

Future Design of Renewable Energy Markets

EUFORES Parliamentary Dinner Debate

4 December 2012

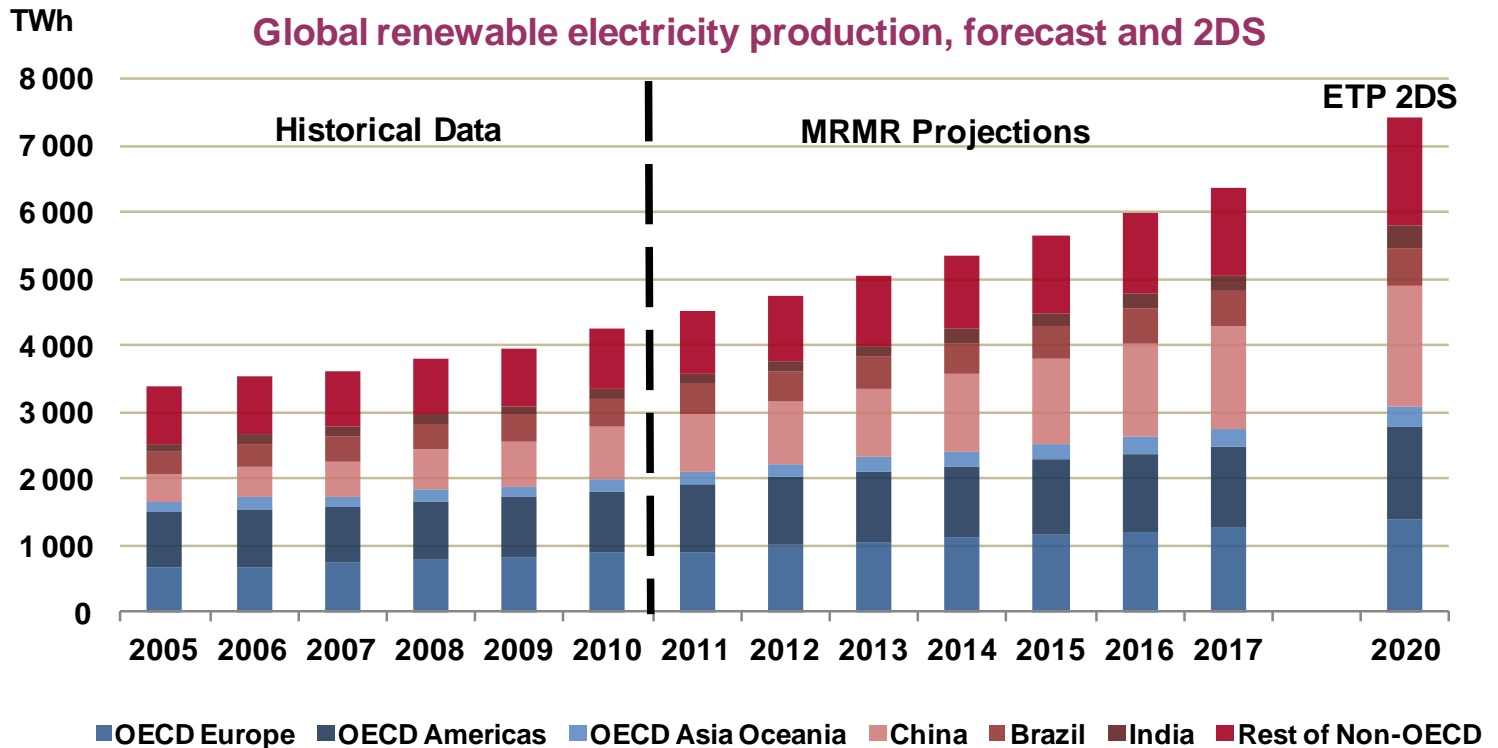
Brussels



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Renewable power growth forecast to accelerate

- Globally, progress is broadly on track to achieve 2DS objectives
- Hydropower remains main RE source (+3% p.a.)
non-hydro growing at +14% p.a.
- Non-OECD accounts for two-thirds of the overall growth
 - China (40% of growth), Brazil, India lead; new markets expanding in all world regions



Mind the different contexts

- Apparent contradiction between markets:
 - OECD countries:
RE perceived as driving up costs
 - China, India, Brazil: RE deployed as attractive options for getting energy security/diversification and – increasingly – good economics

 - Very different contexts:
 - In most of OECD, RE drives generation from existing capacity out of the market
 - In emerging economies RE help to cover a deficit
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Thought experiment: Target Model 2.0

- Perfect European grid (copper-plate)
- Full integration of day-ahead & intraday-markets & balancing
- CO2 price in place

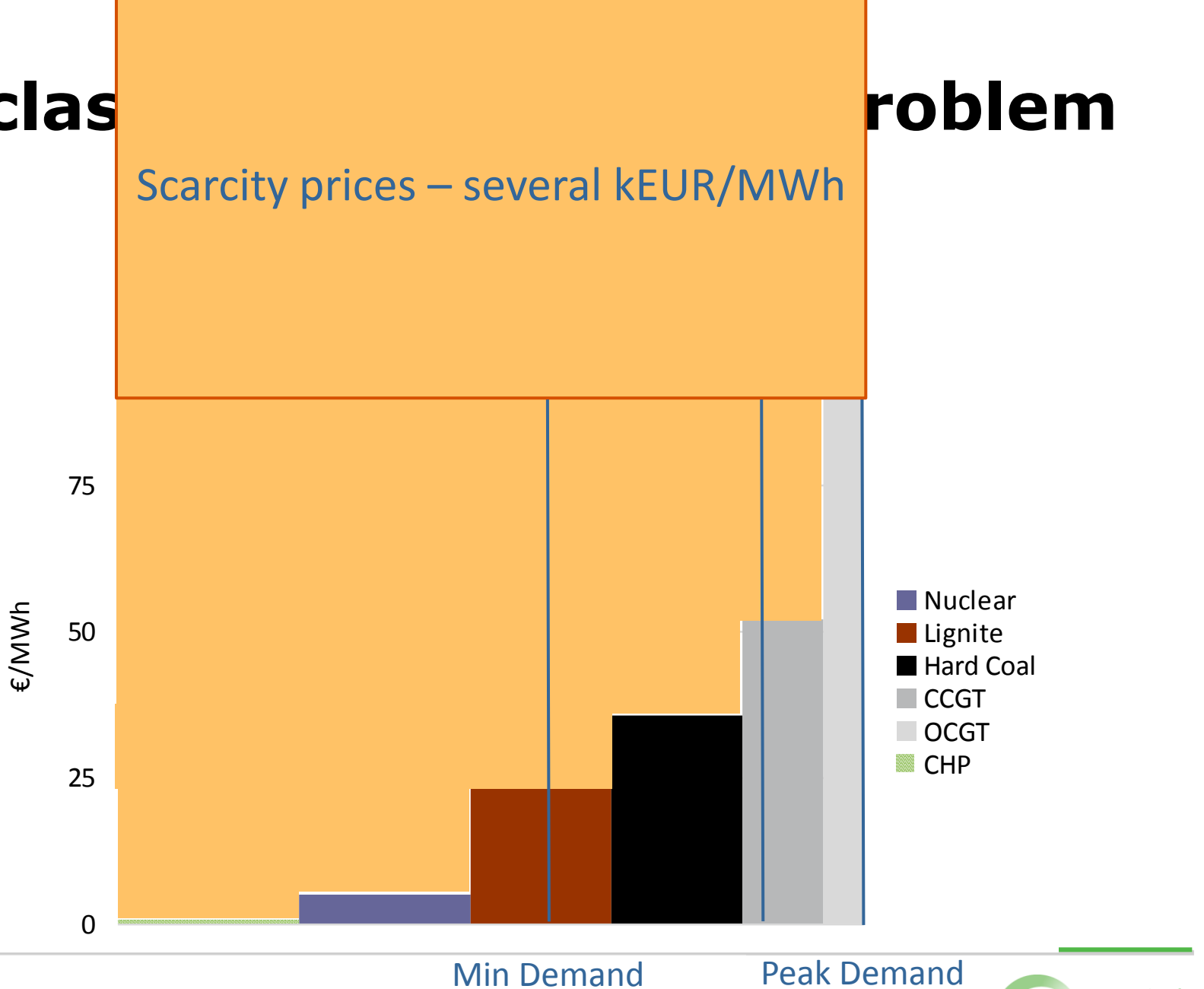
→ Question:
All problems solved?
Including decarbonisation?

The (old) concern – Will spot markets deliver

- Without renewables:
 - Classical missing money problem
- During the transition:
 - Uncertainty can inhibit investments
 - Important transitional market-effects
- Close to decarbonisation:
 - Exploring new territory

The classic merit order problem

Scarcity prices – several kEUR/MWh

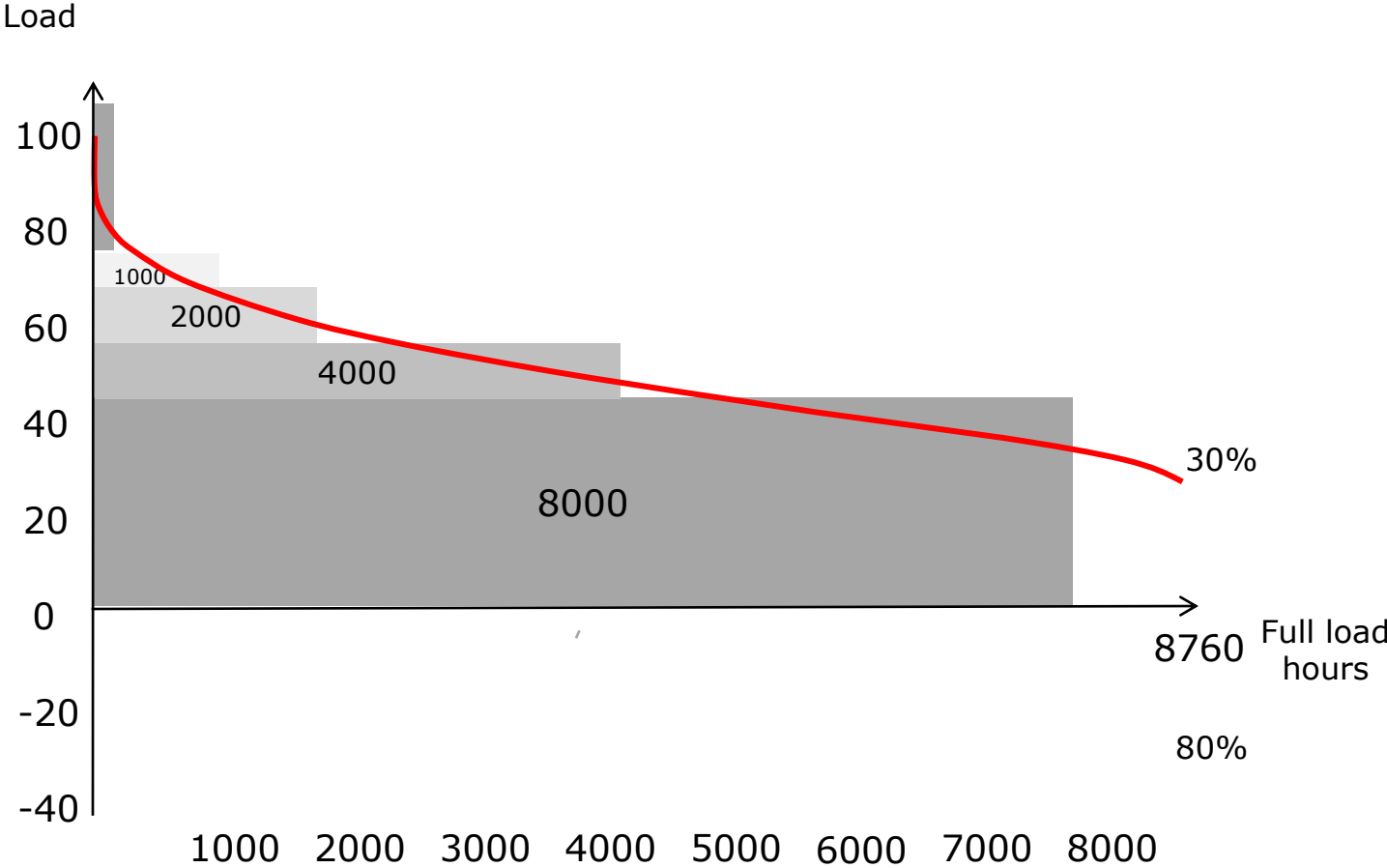


Classical missing money problem

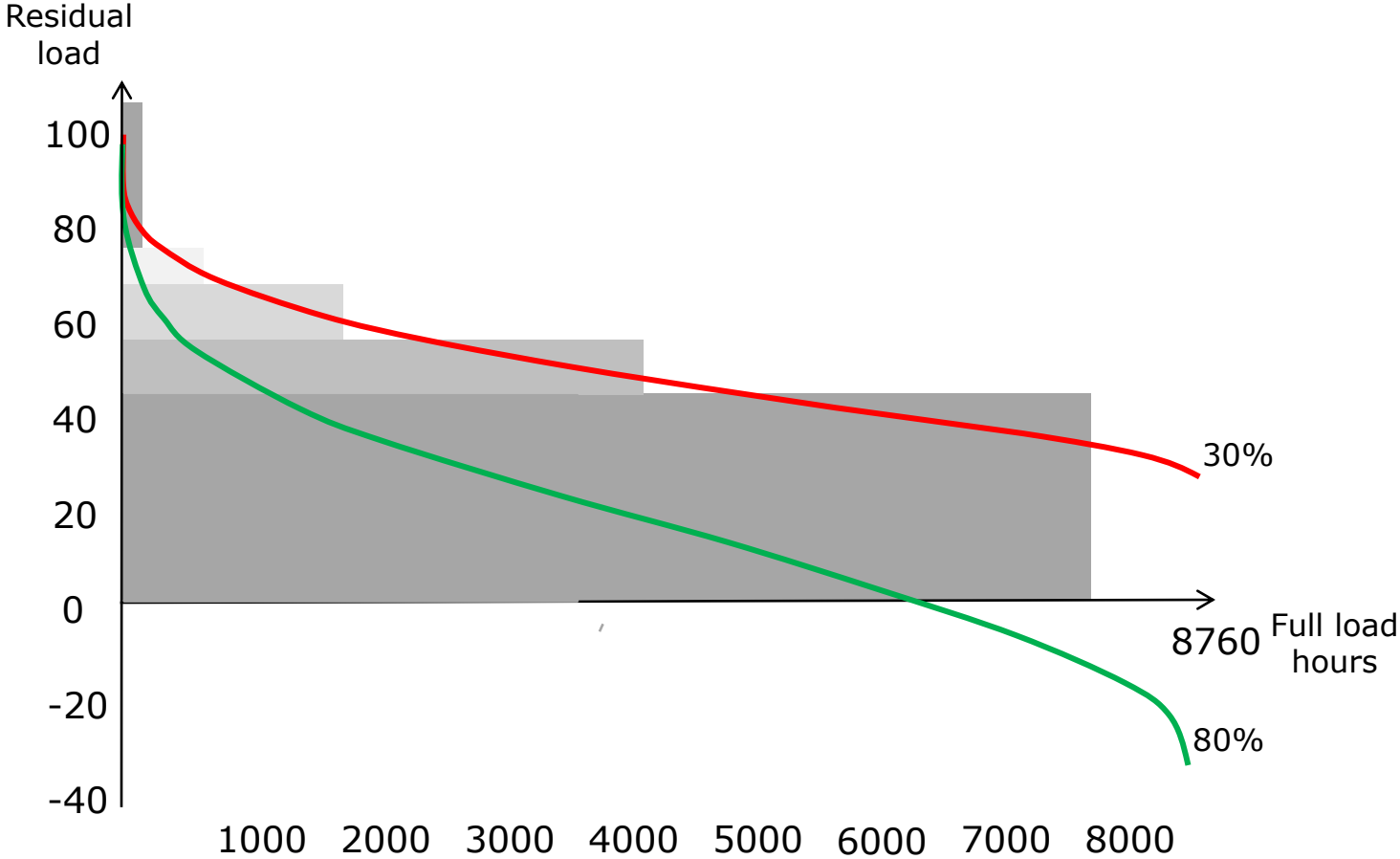
- Capacity markets designed to deal with precisely this problem
- Growing shares of variable renewables tend to exacerbate the issue:
 - Fewer hours of very high residual load
 - ➔ Scarcity prices during less hours > requires even higher prices to recover fixed costs

Transition effects

The merit order effect

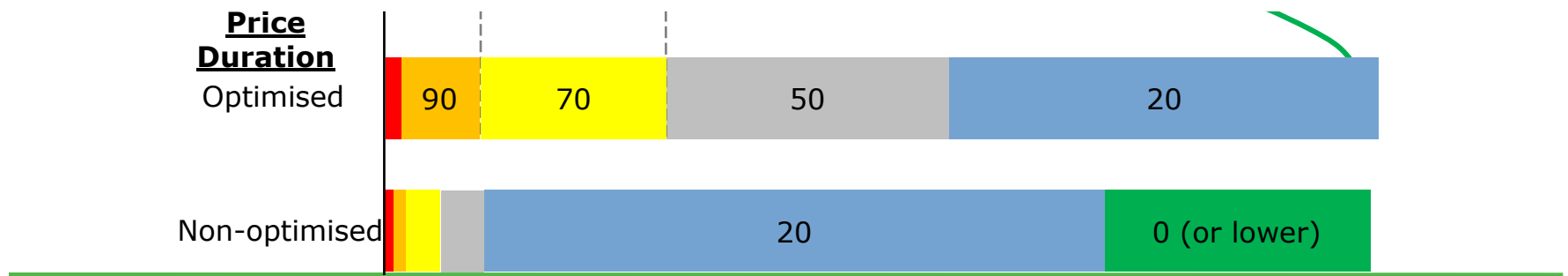


The merit order effect

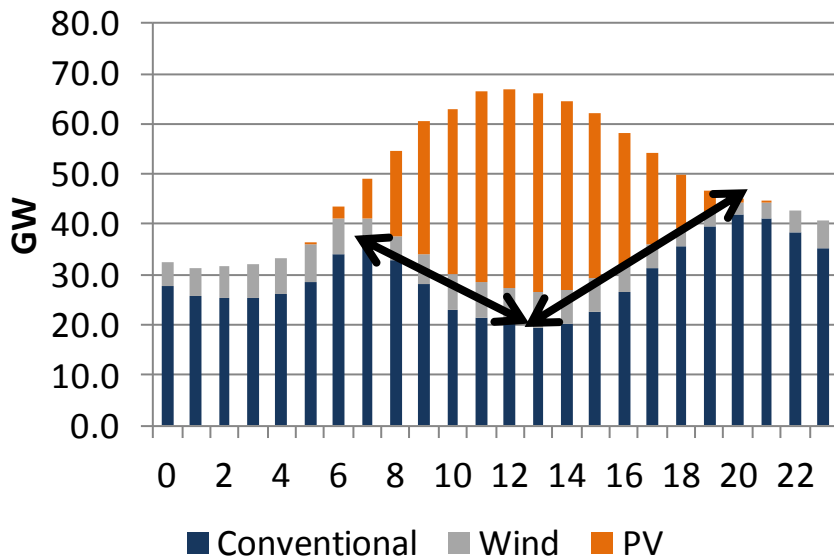
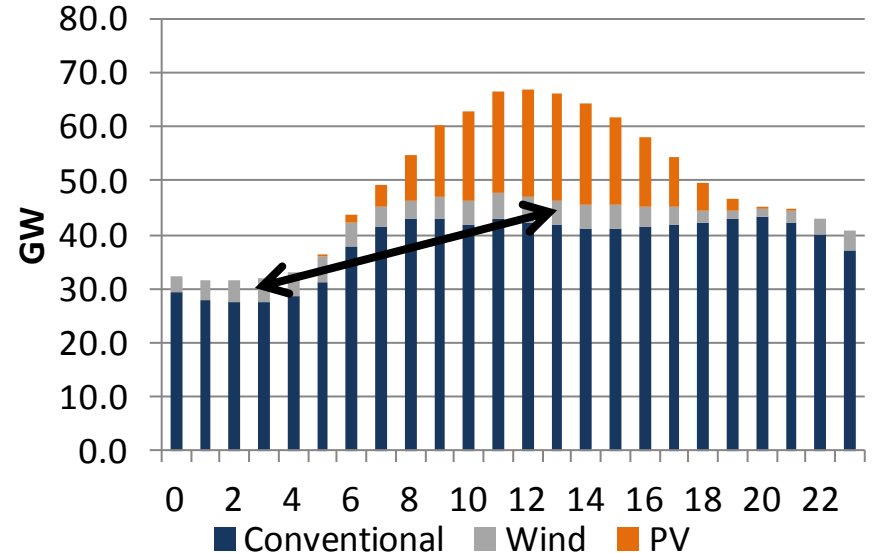
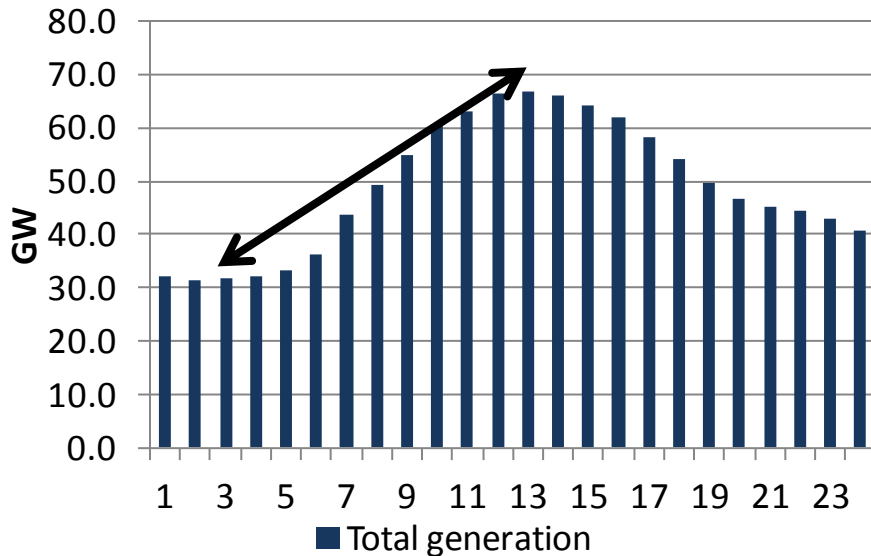


The merit order effect

- RE decrease market price
- RE displaces conventional electricity
- Less attractive to invest in generation



Flexibility – transition effect: storage



- Medium-term:
PV *reduces* value of pumped storage
- Long-term:
Mutual *increase* of market value

The role of CO2 price in the transition

- For existing plants: rising CO2 price
 - Can induce fuel switch for carbon generators
 - Provides more revenue for existing low-C plants

- For new plants: high CO2 price
 - Credibility spiral:
 - ◆ High CO2 price not credible > Risk premium > Even higher price needed > Higher risk premium etc.
 - Future prices – even at high values - get discounted away

Uncertainty impacts on investments

■ Fossil paradigm

- Energy sector extracts, transports and converts fossil energy commodities
- Implication for power sector: (sunk) investment costs make up only part of total costs

■ Decarbonised paradigm

- Commodity flows are replaced by capital investments
- Capital costs dominate total costs

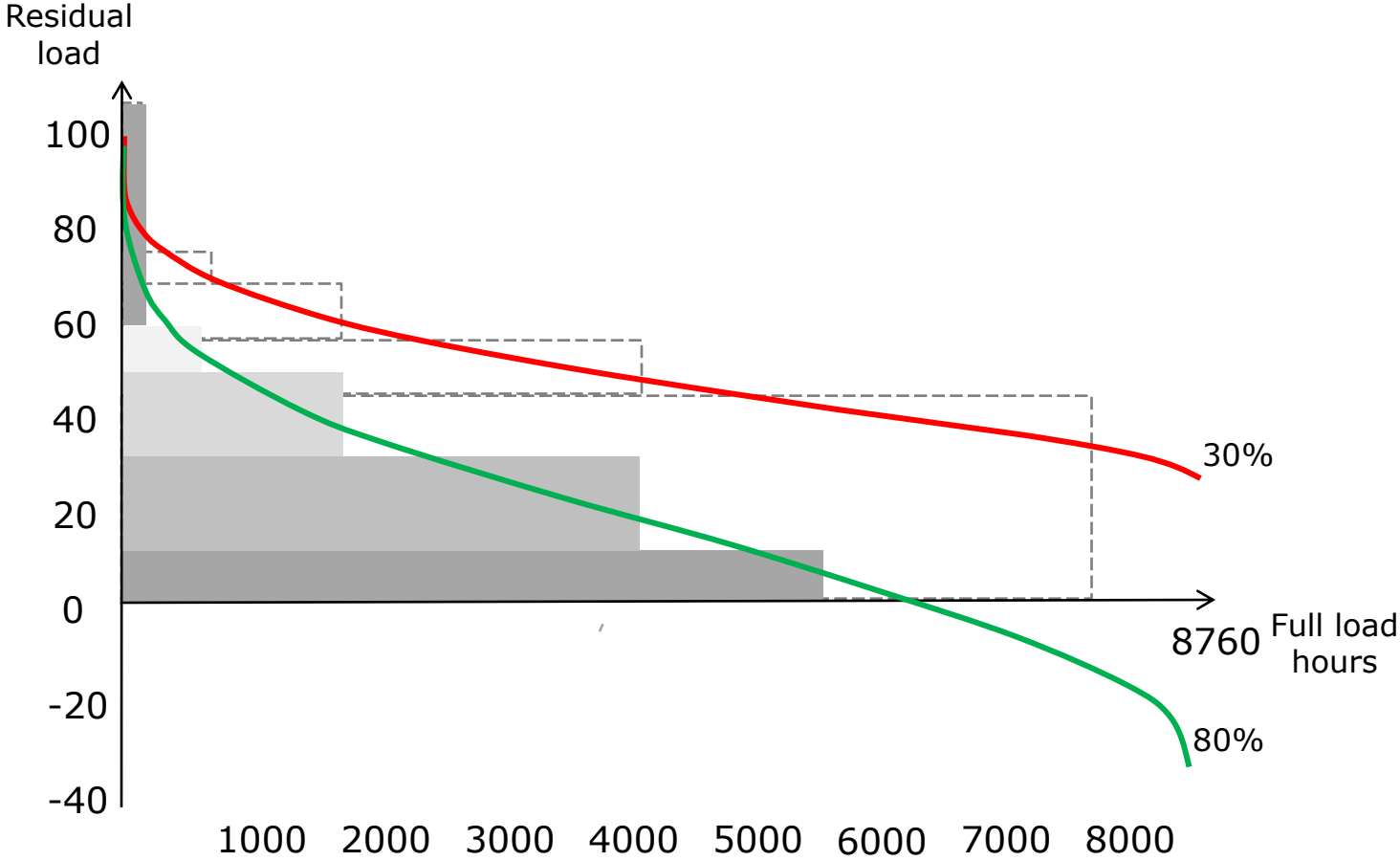
→ Low carbon investments much more affected by uncertainty

All in all: A challenging transition!

- Displaced energy from conventional generation depresses market prices
- No incentive for flexibility investments under certain transition situations
- Future CO₂ price gets discounted away, CO₂ price credibility problem
- Uncertainty disproportionately renders low-carbon investments less attractive

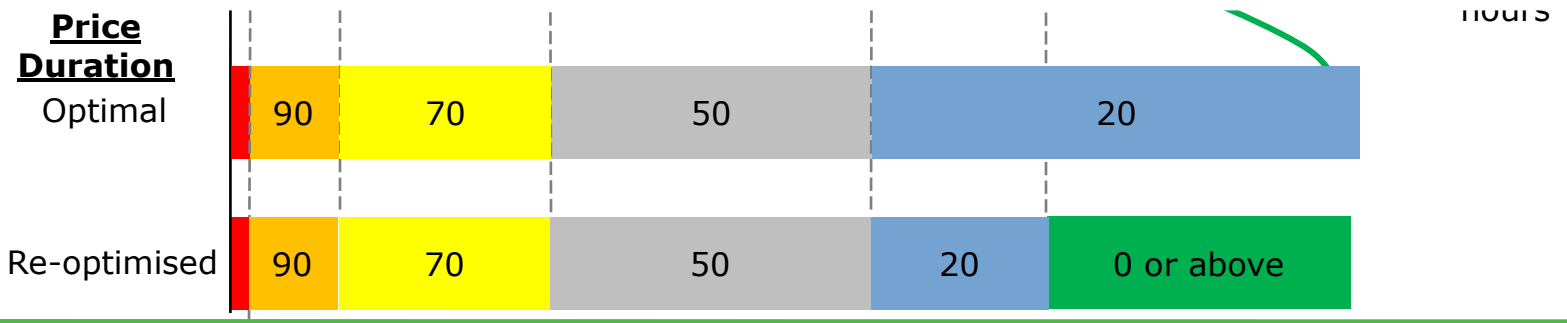
Long-term

Adaptation of the generation fleet



Adaptation of the generation fleet

→ **Spot market prices may recover in the long term**



The value of variable renewables

- At high penetrations difference between: instantaneous and annual value
- Instantaneous value
*"Every good/service that varRE can provide **if** the resource is available, will have a low value **in moments** when the resource is available"*
- Annual value
*"(Variable) renewables are a cost effective, secure and clean way of supplying **a certain amount of energy** in one year"*

The role of the CO2 price

- 50 g/kWh in line with 2050 targets for CO2 reduction
 - Leaves space for some 10% of unabated, efficient gas generation
 - Hours of operation highly variable year on year > driven by wind, sun and economic situation
 - When only low-carbon generators set the price, the CO2 price 'disappears' from the market
 - ➔ **Not guaranteed that low CO2 generators benefit from high CO2 prices**
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A mixed picture in the long term

- Recovery of generation investments not ruled out – but much more challenging
- Instantaneous value of variable renewables volatile - despite their stable 'annual' value
- Close to full decarbonisation:
not clear low carbon generation benefits from CO2 price with sufficient certainty

Thought experiment: Target Model 2.0

- *Answer: Plenty of issues left – in particular during transition*
- Possible misalignment of short-mid term investment incentives and future system needs
 - CO2 price faces credibility/discounting issues
 - Cost recovery not impossible in principle – but much more challenging
 - Uncertainty weights heaviest on low carbon investments
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Future market design and renewables

■ Criteria for a functioning market design

- Mitigate **regulatory uncertainty** to get investments
- Preserve other risks and **competition** to get efficiency and innovation
- Ensure that **full cost/benefit** is actually reflected

■ Conclusion for RE

- Costs need to keep coming down
- Market design needs to recognise value of RE
 - ◆ Secure, clean and (increasingly) low cost **annual energy**
 - ◆ **Flexibility** value of hydro and bioenergy

Thanks.

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