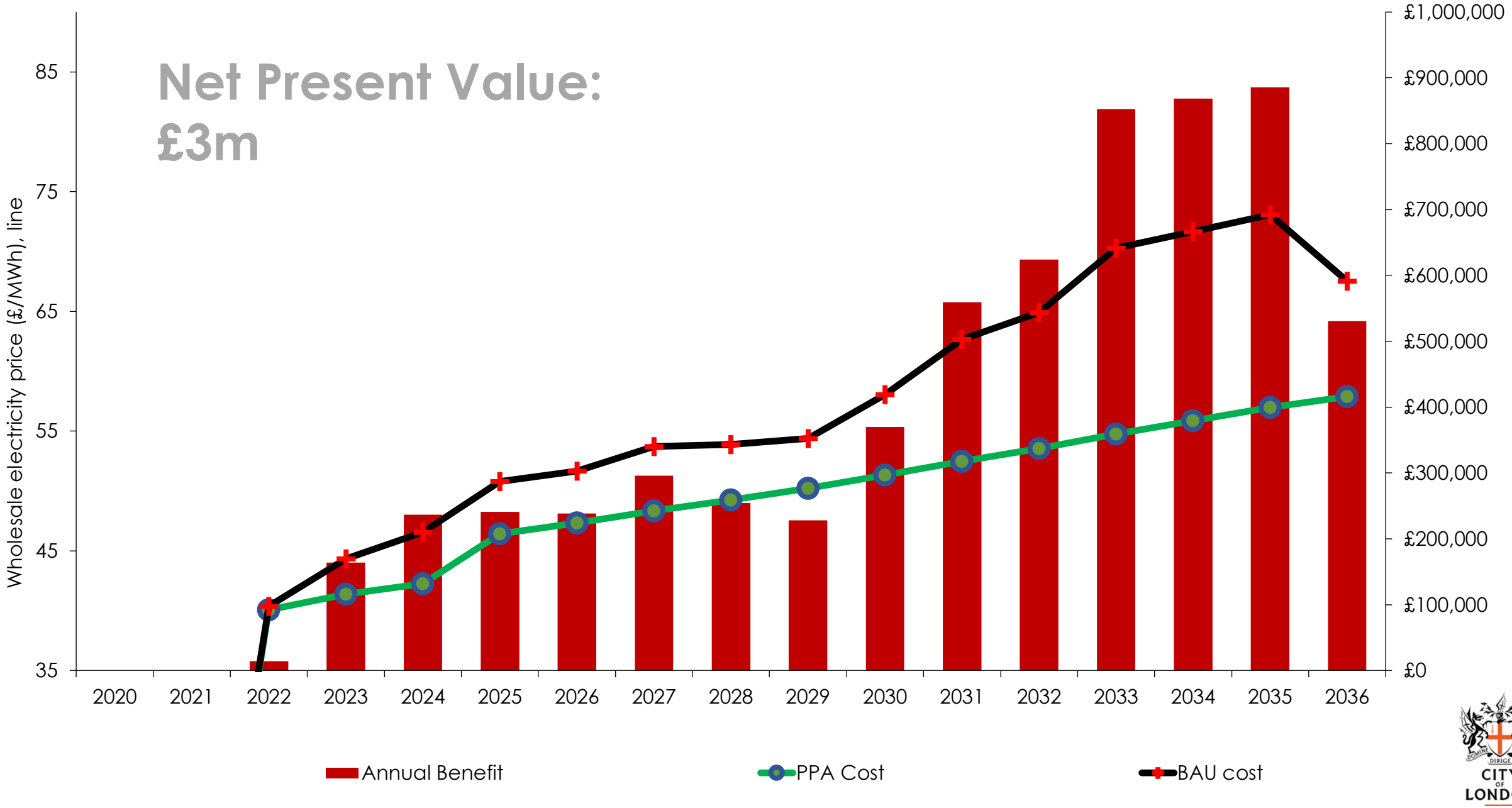
High levels of Volatility

Annual Power Prices: March 22 – February 23

Figure 7: European annual prices (€/MWh)



Net Present Value: £3m



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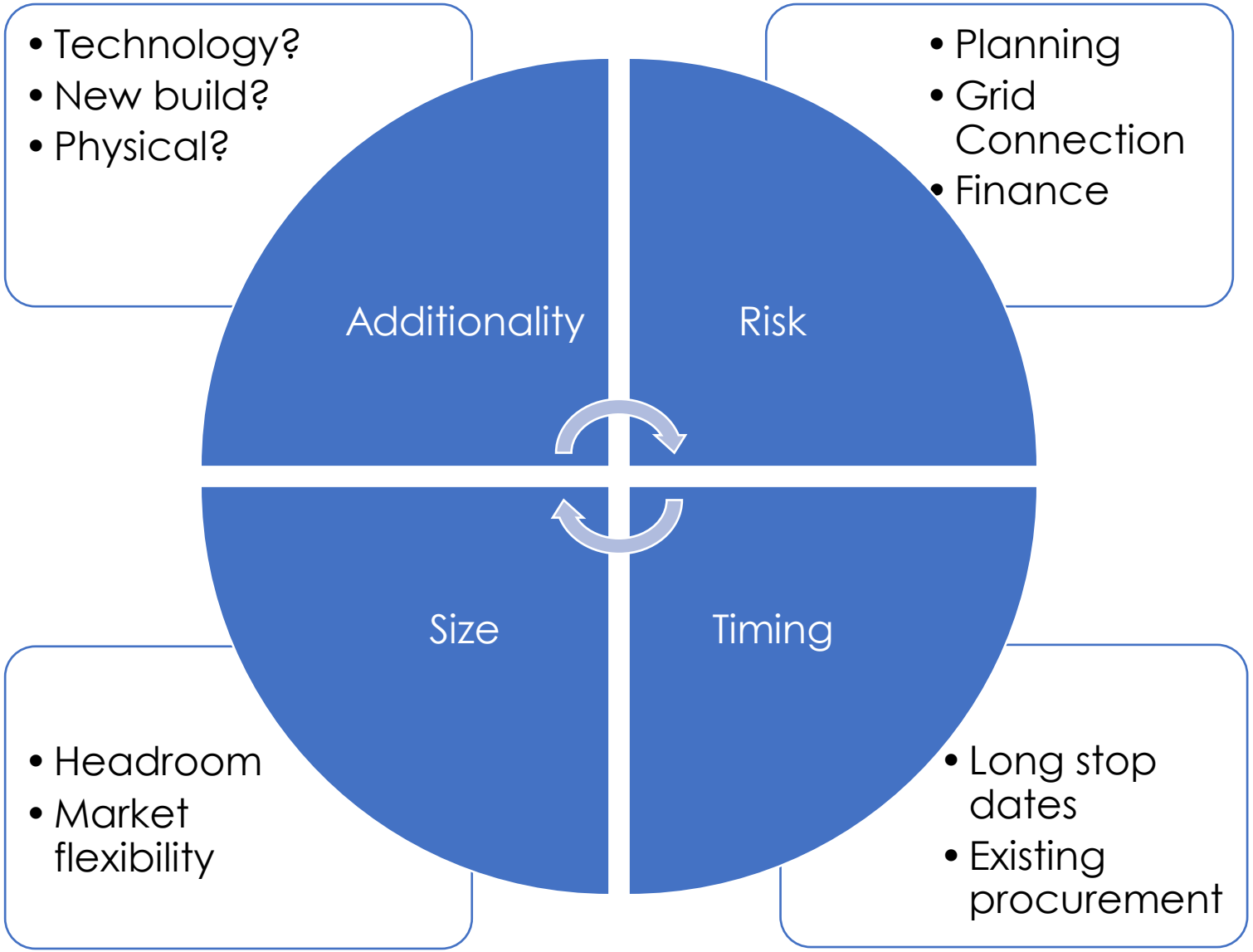
How?



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Lessons Learned

Lessons learned

- Present the opportunity and the risk of BAU
- Get senior buy-in from all and engaged throughout.
- Get the right help – ***Commercial & Legal***

- Talk to the market prior to procurement
- Engage with Sleeving supplier as early as possible.

- Track risks and manage these.
  - *Be ready to adapt hedging strategy for delay*
  - *work with Generator closely.*
  - *Supply chain disruption, Labour Scarcity etc.*

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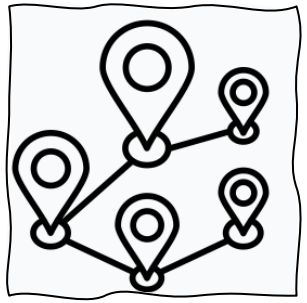
Multi Off-taker PPA

Multi Off-taker PPA



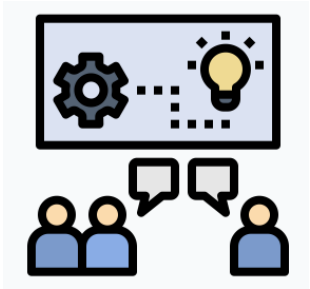
Develop a multi off-taker PPA

Enable **smaller energy users to access PPAs** through collaboration with larger organisations.

EY’s Energy and Infrastructure team providing **commercial expertise** to develop our approach.

Aim is **50GWh** of aggregated demand.

Register to join our workshop
09.30am, Thursday 25th May



Guildhall and Online

City of London Multi-Offtake PPA Workshop Tickets, Thu 25 May 2023 at 09:00 | Eventbrite

Multi Off-taker PPA

Workshop Themes			
Fundamentals of Corporate PPAs	Trends in the market and background	PPA contract structures	Key PPA decisions
Key criteria	Developer pool	Example NPV	Procurement process
Key risks and mitigants	High-level appraisal of contract options	Alternatives to Corporate PPA's	

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Questions

graeme.low@cityoflondon.gov.uk

https://youtu.be/NX68KtXei2A

https://youtu.be/sn6UgZkcmb4