



# A Tale of Two Markets

Richard Green

Florence School of Regulation Workshop:  
Electricity Pricing and Trading in the  
Decarbonised Energy Sector,  
13 November 2020



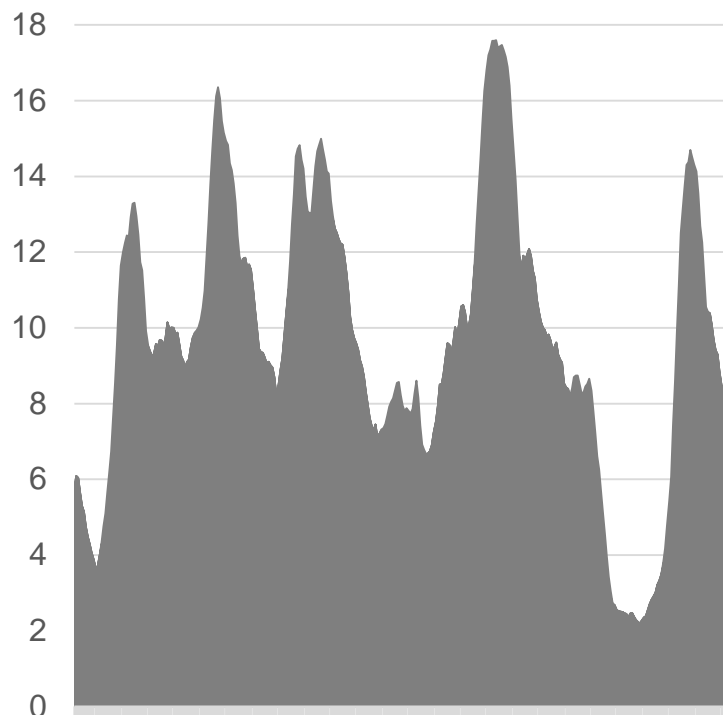
## Two types of electricity?



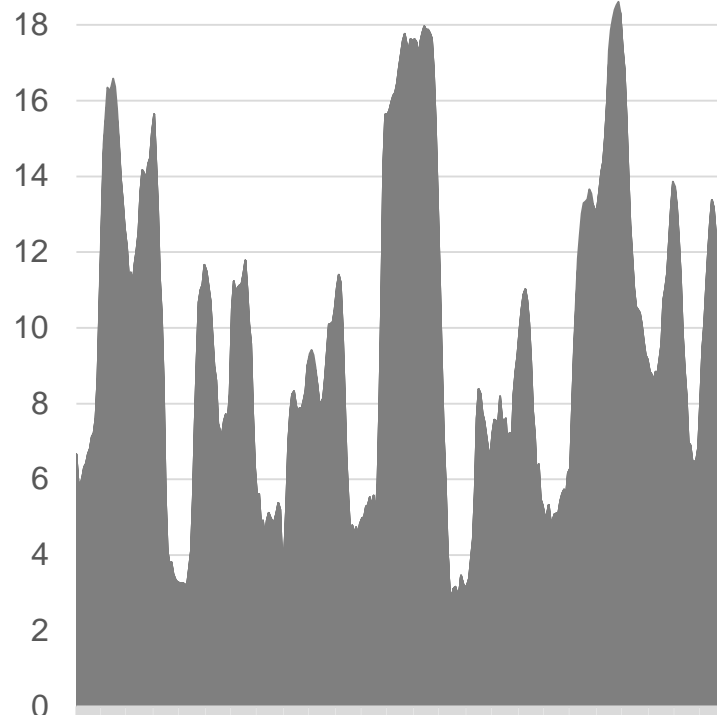
# Variable Generators

Coal, Gas and Oil, versus Wind and Solar

GW

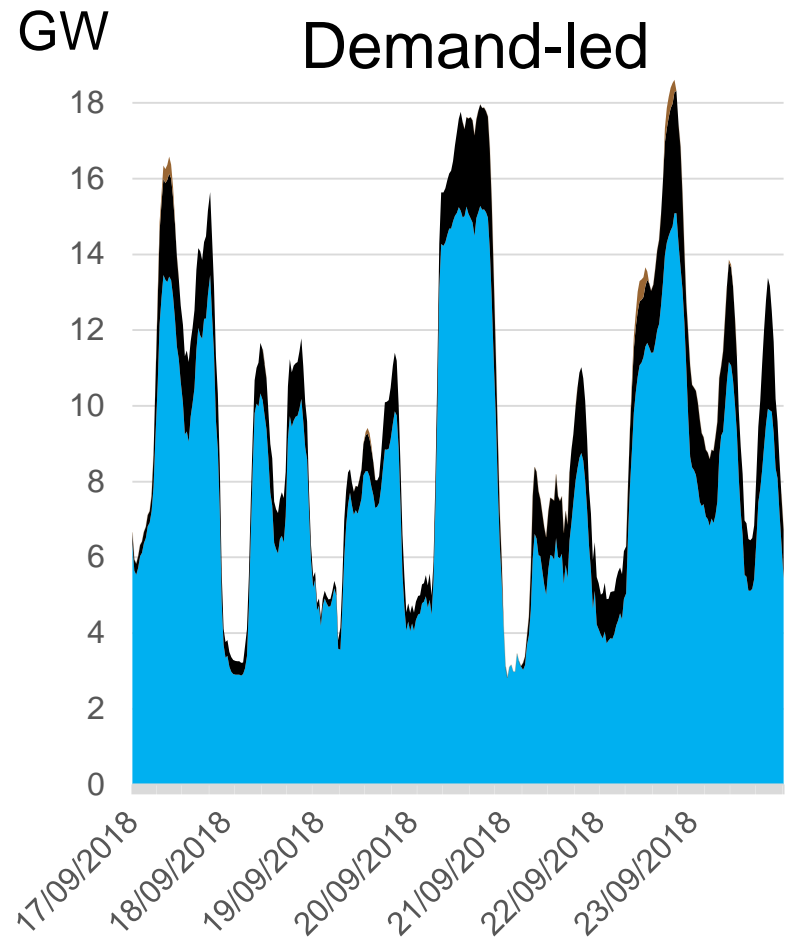
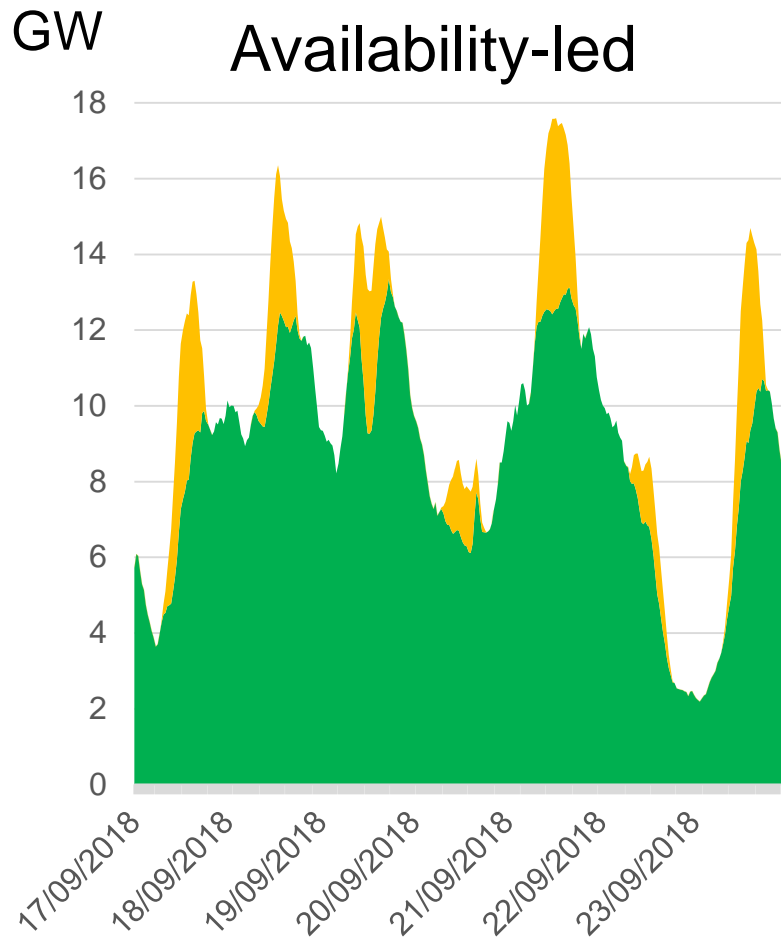


GW



# Variable Generators (x2)

Wind and Solar versus Coal, Gas and Oil





# Two kinds of contracts

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- Demand-led generators
- Fossil, biomass, storage
- Mix of capital and variable costs
- Call Options reflect these characteristics
  - Availability fee  $\approx$  fixed cost
  - Exercise price  $\approx$  variable cost
- One-way Contracts for Difference with a Pool
- Availability-led generators
- Wind and solar PV
- Capital costs dominate
- Put Option gives control to the seller
  - Availability fee  $\approx$  fixed cost
  - Exercise price  $\approx$  variable cost
- “Availability CfD” might be invented for a Pool?

# Availability-led contracting

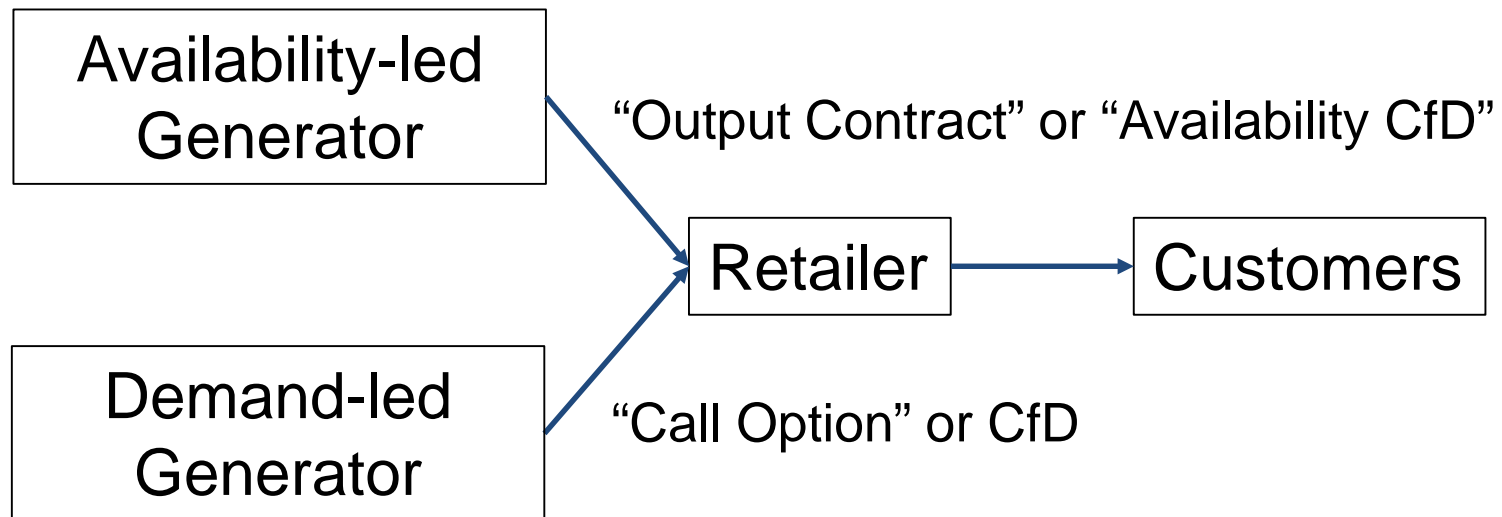
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- Feed-in Tariffs are a Put Option without the optionality
  - High exercise price makes it worthwhile
  - Seller takes the output risk
- Two-part (full) Output Contract partly replicates it
  - Lower exercise price would reflect marginal cost
  - Fixed fee to cover generator's fixed cost
    - Based on *ex ante* estimate of output potential?

# Who holds the contracts?

Retailer procures separately

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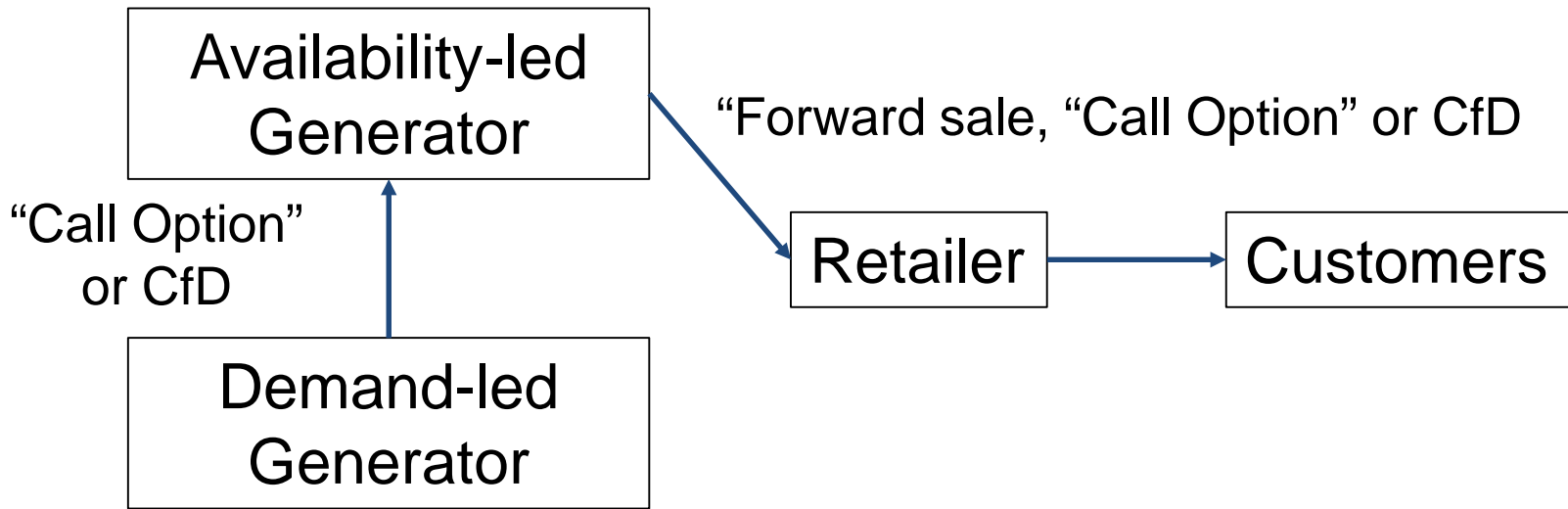


- Availability risk split between retailer and availability-led generator, depending on exercise price
- Demand-led generator faces little risk

# Who holds the contracts?

Availability-led generator buys back-up

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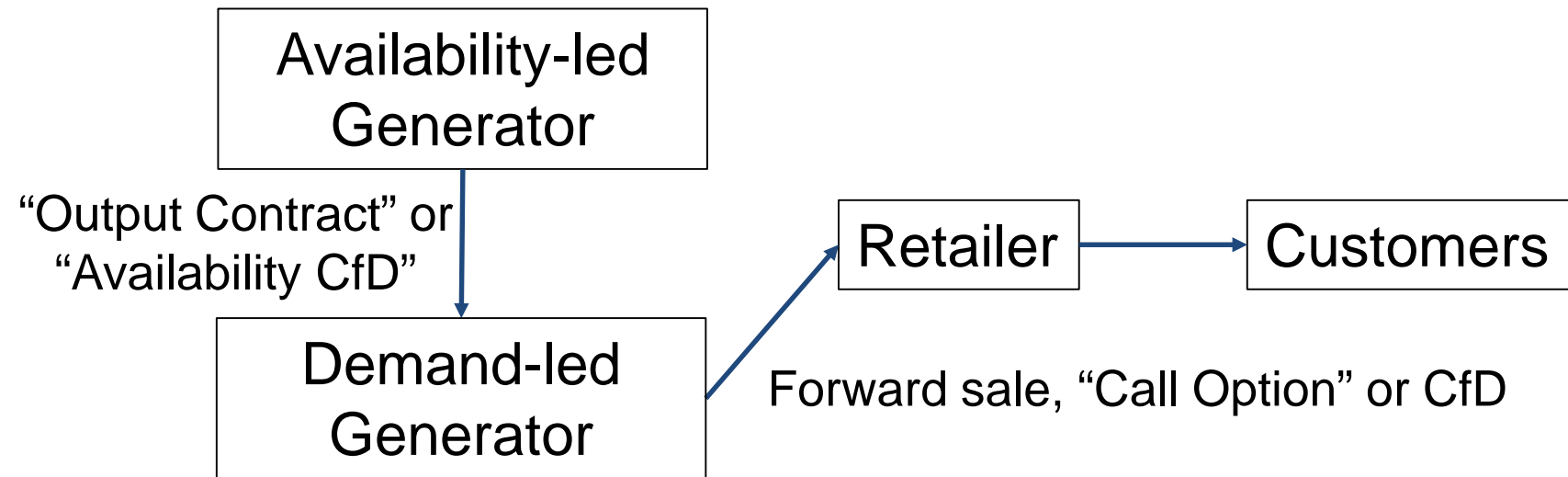
- Availability risk carried by availability-led generator
- Demand-led generator and retailer face little risk
- Is this Helm's "Equivalent Firm Power" auction?
  - *Cost of Energy Review*, 2017



# Who holds the contracts?

Demand-led generator buys cheap when it can

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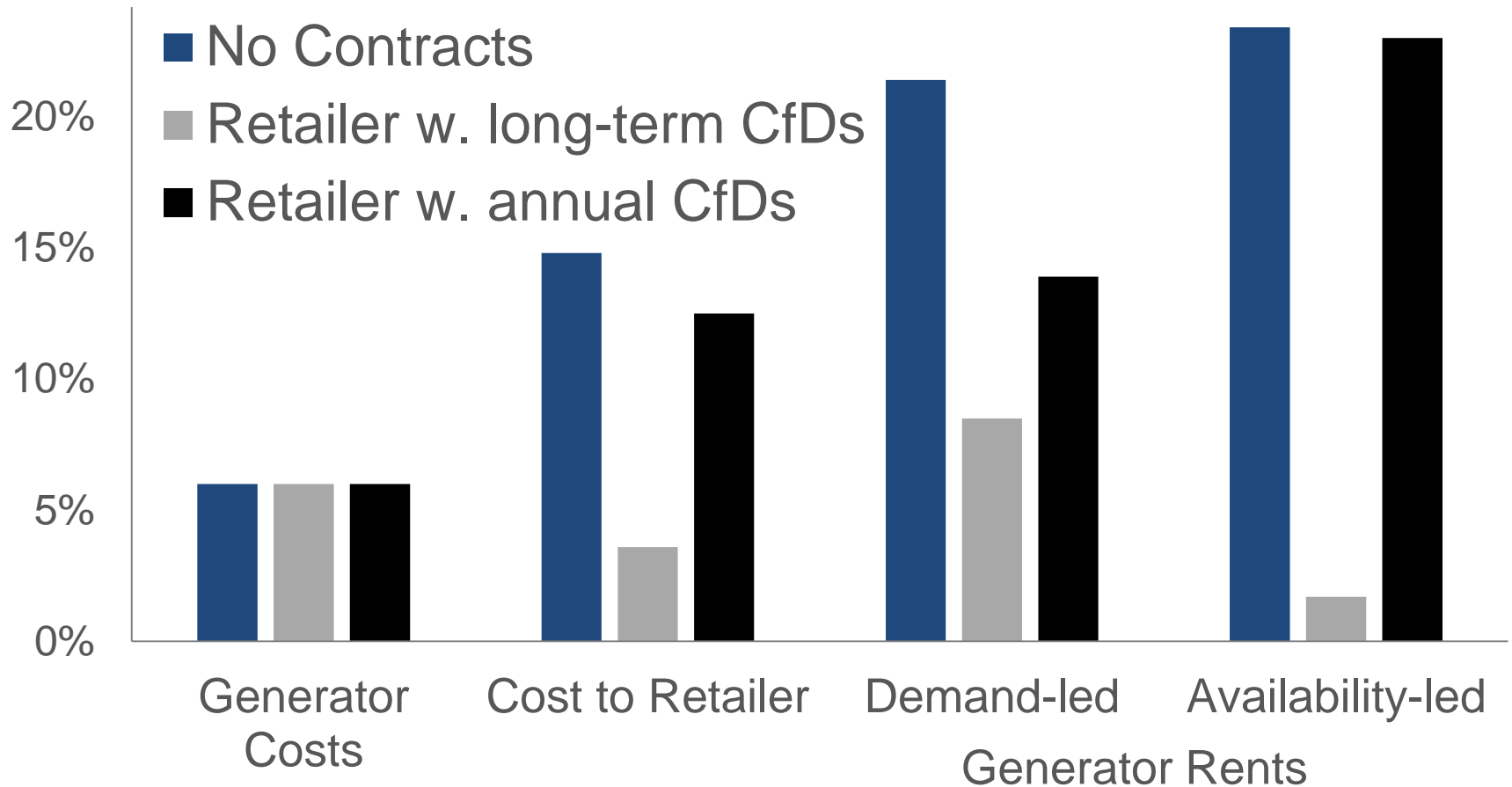
- Availability risk split between availability-led and demand-led generators, depending on exercise price
- Retailer faces little risk



# Risks to the industry

(Availability-led CfDs have a low strike price)

Coefficient of Variation





# Pricing in the short term

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- Forward sales and CfDs fix volume; marginal purchases at spot price
- Call Options should not be exercised if spot price is lower than exercise price; extra purchases at spot price
- Pool plus CfD makes sensible choices more “automatic”

# How many markets?

Don't only study *Energy* Economics

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- Energy (before real-time)
- Balancing energy (real-time)
- Reserve
- Inertia or Fast Response

**Thank you**

