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The Iberian Power Sector in the Global Context. The challenges ahead

ELECPOR Conference

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The Iberian Power Sector in the Global Context



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- The increased globalisation means it is increasingly critical for economies to operate as efficiently as possible (i.e. with the lowest possible costs).
- What challenges lie ahead for the Iberian power sector?
 - Short-term challenges: economic crisis and re-regulation
 - Medium-term challenges: renewables become competitive
 - Long-term challenges: full decarbonisation
 - Challenges arising from European Commission decisions
- The challenge for the regulator:
 - How to ensure that electricity is produced and delivered at the lowest cost?

Short-term challenges

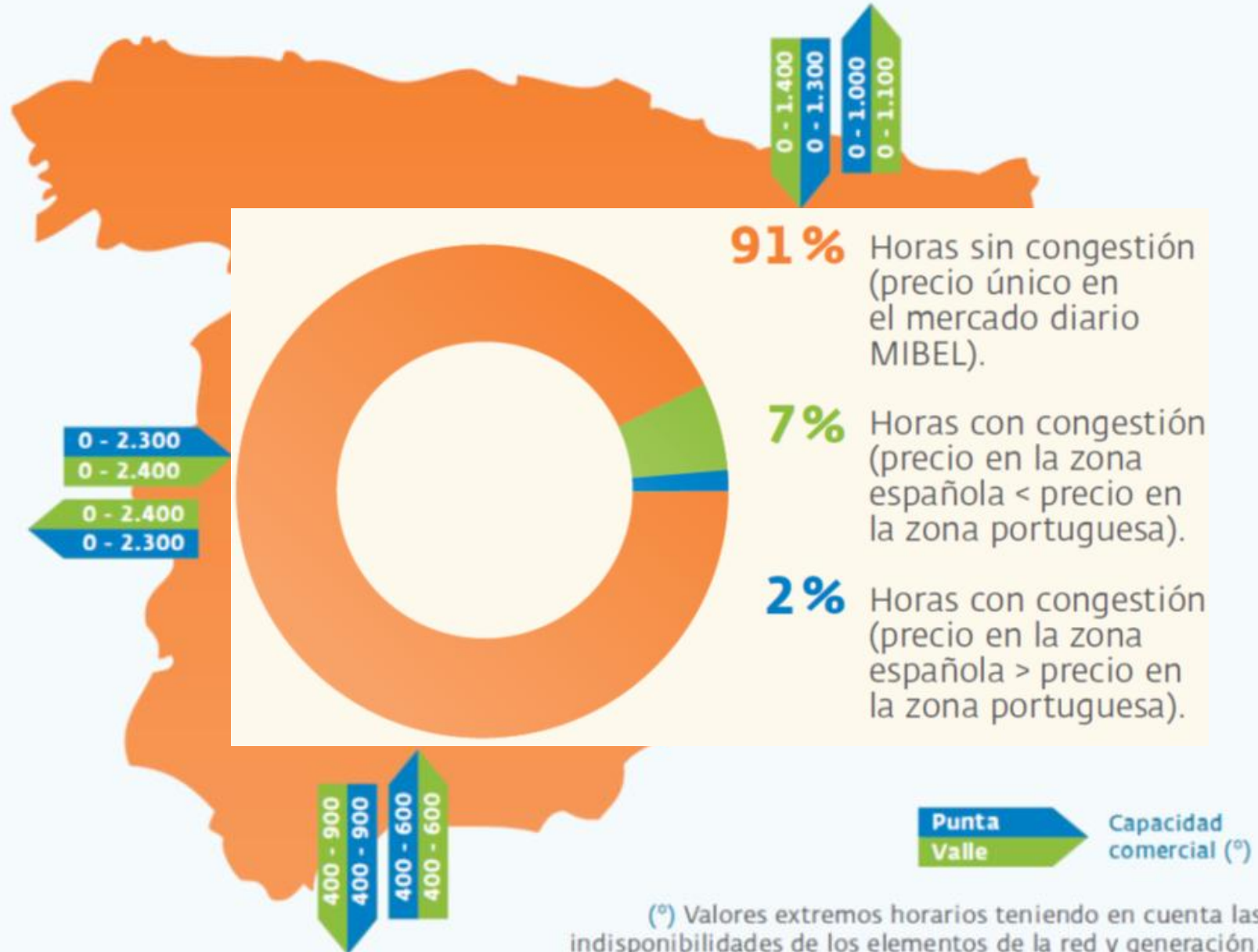
Economic crisis and re-regulation

Short-term challenges: The economic crisis and re-regulation



- The economic crisis is causing a contraction of demand, which increases the average costs of supply, but it also makes regulators specially reluctant to increase tariffs.
- Rather than increase tariffs, it is easier for regulators to argue that profits are excessive and:
 - Reduce allowed revenues of regulated activities (incl. CMECs and CAEs)
 - Reduce/eliminate capacity/availability payments
 - Impose taxes on generators (Spanish proposal)
- These decisions will result in a lower security of supply (though, no doubt, it is the electricity companies that will be blamed...).

Does it make sense to talk about the Iberian Power Sector?



The Iberian electricity market is not highly concentrated

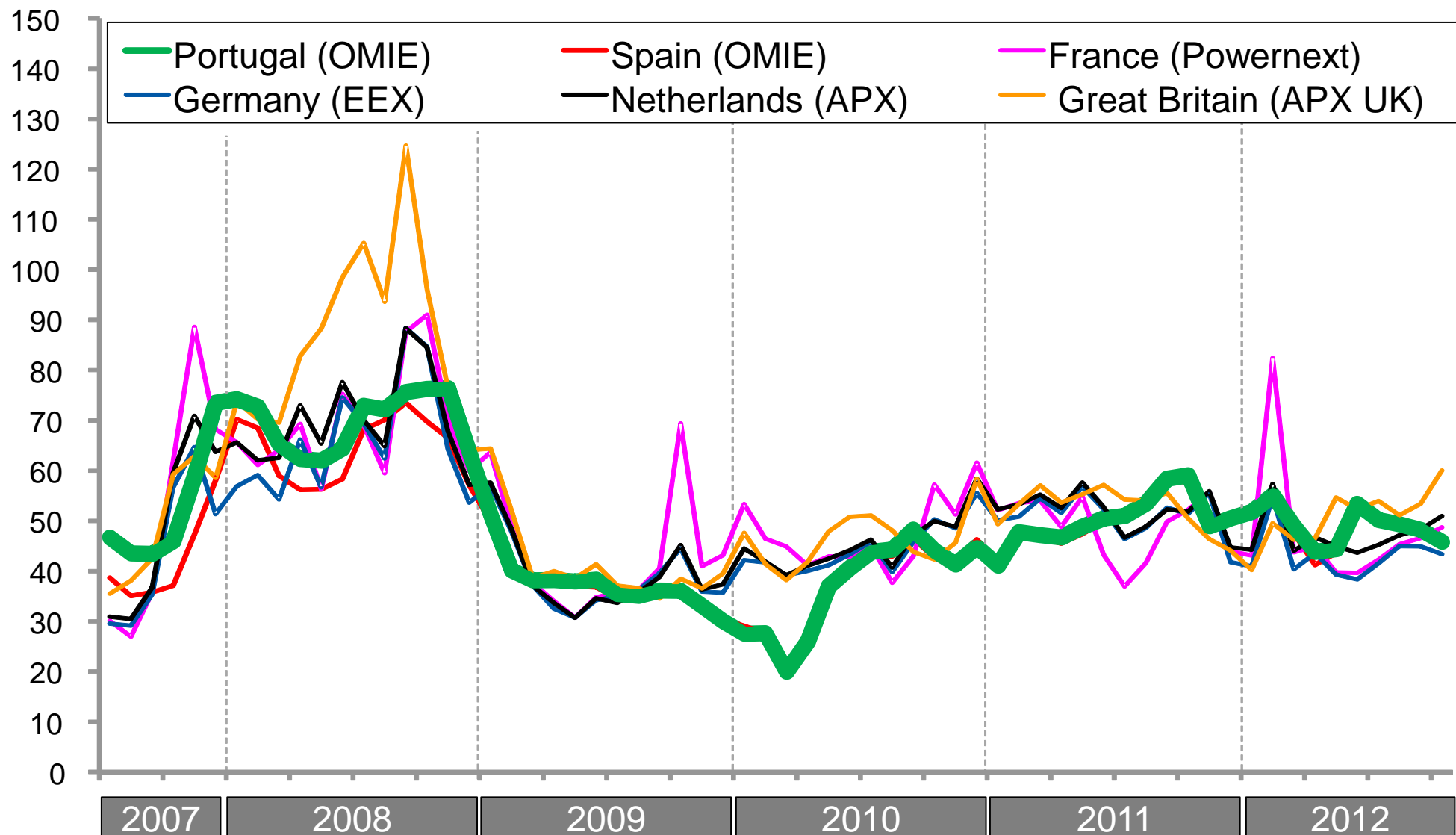


| Generator | Iberian Market |
|---------------------|----------------|
| Endesa | 21.4% |
| Iberdrola | 21.1% |
| EDP Hidrocantábrico | 13.1% |
| Gas Natural Fenosa | 12.3% |
| Acciona | 5.9% |
| E.ON | 3.2% |
| GDF | 2.3% |
| Others | 20.2% |
| Imports | 0.6% |
| HHI | 1276 |

Wholesale prices are similar or lower than in most neighbouring countries



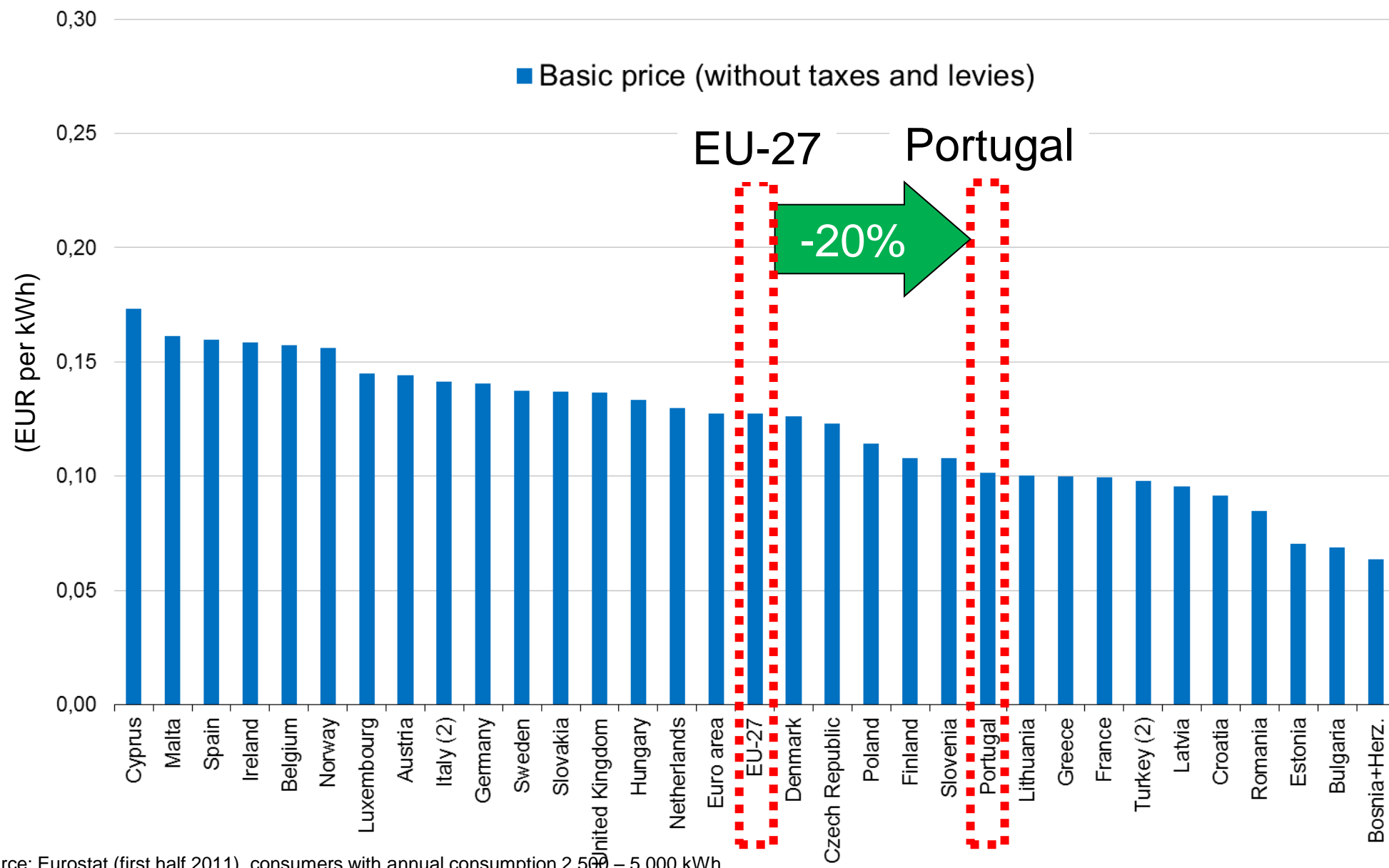
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The retail prices are also lower than in most neighbouring countries



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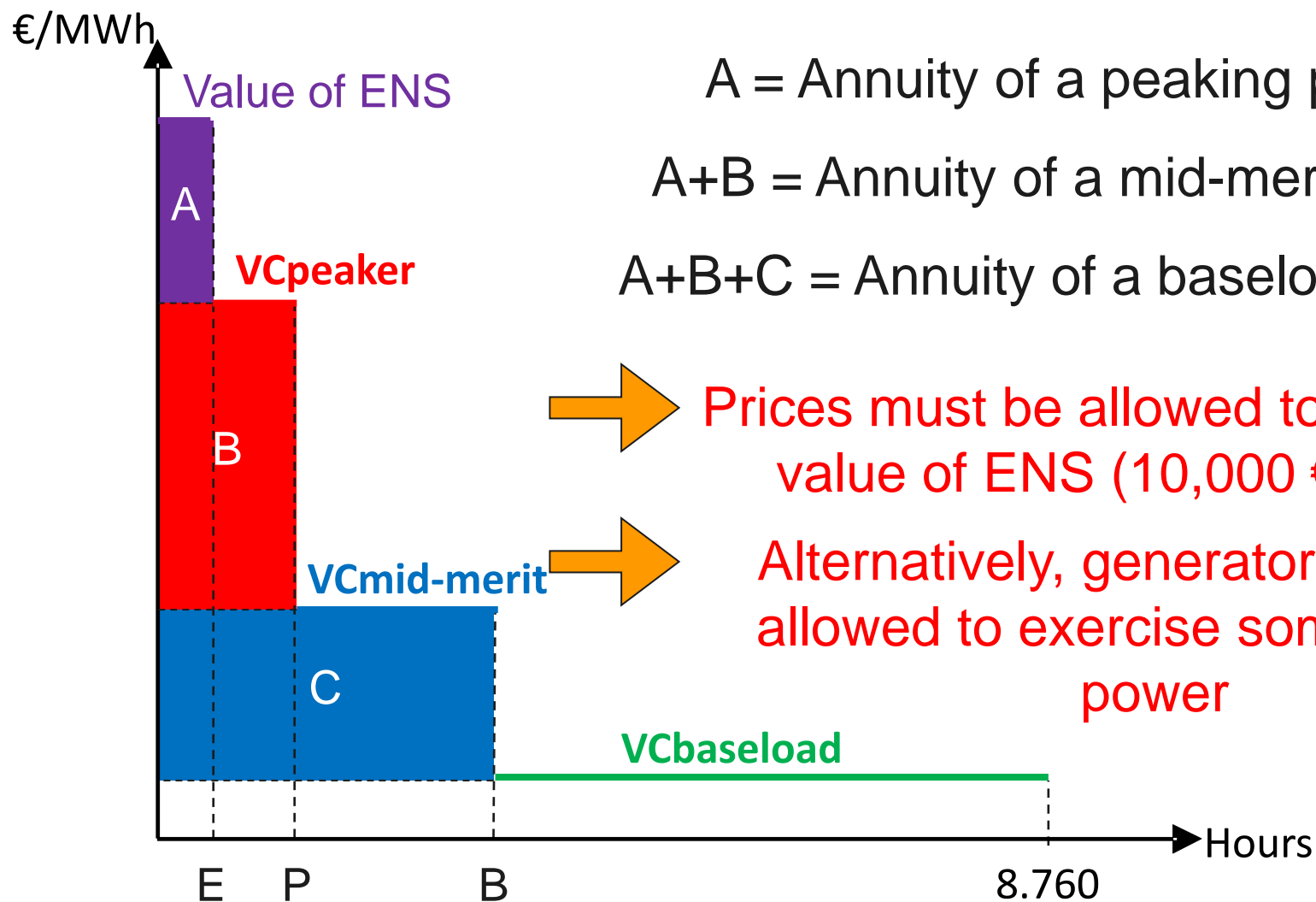


Source: Eurostat (first half 2011), consumers with annual consumption 2,500 – 5,000 kWh.

The elimination of the capacity payments implies that the market is “energy-only”



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A = Annuity of a peaking plant

A+B = Annuity of a mid-merit plant

A+B+C = Annuity of a baseload plant

➔ Prices must be allowed to increase to value of ENS (10,000 €/MWh?)

➔ Alternatively, generators must be allowed to exercise some market power

Capacity payments must be paid to all generators without discrimination...



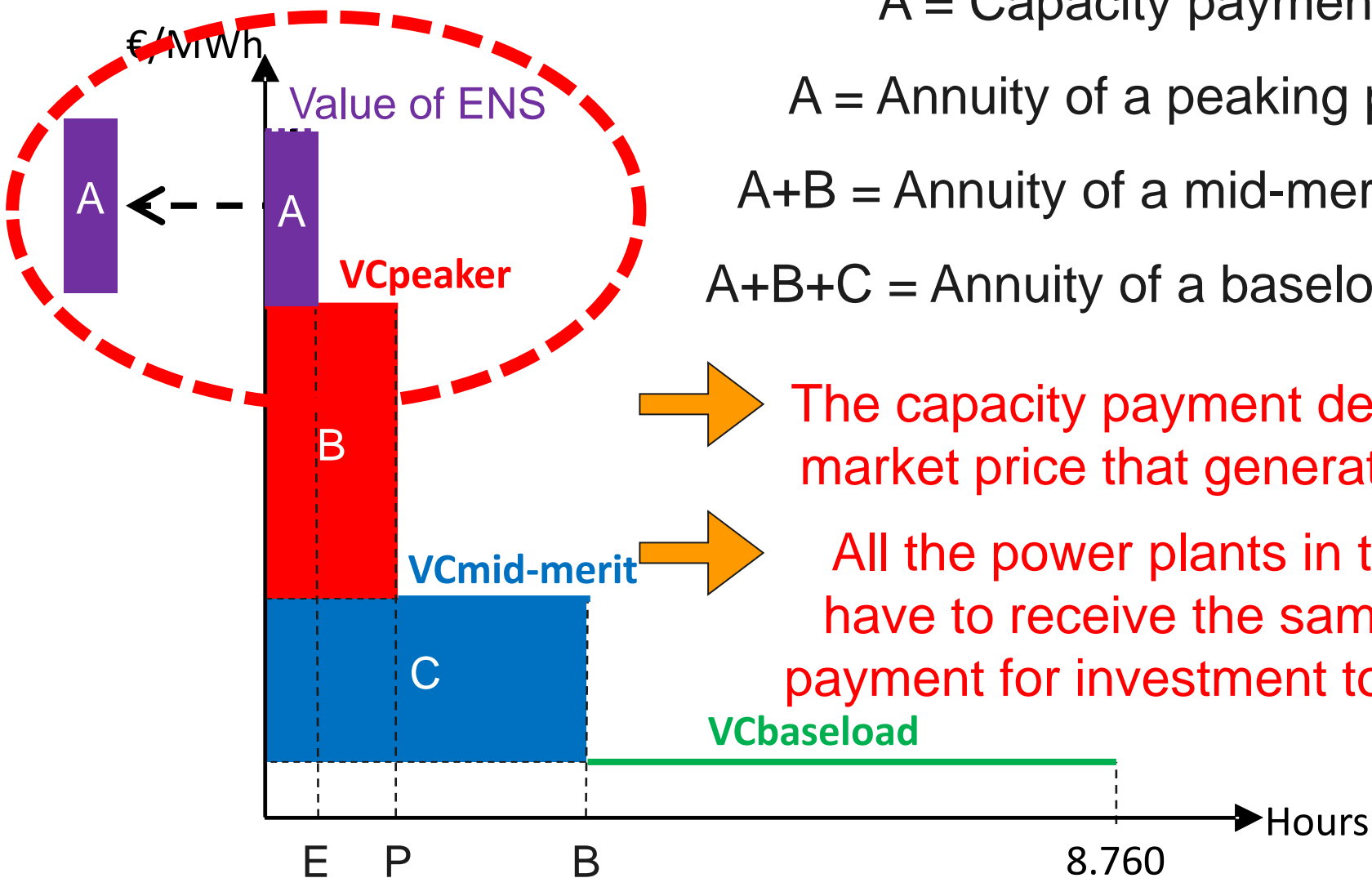
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A = Capacity payment

A = Annuity of a peaking plant

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A+B+C = Annuity of a baseload plant



→ The capacity payment depresses the market price that generators receive

→ All the power plants in the market have to receive the same capacity payment for investment to be efficient

... and reflect the annualised fixed costs of a peaking plant

- CER estimates that the best peaking plant is an Alstom GT13E2.

| Year | BNE Peaker Cost (€/kW/yr) | Capacity Requirement (MW) | ACPS (€) |
|------|-------------------------------|---------------------------------|-------------|
| 2007 | 64.73 | 6,960 | 450,517,348 |
| 2008 | 79.77 | 7,211 | 575,221,470 |
| 2009 | 87.12 | 7,356 | 640,854,720 |
| 2010 | 80.74 | 6,826 | 551,133,375 |
| 2011 | 78.73 | 6,922 | 544,956,545 |
| 2012 | 76.34 | 6,918 | 528,120,120 |

- Does the regulator want an energy-only market (with a cap around 10,000 €/MWh) or a secure supply (with a capacity payment to generators around 75,000 €/MW/yr)?

Gas ToP clauses will mitigate the impact of taxes on Spanish generators...

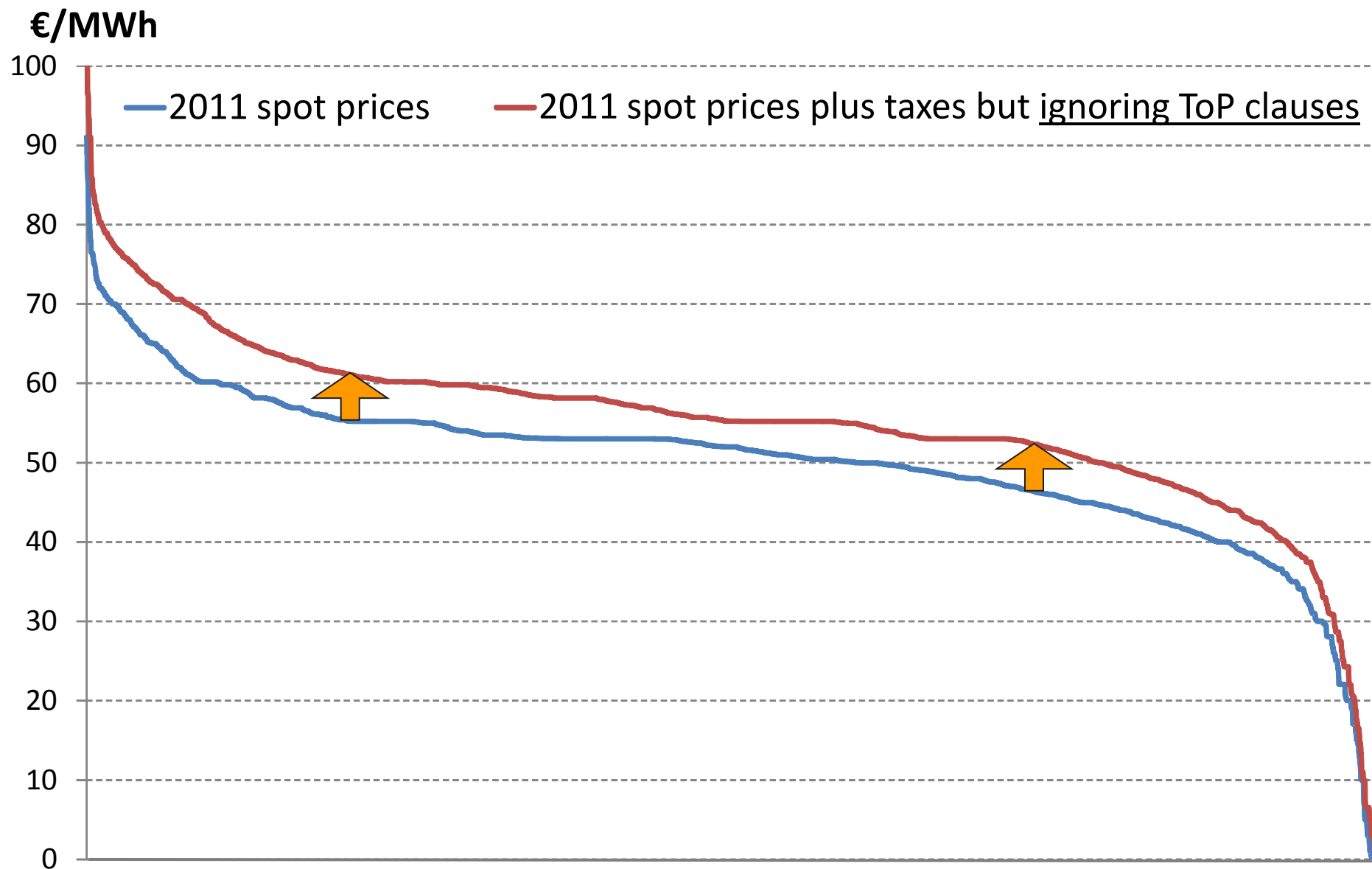


- Offers which will go up by the full amount of the taxes:
 - Imported coal plants: will reflect the full impact of taxes
- Offers that will not increase with the taxes:
 - Imports: generators outside of Spain will not be affected by the taxes
 - Domestic coal plants: prices are regulated (unlikely to be revised upwards)
 - Nuclear: operate regardless of the market price (inflexible)
 - Renewable: operate regardless of the market price (subsidies)
 - Run of river: operate regardless of the market price (zero opportunity cost)
- Offers that will only reflect the taxes partially:
 - CCGTs: cannot pass the taxes to their offers *if they have ToP clauses*
 - Storage hydro: offer their production at the cost of plants they displace

... but as ToP clauses are renegotiated, the spot price will tend to increase



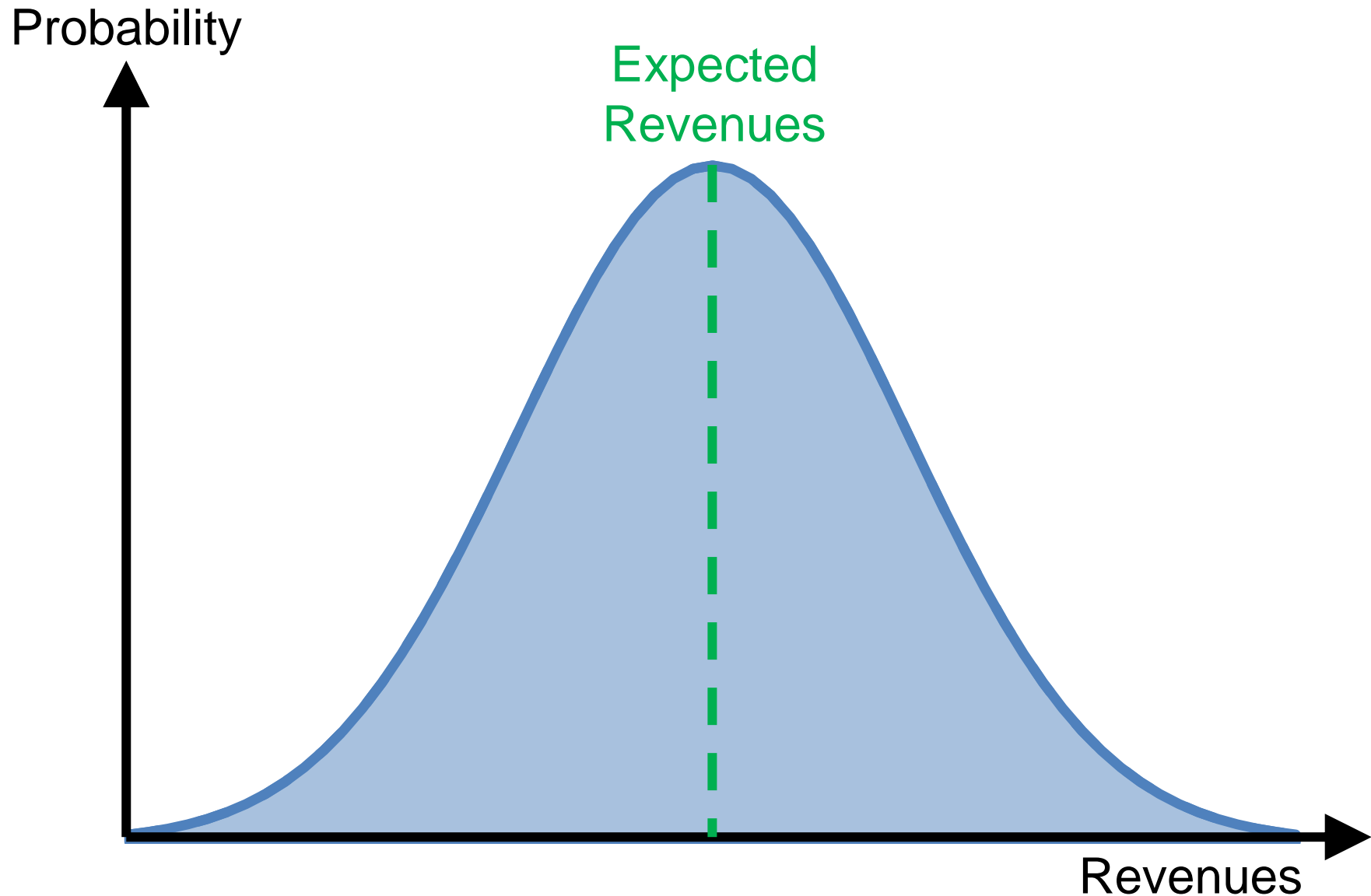
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Will future investors have reasonable perspectives of cost recovery?



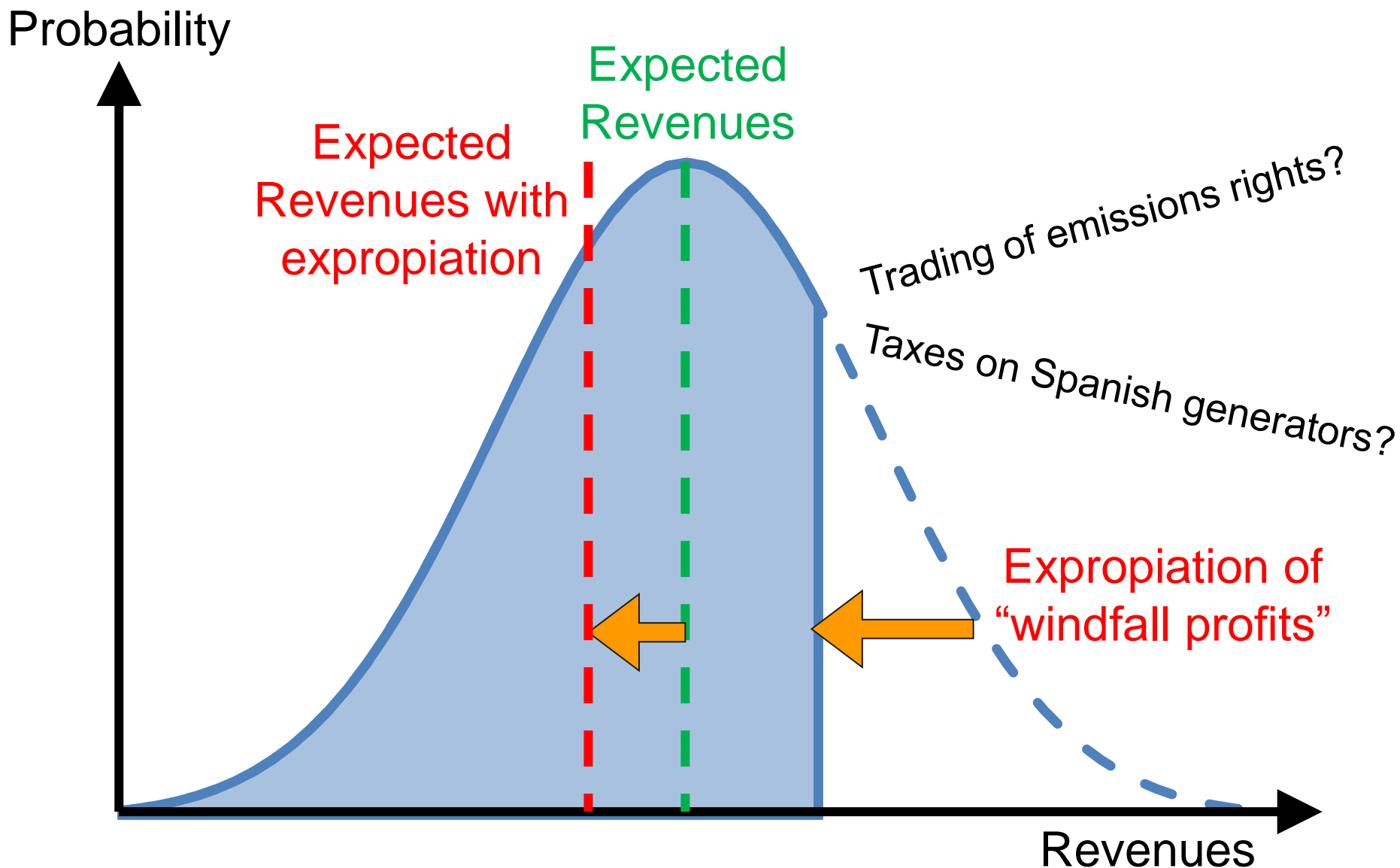
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The expropriation of “windfall profits” depresses the expected revenues



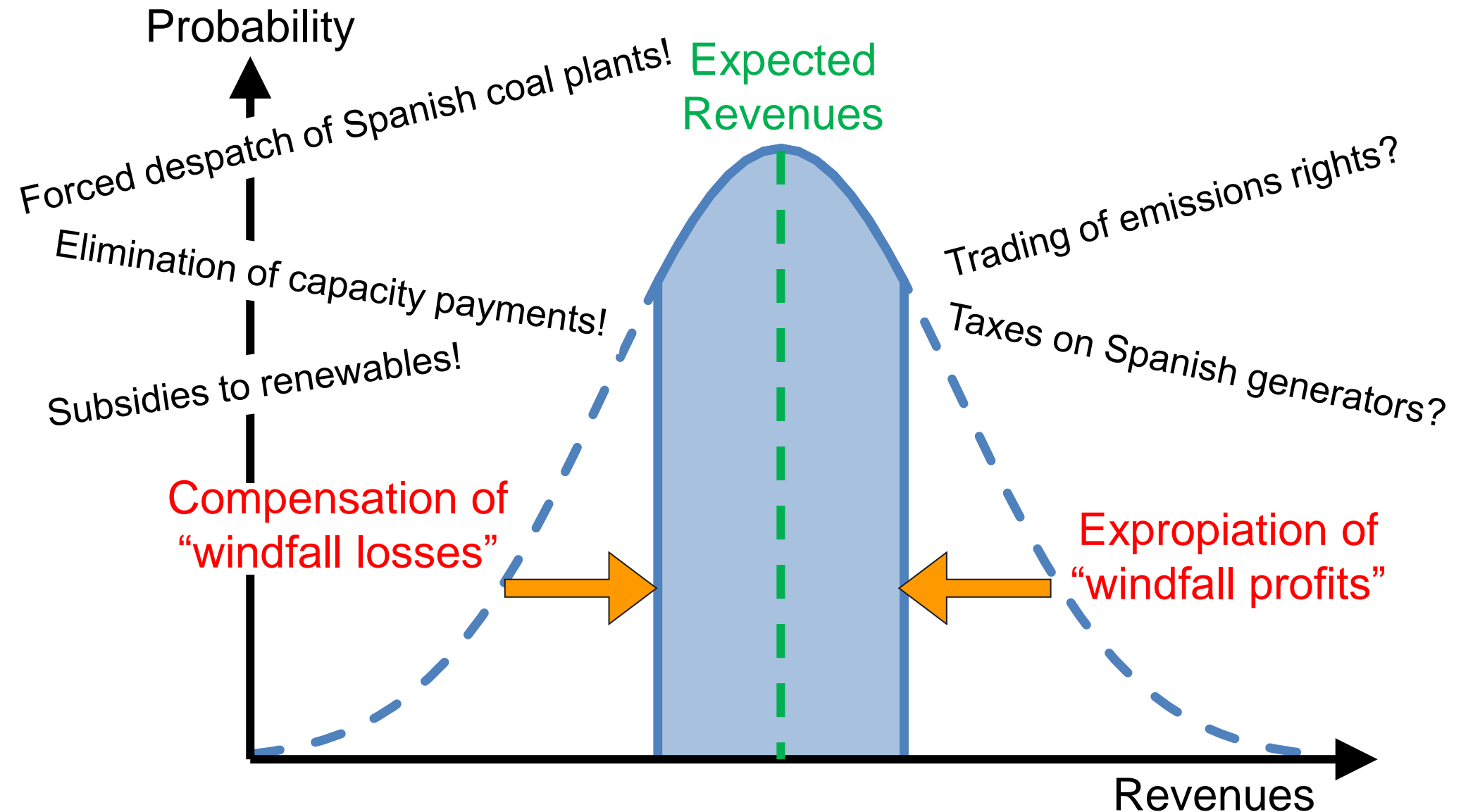
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If “windfall profits” are expropriated, then “windfall losses” must be compensated



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Medium-term challenges

Renewables become competitive

Medium-term challenges: Renewables become competitive

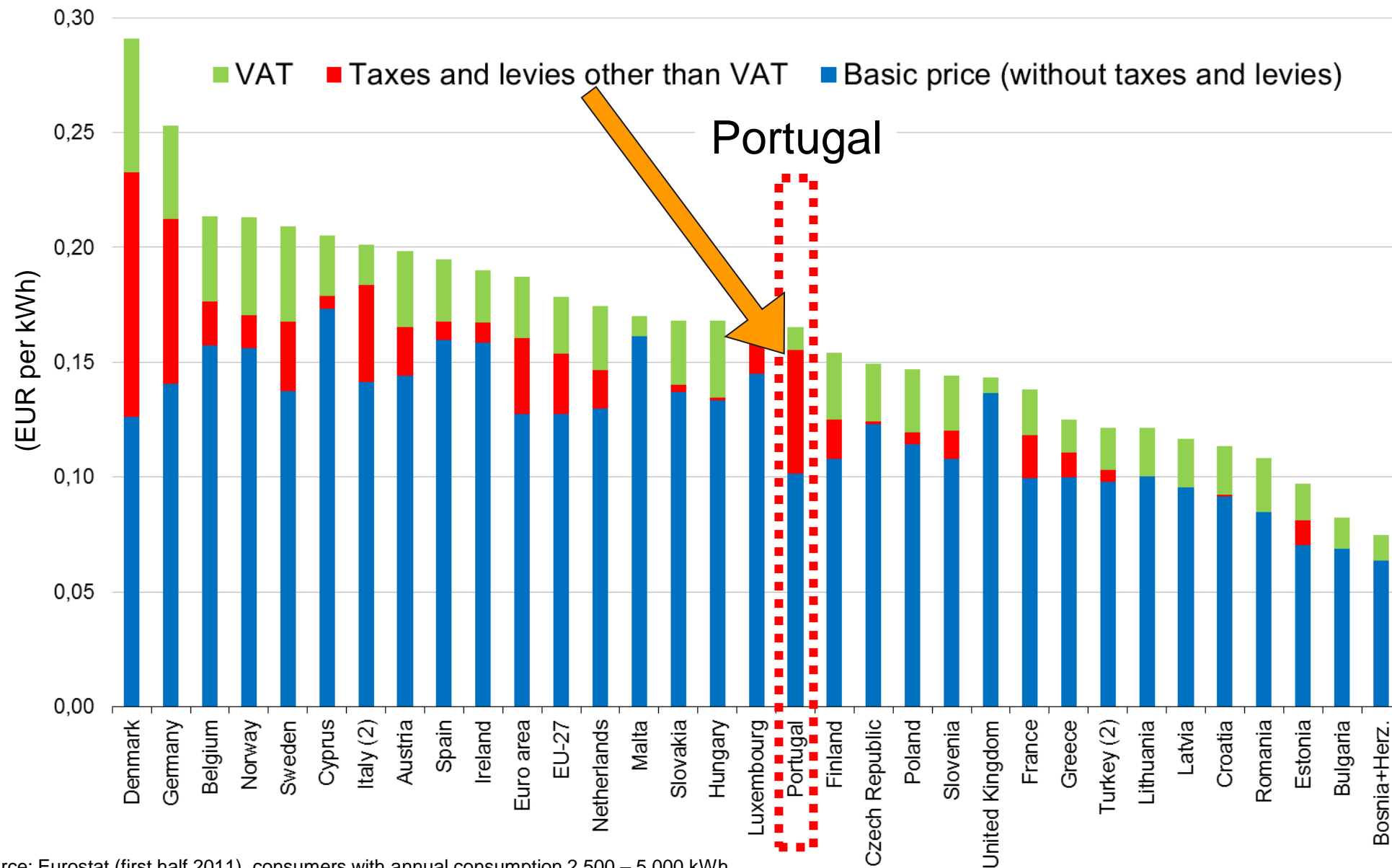


- Continued support to renewables has brought them close to competitiveness.
 - Large renewables will become competitive with the wholesale market price
 - Small renewables (microgeneration) will achieve grid-parity
- Soon the question will not be how much renewable capacity do we want to subsidise, but how much can the system cope with?
 - Impact on the wholesale market design?
 - Impact on the design, operation and regulation of the distribution activity?

Electricity tariffs include substantial costs unrelated to supply



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Access tariffs can make micro-renewables appear attractive



- Consumers install micro-renewables to reduce their bills.
 - However, the energy component in the access tariff includes
 - (a) costs of energy, environmental and general interest policies, and
 - (b) costs of the network, which they will still require

| TARIFA DE ACESSO ÀS REDES EM BTN (>20,7 kVA) | | PREÇOS |
|--|----------------|-----------|
| Energia ativa | | (EUR/kWh) |
| | Horas de ponta | 0,1857 |
| | Horas cheias | 0,0754 |
| | Horas de vazio | 0.0400 |

- However, if by installing micro-renewables the consumers avoid paying for costs which do not disappear, the result will be:
 - An increase the total costs of supply
 - Costs being transferred to other consumers

How to ensure that micro-generation only develops if it is efficient?



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Option 1

Charge them
“backup” tariff



Energy
produced

Energy
consumed



Charge them
access tariff
plus energy

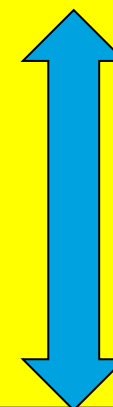
Option 2

Pay them
the value of
their energy



Energy
produced

Energy
consumed



Charge them
access tariff
plus energy

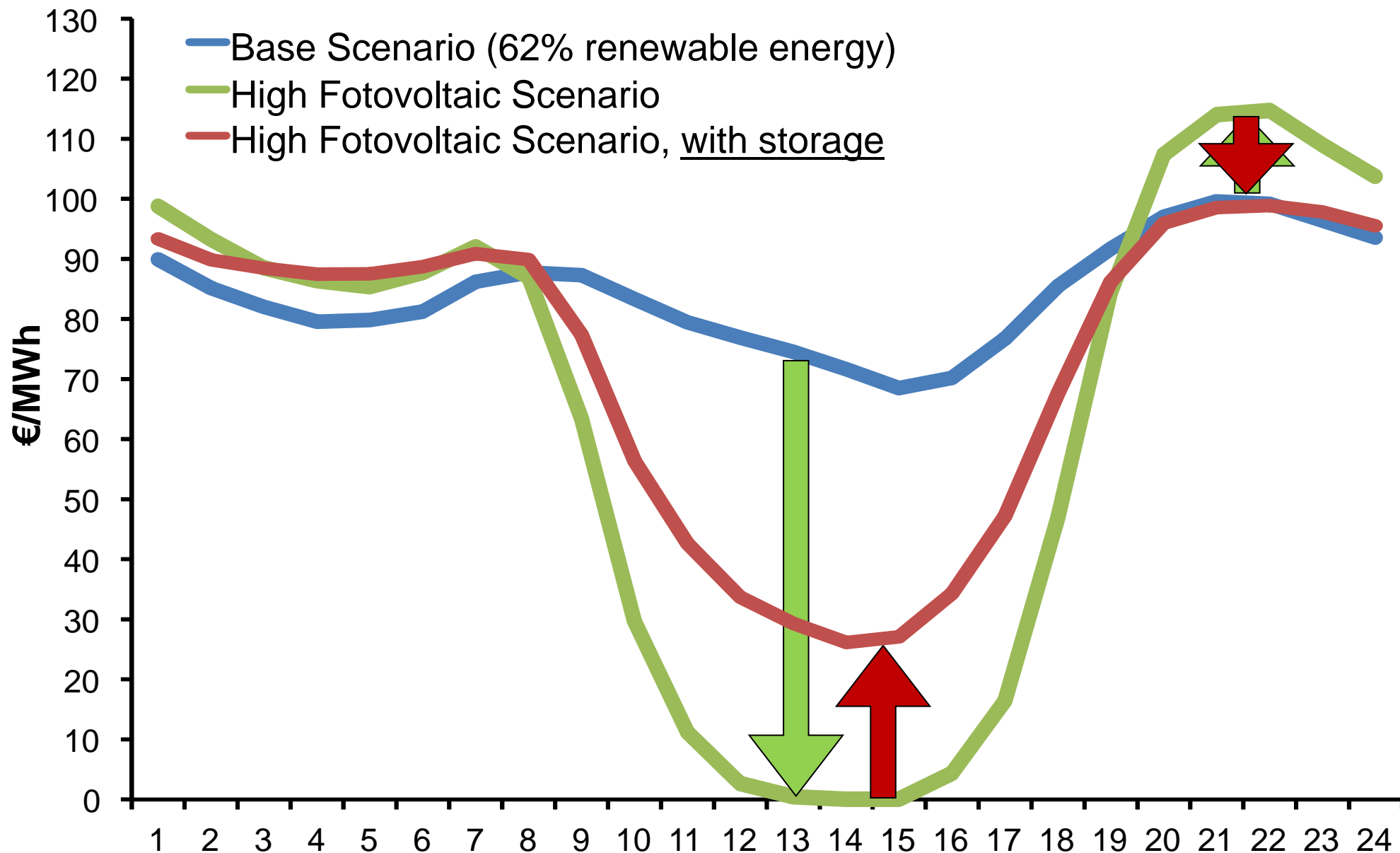
Option 3

Move all costs to the capacity/fixed charge or to off-peak

The increased penetration of renewables does not imply persistent zero prices



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The penetration of renewables will not require a change in the market model

- The “marginal price” market design will remain valid
 - Need capacity payment to reflect annuity of peaking plant (75,000 €/MW/yr?)
 - Need to allow spot market prices to reflect the value of ENS (10,000 €/MWh?)
 - Need to allow spot market prices to be negative
 - (as long as renewables do not have incentives to operate if prices are negative)
 - Need to reward thermal and hydro plants for their natural “reserve to go up”
- Need to ensure the integration of large-scale renewables
 - Renewables that receive a FIT or a premium linked to the spot market price have incentives to operate (inefficiently) even if the spot market price is negative. Also, they do not have incentives to sell energy in forward markets.
 - Pay them a premium, not linked to the spot market price,
 - Limit the number of hours they can receive the premium (1800 hours?)
 - Charge intermittent sources for the cost of the “reserve to go up” they impose
 - Charge and pay all generators the marginal price of imbalances

But it will impact the design, operation and regulation of the distribution grids



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- The integration of distributed generation will require investments to make distribution grids “smart”.
 - The DSO* will have to make the grids smart to manage increasing volumes of distributed generation (and also PEVs**)
 - Once the grid is “smart”, it will make sense to also control smart appliances to increase flexibility of demand and minimise investment requirements
 - Electric vehicles will be just another smart appliance (V2G***?)
- How will distributed generation and appliances be controlled?
 - Will the DSO remotely control them, or will they respond to (nodal) prices?
- The remuneration of the distribution activity will need to be reconsidered if demand growth is no longer the main cost driver
 - Are “price cap” and “revenue cap” remuneration models still valid?

Long-term challenges

Full decarbonisation

Long-term challenges: Full decarbonisation of electricity supply

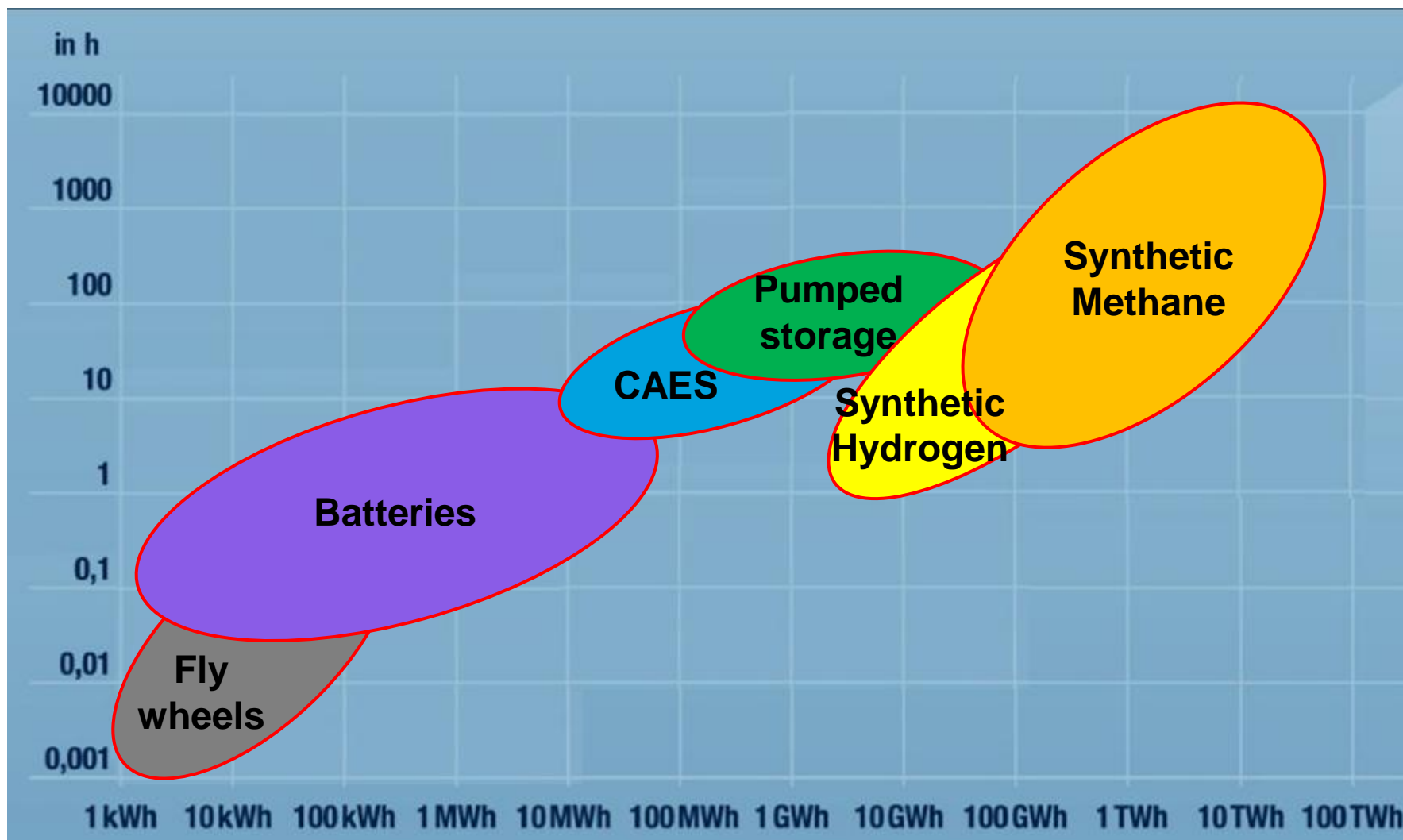


- Full decarbonisation can be achieved in a variety of ways:
 - Nuclear
 - Carbon Capture and Storage (CCS)
 - **OR?**
 - Renewables
- How can the intermittency of renewables be addressed?
 - Despatchable renewables (biomass)
 - Interconnections
 - Storage (centralised vs. decentralised, regulated vs. competitive)

Which of the storage options will be able to best cover the needs of the system?



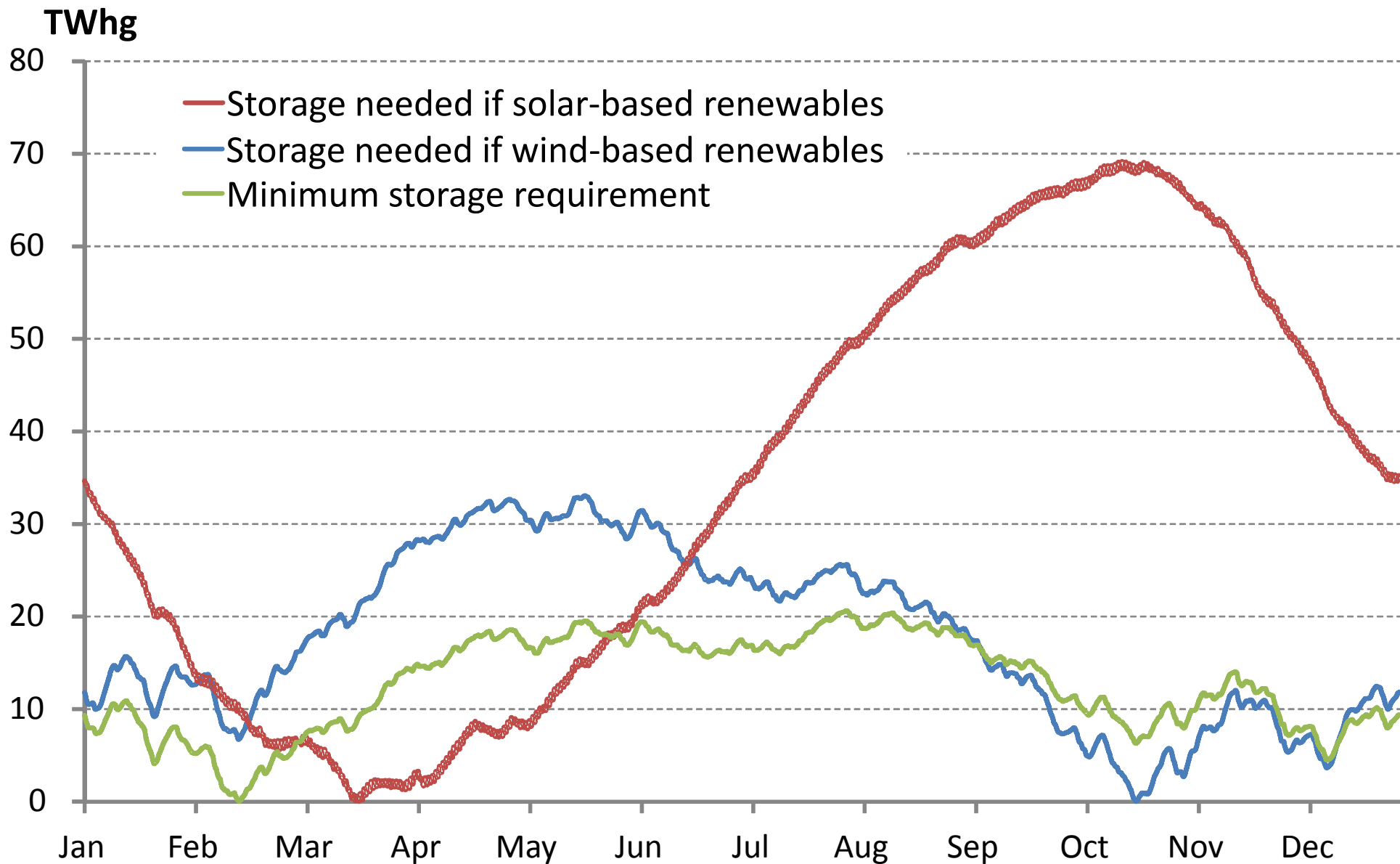
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How much storage would be needed if decarbonisation relied on methane?



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Is current underground storage capacity in the Iberian peninsula sufficient?

- The current storage capacity in the Iberian peninsula is sufficient to achieve a fully decarbonised system with synthetic methane.
 - Current storage in the Iberian peninsula stands at 60 TWhg.
 - But Portugal would have a storage deficit.

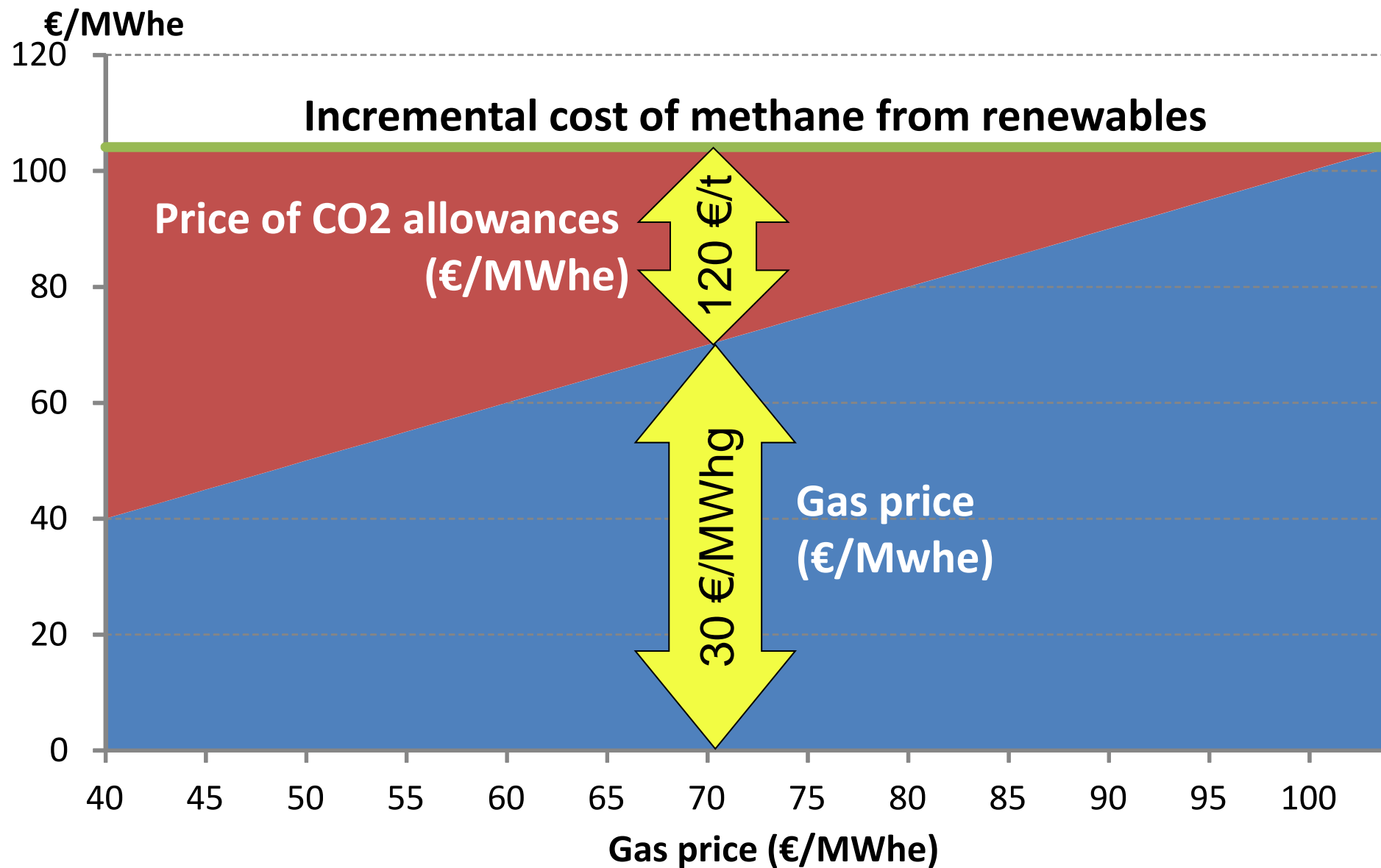
| | Spain | Portugal | Iberia |
|------------------------|-------|----------|--------|
| Mm3 (useful) | 5,366 | 155 | 5,521 |
| Thermal energy (TWhg) | | | |
| Natural gas or methane | 59 | 2 | 61 |
| Hydrogen | 3,238 | 94 | 3,332 |

- Should storage development and operation be regulated or competitive?
- Synthetic methane would appear to be a better option than relying on extensive EU-wide interconnections.

Will the EU Emissions Trading Scheme be able to achieve full decarbonisation?



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Challenges arising from European Commission decisions

European Commission decisions create additional challenges



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- Internal energy market
 - Is it important to align national market and network operation rules?
 - How much investment in interconnections is really necessary?
- Gas target model
 - Rejection of point-to-point tariffs prevents competition in gas networks.
- European Emissions Trading Scheme
 - The EC defined the *quantity* of emissions, now also wants to set the *price*
- Renewables post-2020
 - Do we need a unified renewable support scheme or targets post-2020?
- Energy efficiency
 - Do we need energy efficiency targets if energy comes from renewables?

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Summary and Conclusions

Summary and conclusions



- The sector faces a variety of challenges and uncertainties as a result of the economic crisis, renewables and decarbonisation.
 - The Iberian electricity market design can meet demand with low prices
 - The basic market design will remain valid (with small adjustments)
- Regulators cannot be expected to foresee the technologies and the system configuration that will lead to the lowest electricity costs.
 - Investment decisions should be taken by market agents reacting to price signals, not by regulators.
 - Regulators must focus on ensuring that agents receive price signals that reflect the cost of their decisions, and the value of their contributions.
 - Market agents should bear the costs of their mistakes and reap the profits of their successes, not have their remuneration decided by the regulator.

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