



Gníomhaireacht Bainistíochta an Chisteáin Náisiúnta
National Treasury Management Agency

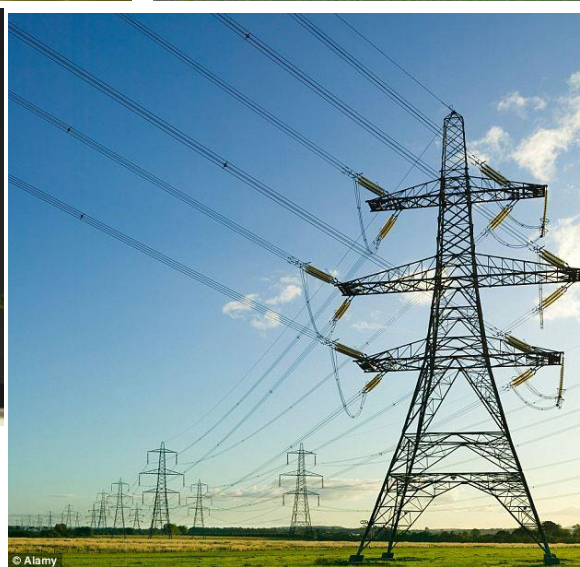
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Ireland Strategic Investment Fund

FINANCING ENERGY INFRASTRUCTURE

IRELAND STRATEGIC INVESTMENT FUND

PATRICK MOHR

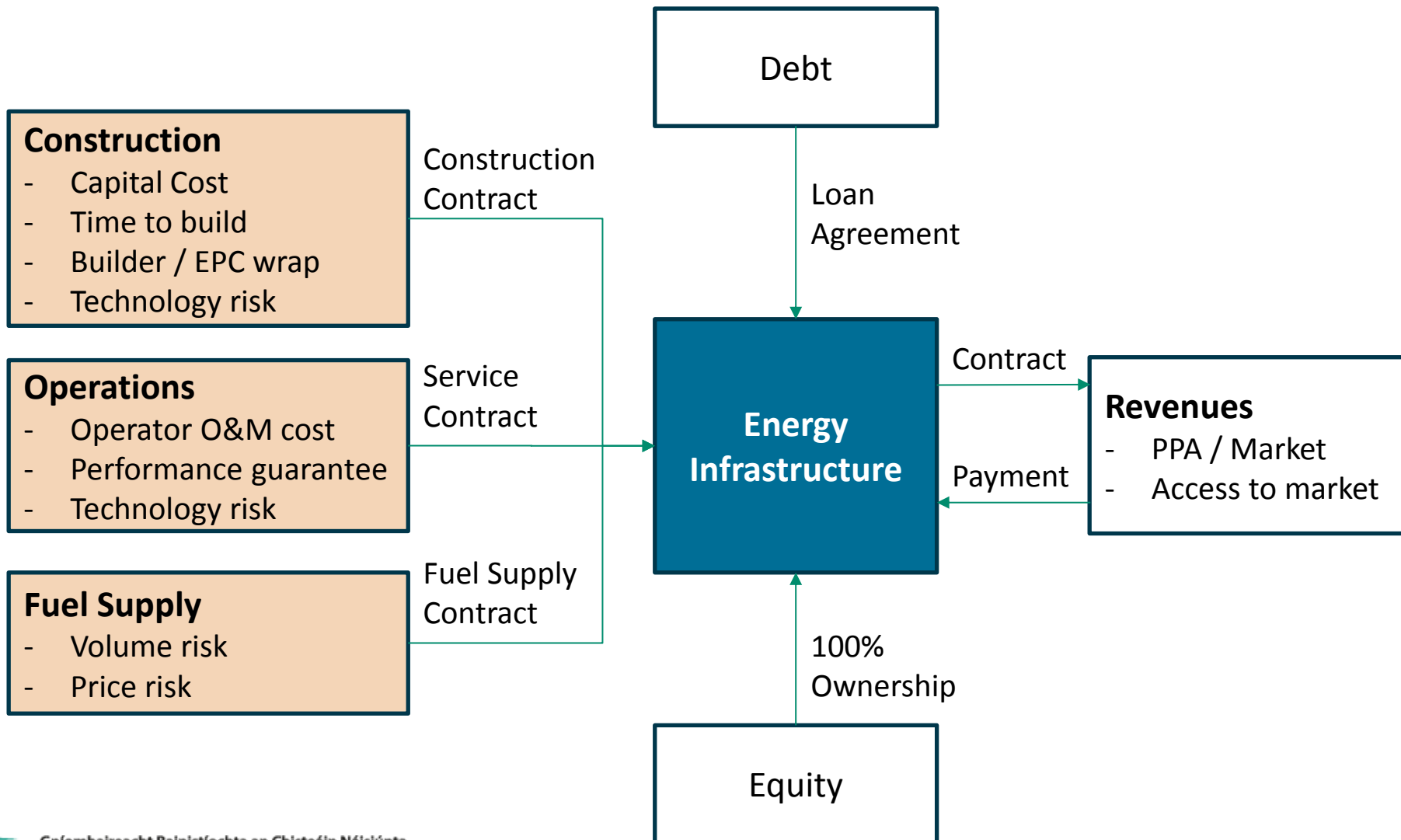
What is energy infrastructure?



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Typical Project Structure



Construction – upfront capital costs

- Nature of the asset (Onshore wind, Offshore wind, Nuclear)
- Experience, track record and credit-worthiness of contractor
 - ▶ Overall cap on liability --- PCG --- Performance Bond
- Fixed price, date certain, turnkey
- Pass-through of risks to contractor
 - ▶ Time Delay
 - Liquidated Damages
 - Keep project cashflows whole
 - May need PCG or LC
 - Termination rights
 - ▶ Asset under performance
 - Technical requirements / complexity
 - May overlap O&M / Equipment provider
 - Clear interfaces needed



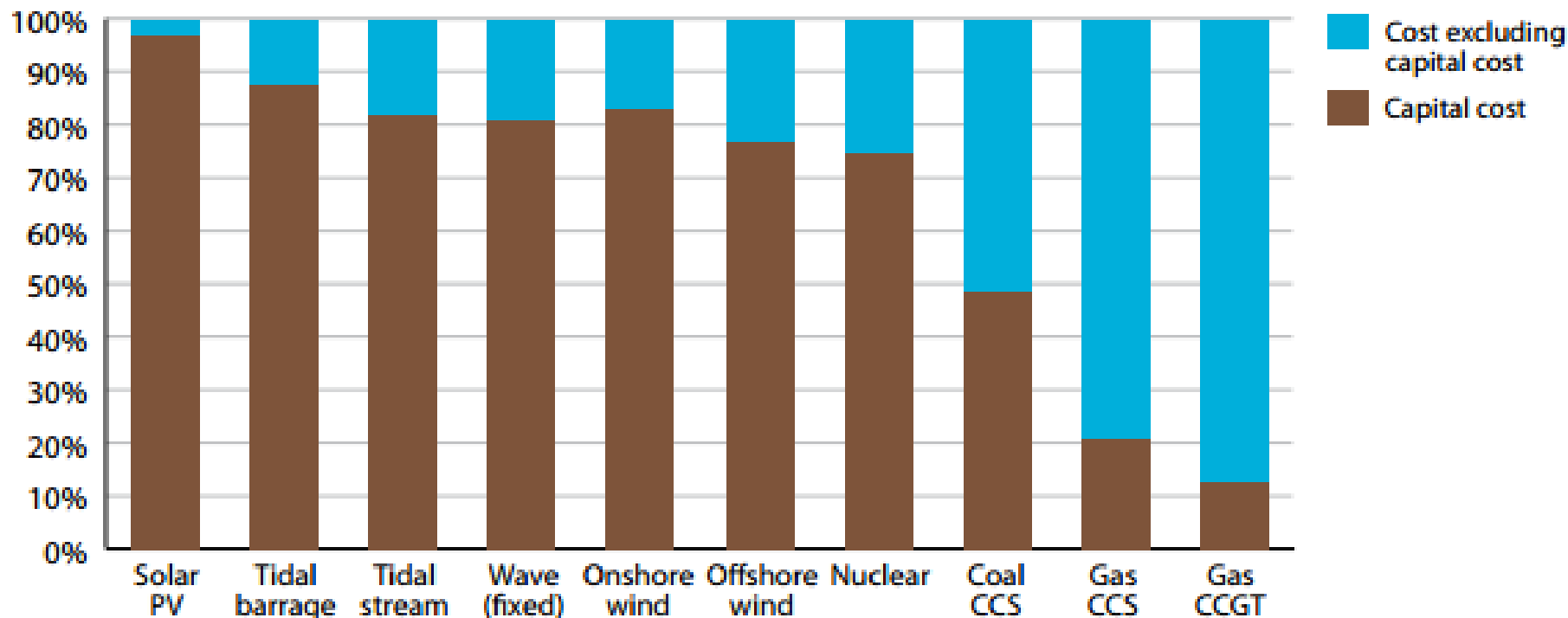
Operations – on going operational costs

- Operations & Maintenance
 - ▶ Extent of Risk pass through: back-to-back contract vs. retained by SPV
 - Price certainty vs. flexibility risk/reward
 - Long term sub-contract vs. shorter term more cost competitive
 - Performance guarantee vs. technical performance risk

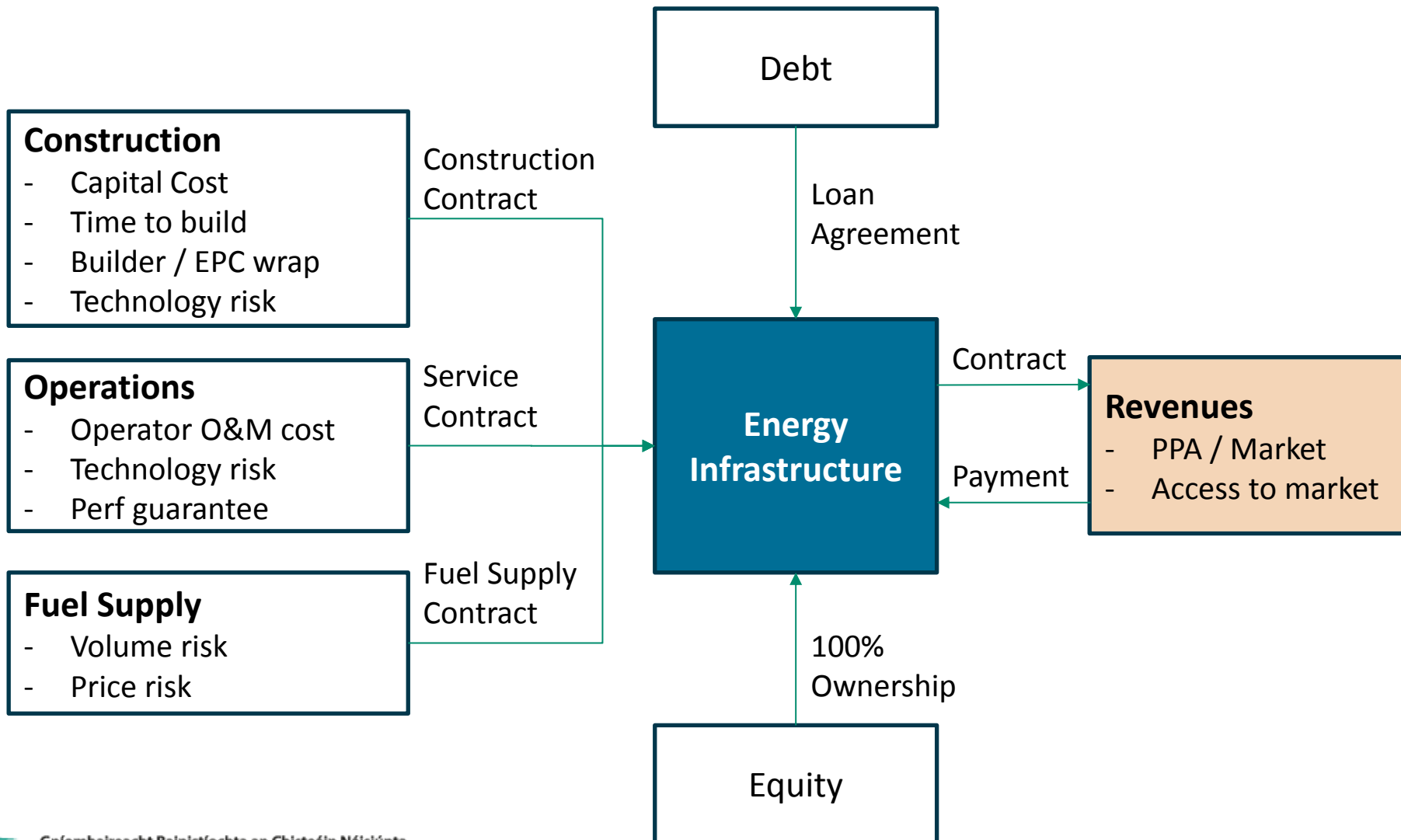
- Fuel Supply
 - ▶ Price risk
 - Commodities - gas, coal, biomass
 - ▶ Volume risk
 - Weather - wind, solar
 - Supply chain - biomass



Share of capital costs in long-run marginal costs



Typical Project Structure



Project Revenues – PPA vs. Market

- Power purchase agreement (PPA)
 - ▶ Long term contract – price certain
 - ▶ Renewables underpinned by price support mechanisms
 - ▶ May guarantee one side of the equation (price, volume)
 - ▶ Debt providers usually size loan tenor to contract duration
 - “project tail” = contract > loan tenor
 - “merchant tail” = contract < loan tenor
- Market revenues
 - ▶ Merchant power plant – no long term price certainty
 - Wholesale electricity price
 - Capacity market
 - System service provision
 - ▶ Market analysis and TA Due Diligence

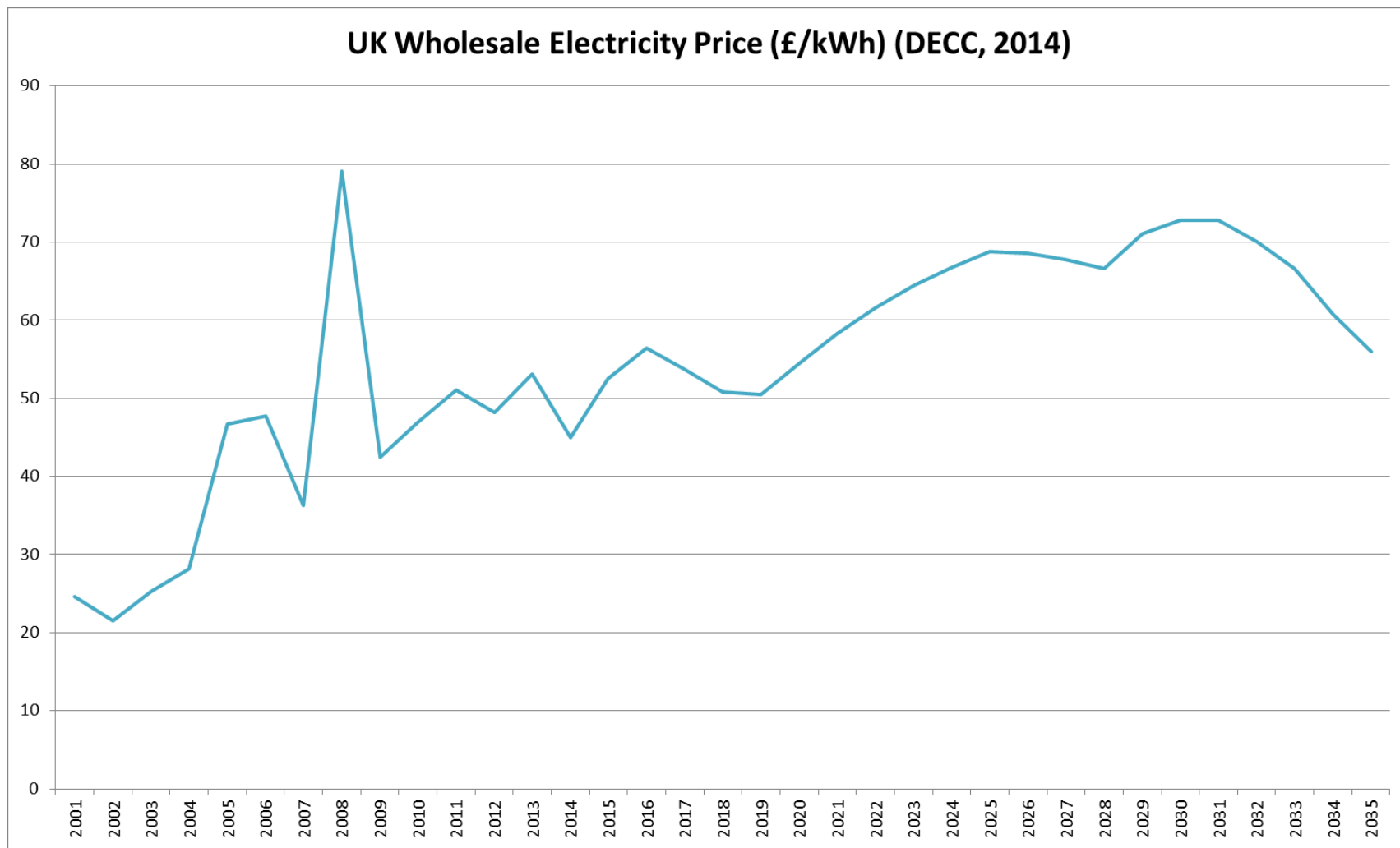


Project Finance Debt

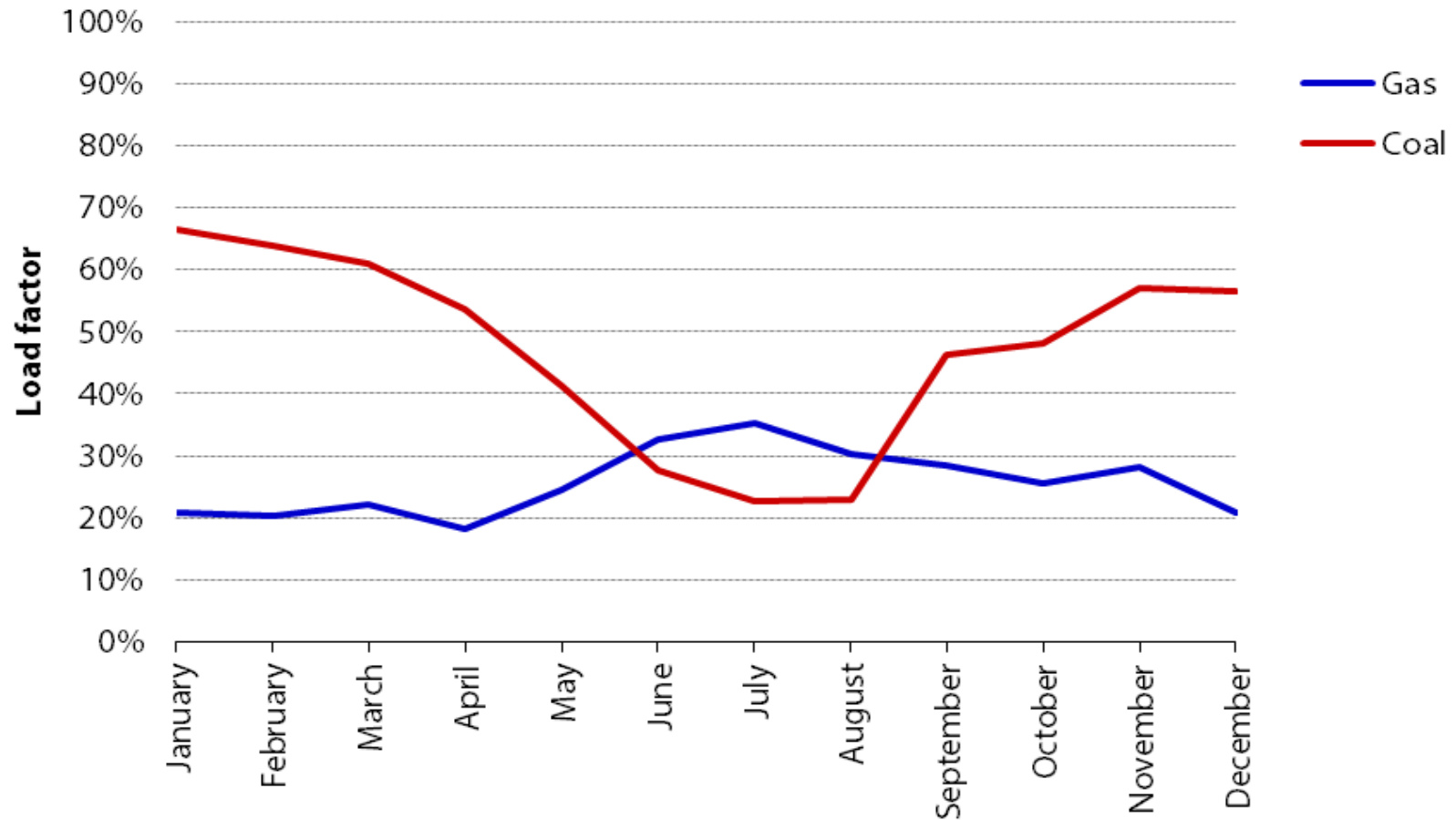
- The term “Project Finance” refers to the financing of a long term economic unit in which a lender is prepared to rely upon:
 - ▶ the cashflow for repayment as defined by the contractual relationships within each project; and
 - ▶ To the entire assets of the unit, as security.
- Pass risks to party best equipped to manage them
- Highly structured – a web of contractual arrangements
- Key cash coverage covenants
- Sensitive to downsides



Market price – wholesale electricity (UK)



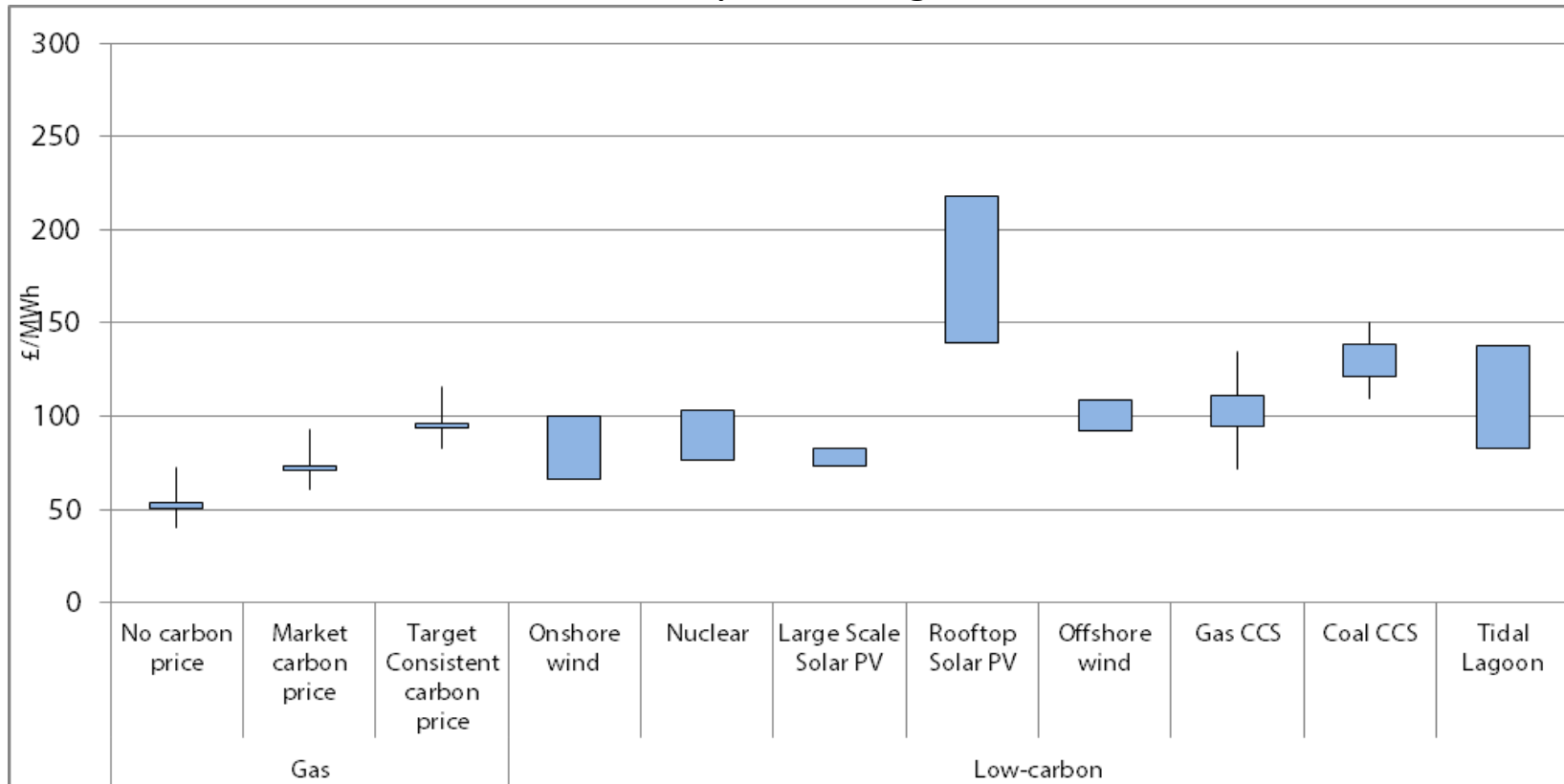
Average monthly load factors for coal and gas in 2014 (UK)



Levelised Cost of Energy by technology (2025)

LCOE is an economic assessment of the total cost to build and operate a power-generating asset over its lifetime divided by the total power output of the asset over that lifetime.

The LCOE is the cost at which electricity must be generated in order to break-even.



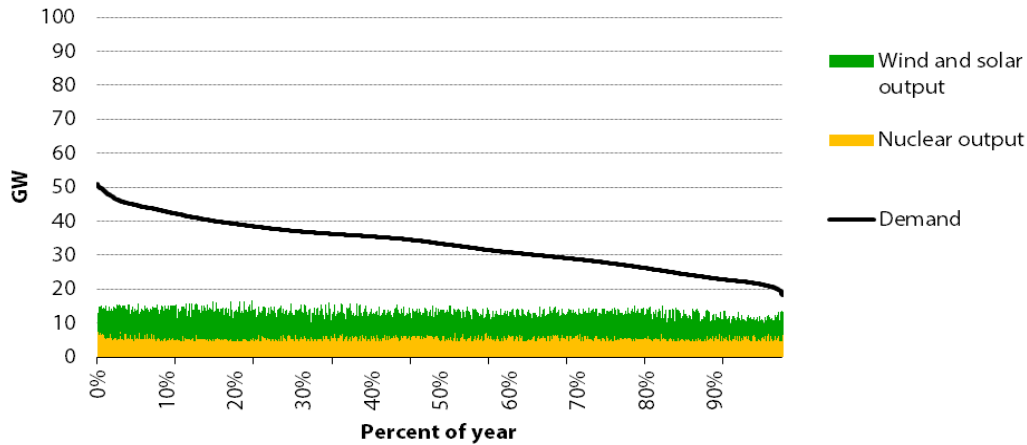
Key assumptions used to derive LCOE

- Discount rate / Expected return
- Capital cost
- Capacity Factor
- Fixed O&M cost
- Variable O&M cost
- Fuel cost
- Time to build (pre-construction, construction)
- Asset lifetime
- Projected commodity prices (electricity, gas, coal, carbon)
- Other revenue sources (capacity payments, system service payments)



Electricity Demand vs. Low Carbon Supply (UK)

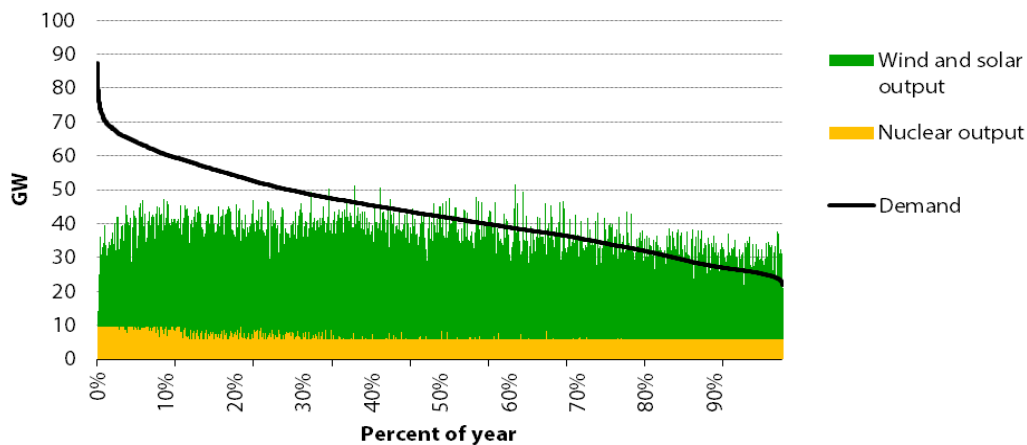
2014



Options for flexibility

- Flexible unabated gas plant
- Interconnection
- Demand-side response
- Energy storage technologies

Low carbon future



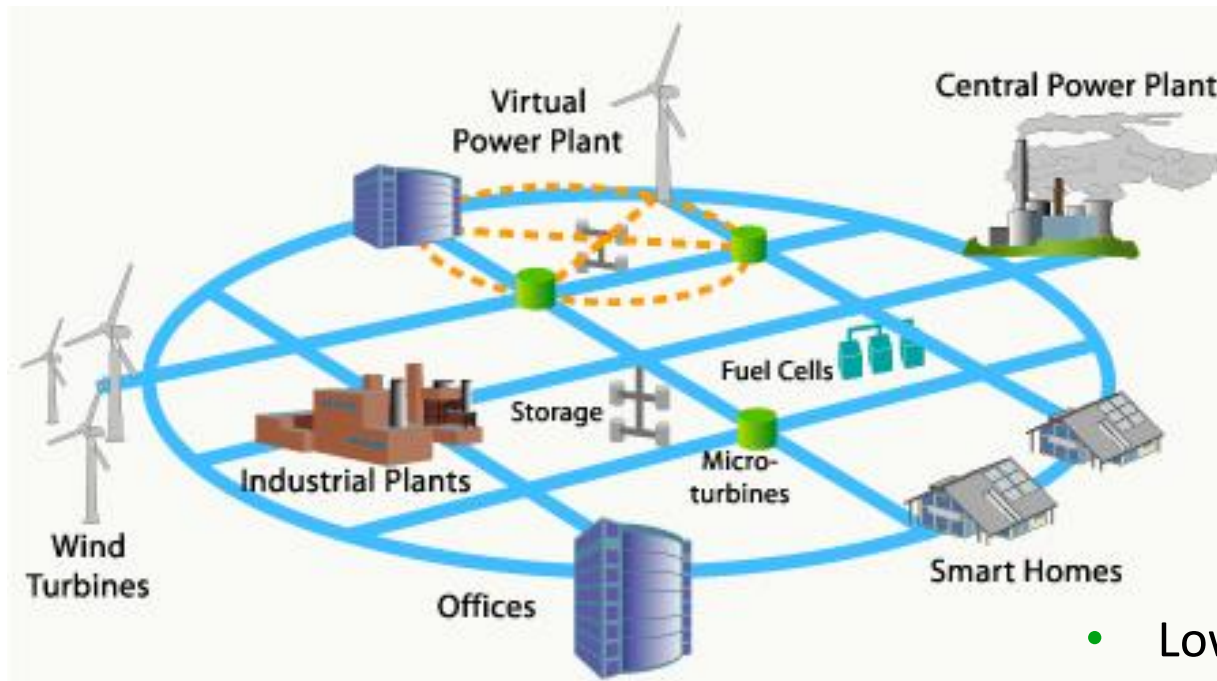
Value of flexibility

- Lower system costs
- Reduce curtailment
- Maintain security of supply

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Energy infrastructure is changing



- Low carbon driven
- Distributed generation
- Demand focused
- Flexibility focused
- New revenue models
 - ▶ Equity risk
 - ▶ Debt cashflow certainty



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