

Investment Incentives for the South Eastern Europe Regional Electricity Market



For The World Bank

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*Conference for South Eastern Europe Parliamentarians:
Forum on Electricity and Gas
Skopje, Macedonia*

10 June 2005

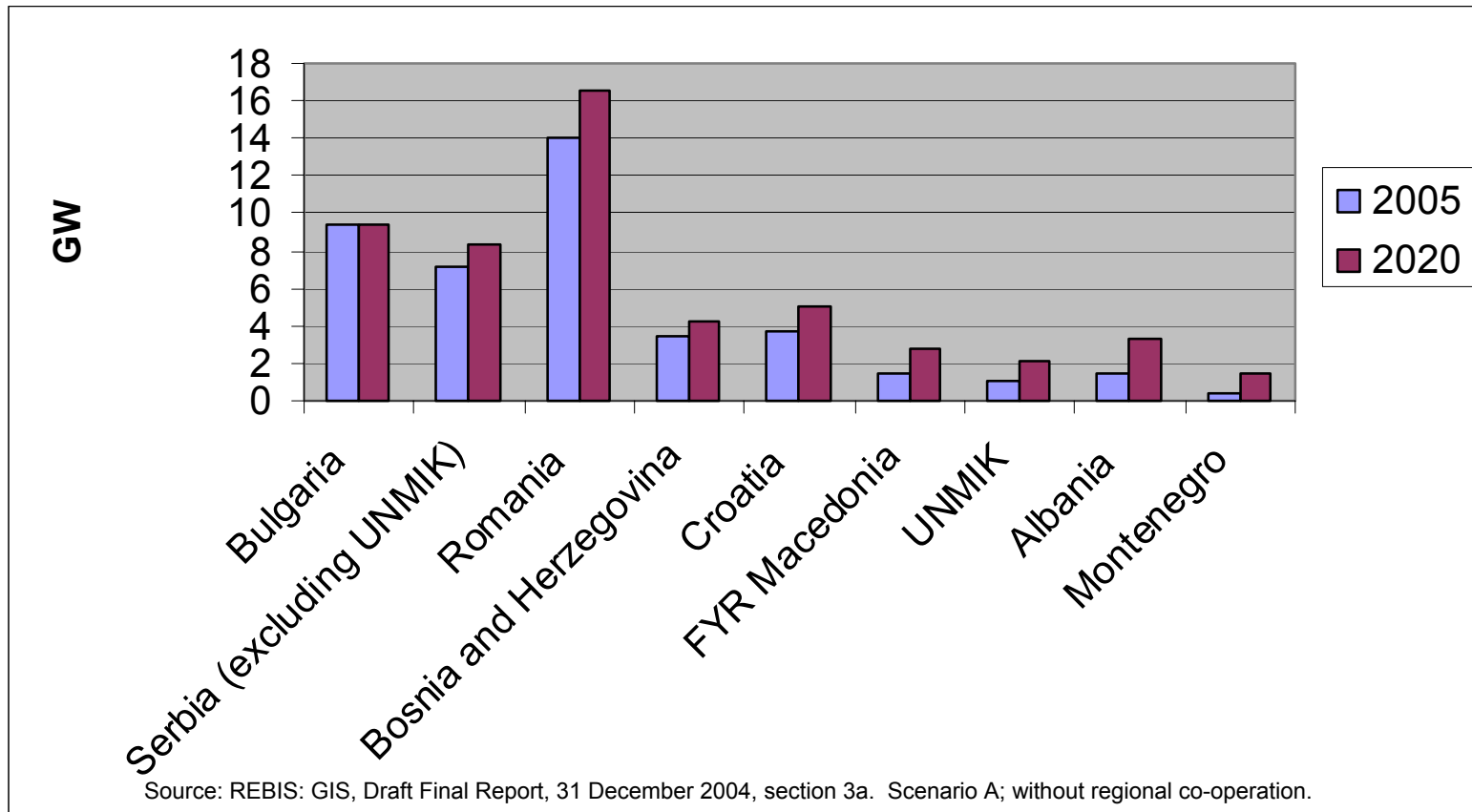
The SE Europe Regional Electricity Market is large and diverse

Consumption, Imports and Exports 2000



All countries expect capacity growth but at different rates

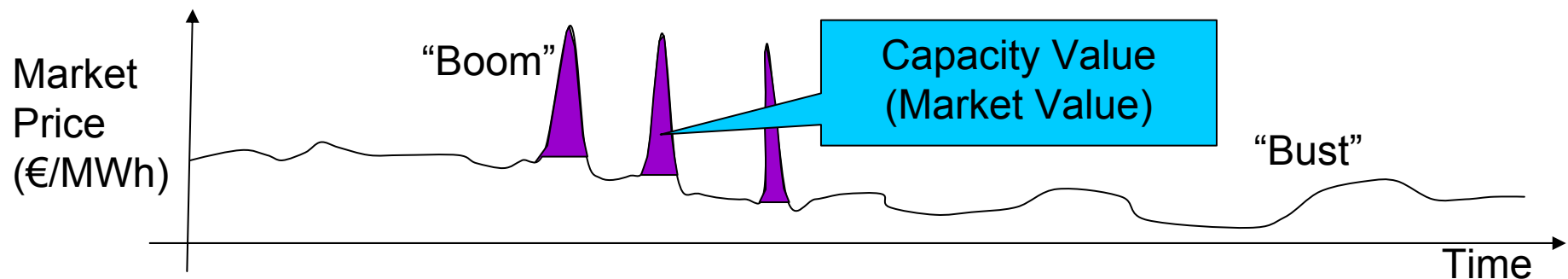
Forecast System Net Capacity 2005 and 2020 (GW)



What market rules will attract private sector investment?

Energy-only markets give efficient incentives to invest (in theory)

- In energy only markets prices mostly cover only variable costs
- When demand exceeds capacity, prices rise to extreme levels
- These high prices pay the fixed costs of investment
- Rewards for investment often follow “boom-and-bust” cycles
 - “Busts” cause problems for investors
 - “Booms” cause problems for consumers and governments
- Such rewards may not be sustainable.....

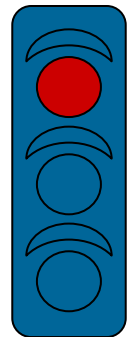


In the market paradigm, lost load gives a price signal to invest

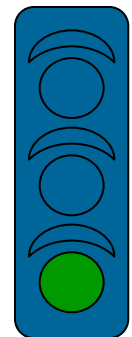


- Assume cost of peaking generator = €50/kW per year
- Price in Shortage = Value of Lost Load = €5,000/MWh = €5/kWh
- Peaking generator recovers fuel costs from energy price, if it runs

- If hours of lost load = 9 h/a
- Revenue to capacity = 9 h/a * €5/kWh
= €45/kW per year => Don't Invest!



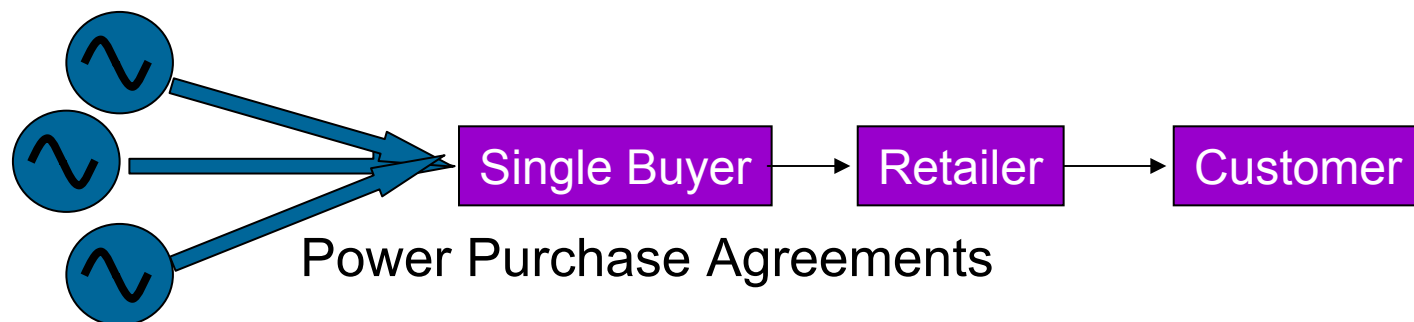
- If hours of lost load = 11 h/a
- Revenue to capacity = 11 h/a * €5/kWh
= €55/kW per year => Invest!



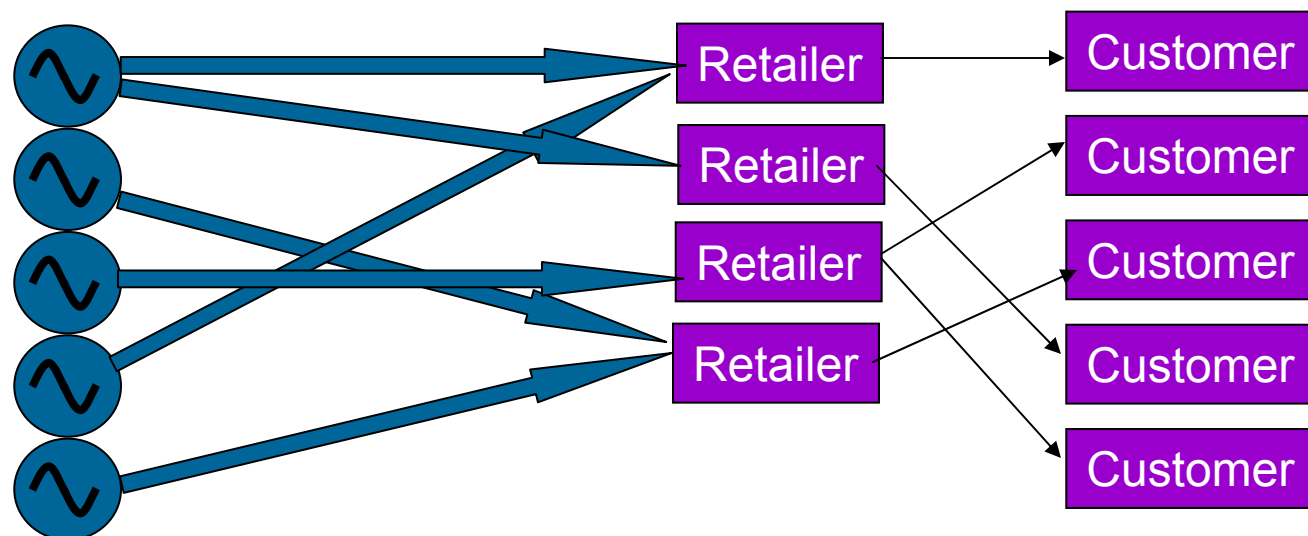
Power Purchase Agreements offer advantages, but a single buyer limits competition



“Single Buyer”



Wholesale
And
Retail
Competition



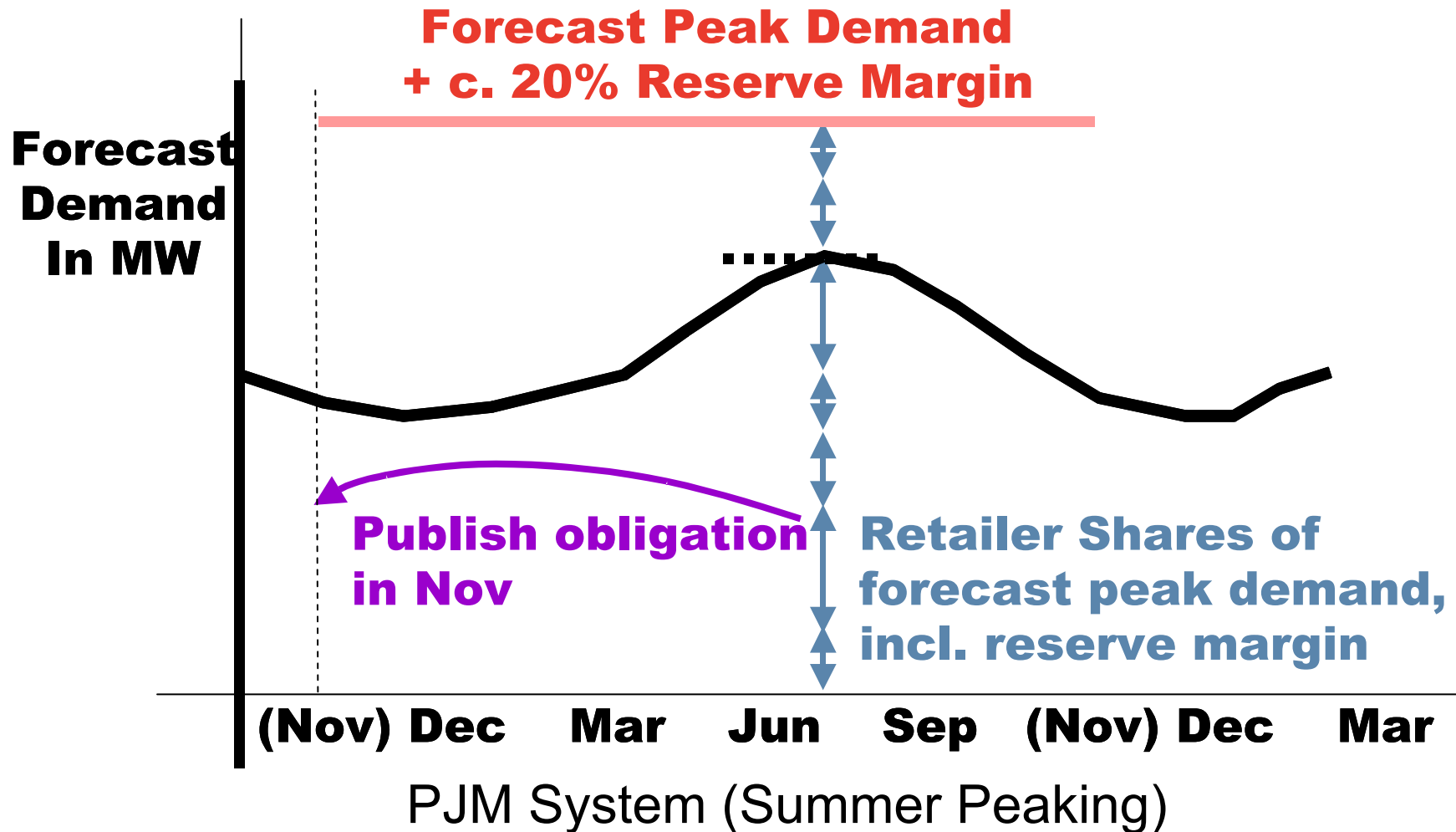
Competition requires decentralisation of the obligation to pay for investment

We reviewed several options, taking account of SEE conditions



Criterion	Weight	PPAs (SB)	Energy only	Capacity Price	Capacity Quantity	Capacity Hybrid
1 Security of supply	5	4	2.5	3	3	4
2 Cost efficiency	4	3	5	3	3.5	4
3 Competition	4	3	4	3	4	4
4 Transparency	3	3	3	3	4	2
5 Price stability	2	4	1	3	2	3.5
6 No gaming	2	4	3	4	3	3.5
7 Fairness	1	3	3	3	3	3
Total		24	21.5	22	22.5	24
Ranking		1	5	4	3	1
Weighted Total		72	68.5	65	70	75
Ranking		2	4	5	3	1

Quantity Obligations set the level of capacity and let the price vary

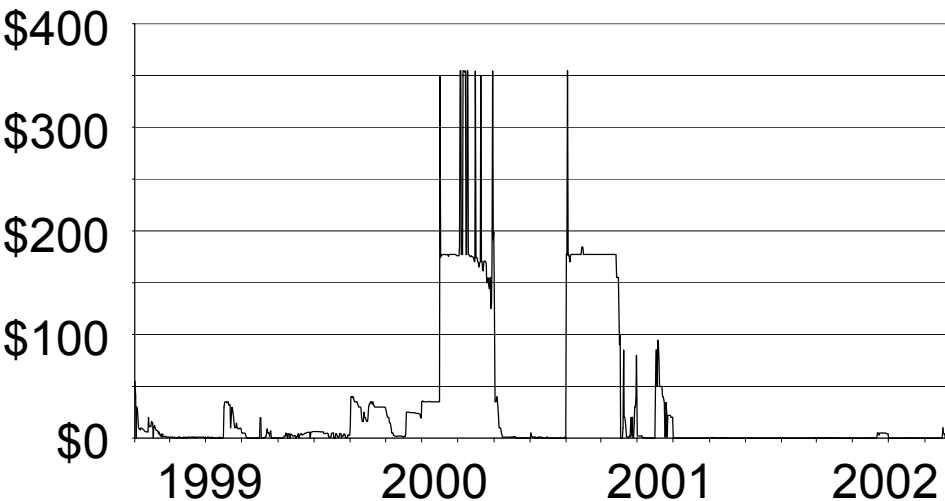


With fixed obligations, capacity prices can be very volatile in the short-term

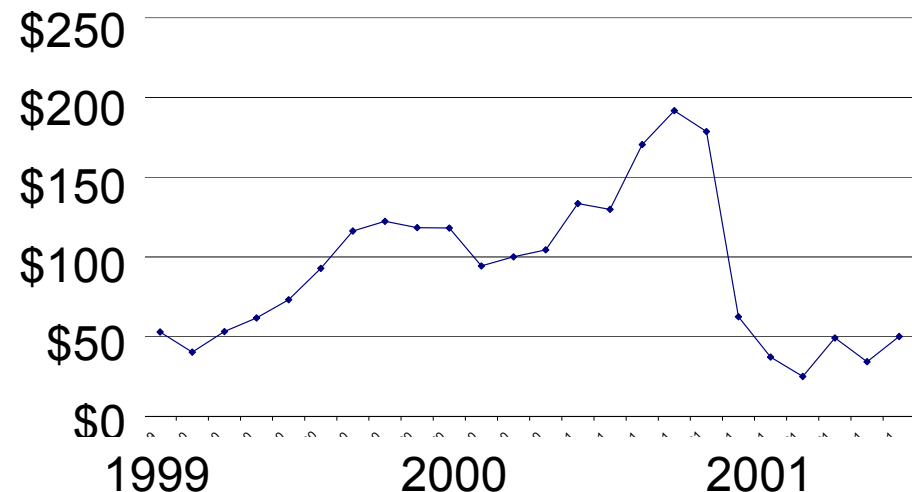


- Real time prices *either* sit at zero or rise to the penalty for a shortfall
- Forward prices are less volatile

PJM 3 Daily Capacity Price
2000-2001 (\$/MW-day)

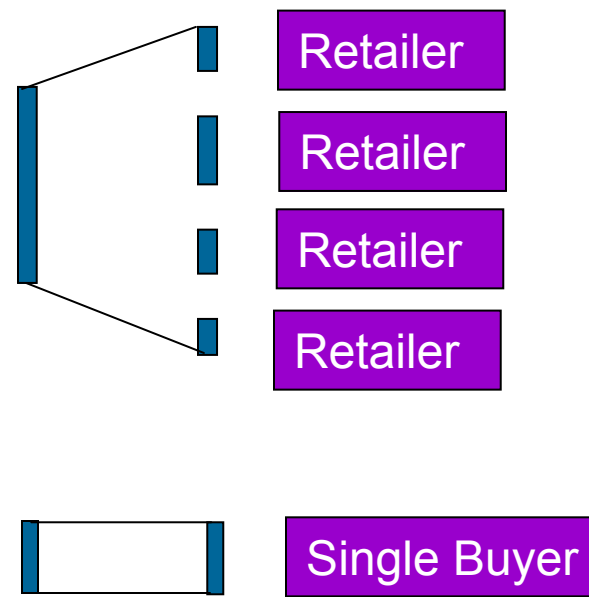


PJM 12 Month Average Forward Capacity Price
2000-2001 (\$/MW-day)



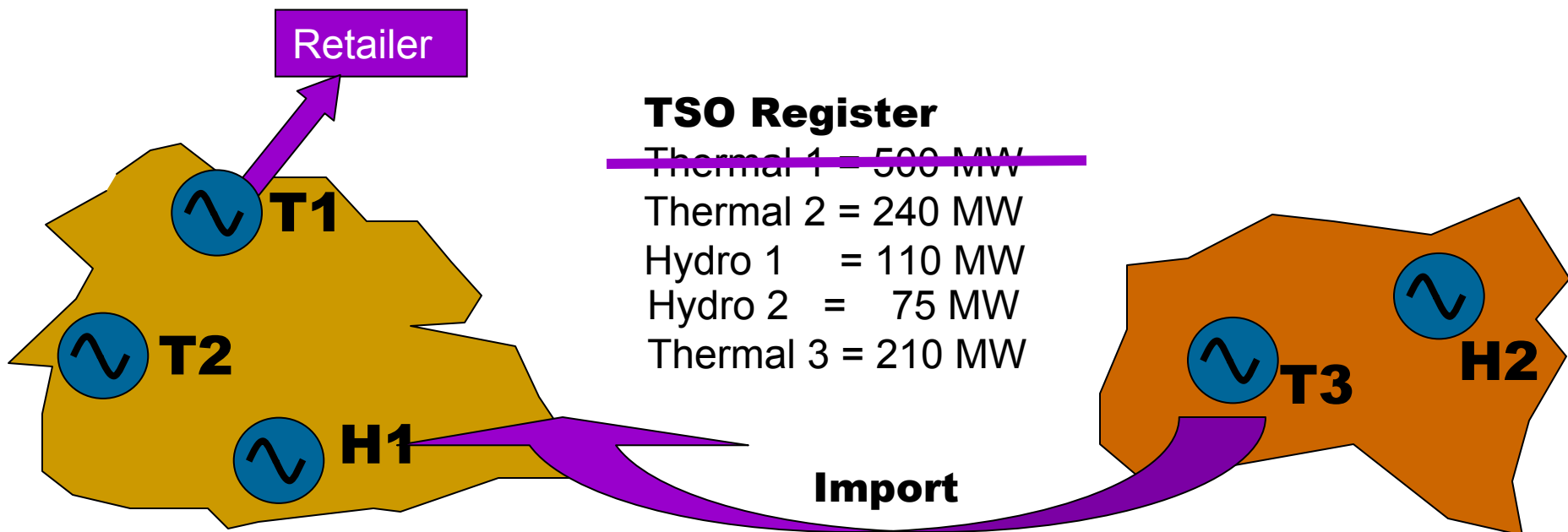
Step 1: Allocate capacity obligations by country and – Step 2: within country

- Agree rule for allocating regional capacity needs among SEE member countries
- Each country sets rule for allocating its capacity needs among retailers (or to Single Buyer?)



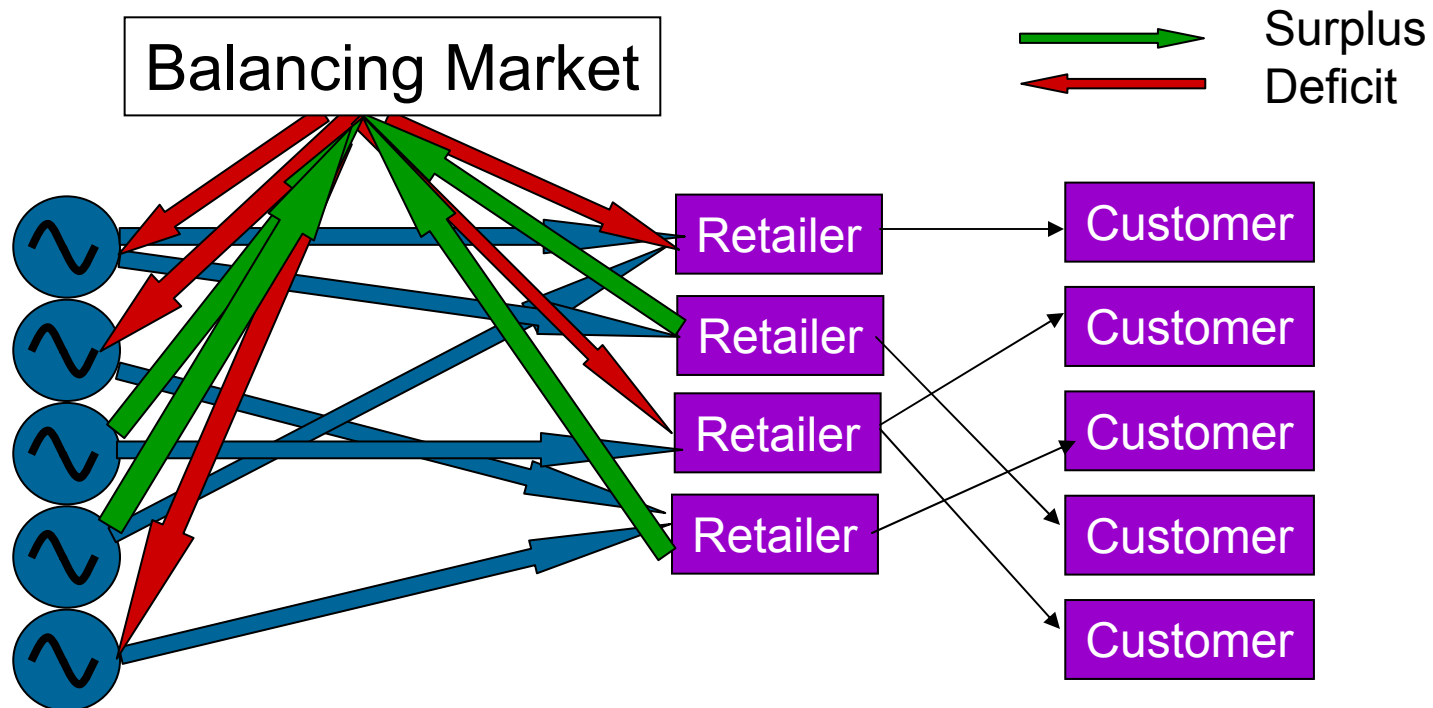
Step 3: Each country sets up a register of capacity that would fulfil the obligation

- To begin with, each TSO compiles a register for its own country, e.g.:
 - Thermal Plant – Net Capacity Rating
 - Hydro Capacity – Average Winter Peak Output
 - etc
- In addition, each country can choose to accept capacity registered in another country, if that country agrees, to allow capacity trading
- Generators then sell capacity to Retailers and TSO registers the sale



Step 4: Define what a generator must do if it sells its capacity

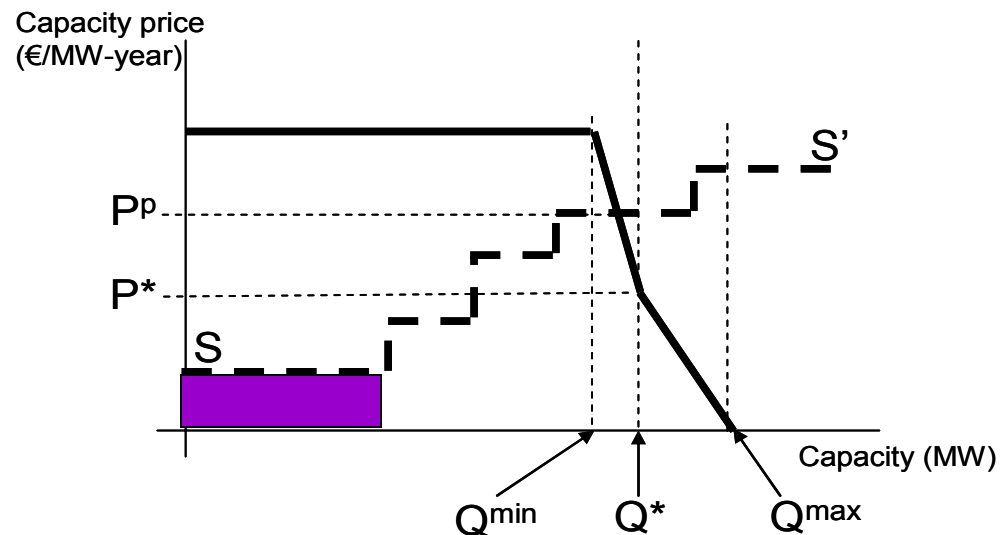
- Generators must offer uncommitted capacity to the Balancing Market
- To prevent double payment for capacity, generators must:
 - either accept a price cap in the Balancing Market
 - or pay back double revenue for volume of capacity sales =
(Actual Balancing Market Price – Price Cap)



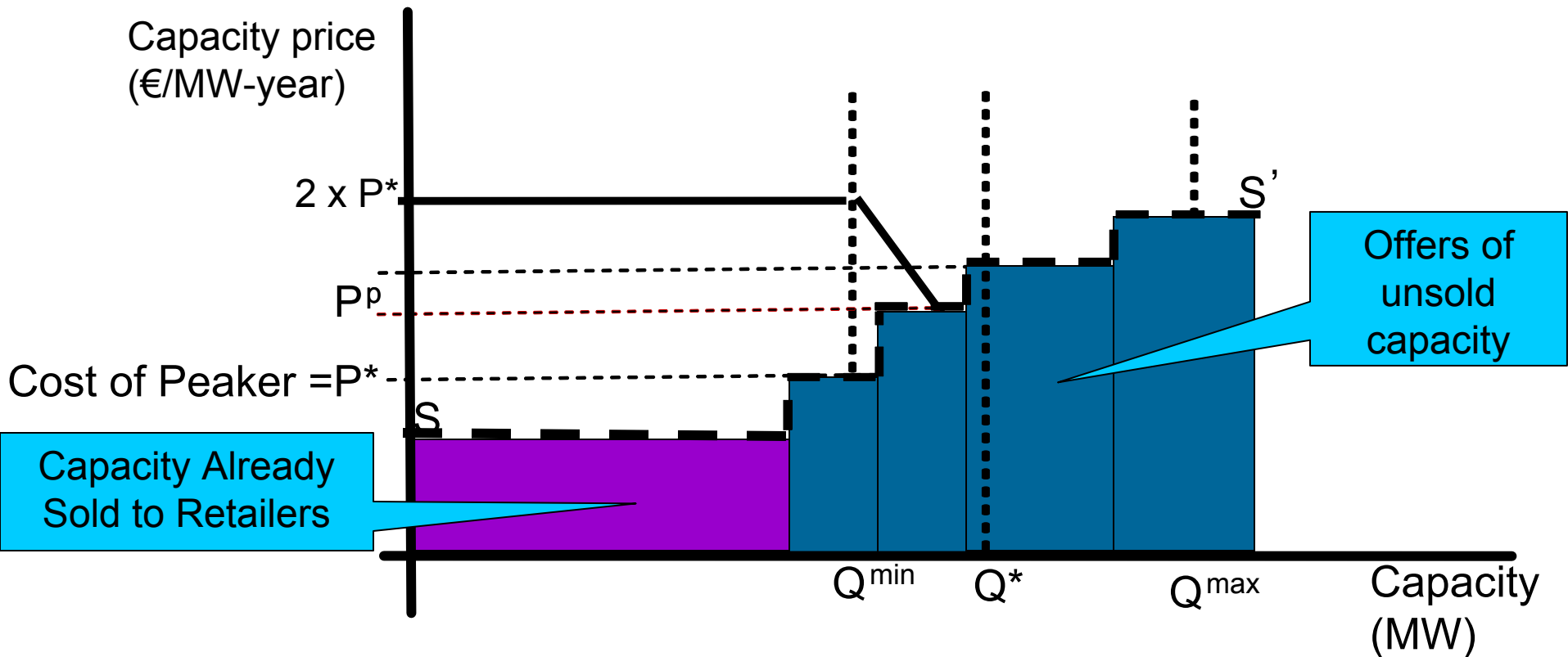
Step 5: Market operator (TSO) must enforce obligation and penalise shortfalls



- Define each retailers' obligation
= its customers' peak demand + 20%(?)
- Basic method = TSO charges a penalty for shortfall
 - If a generator sells more capacity than it owns
 - If a retailer buys less capacity than its obligation
- Ideal Method = New England 2005 = “Hybrid Scheme”
 - TSO runs a capacity market
 - Buys up unsold capacity
 - Charges retailers with a deficit
 - If price rises, obligation falls



“Hybrid” Capacity Schemes vary the quantity *and* the price of capacity



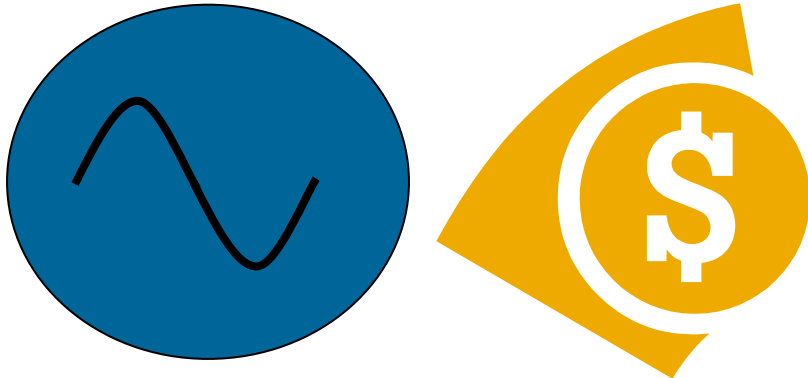
1. Set obligation equal to Q^*
2. If capacity is expensive, reduce obligation (down to $Q^{\min}$)
3. If capacity is cheap, raise obligation (up to $Q^{\max}$)



Step 6: Pass through the costs to consumers!



- A pre-condition for any general incentive is that investors should have a reasonable prospect of cost recovery
- Paying for new capacity will raise costs – so tariffs must rise too!



Summary: SEE needs to offer incentives for investment and cost recovery is a necessary pre-condition



- The SEE region needs to encourage private investment in generation capacity in the coming years
 - Energy-only markets are unlikely to be attractive to investors
 - Long-term PPAs have many advantages – but need to be reconciled with the aim of introducing competition
 - Generalised capacity schemes allow competition in markets for capacity and energy

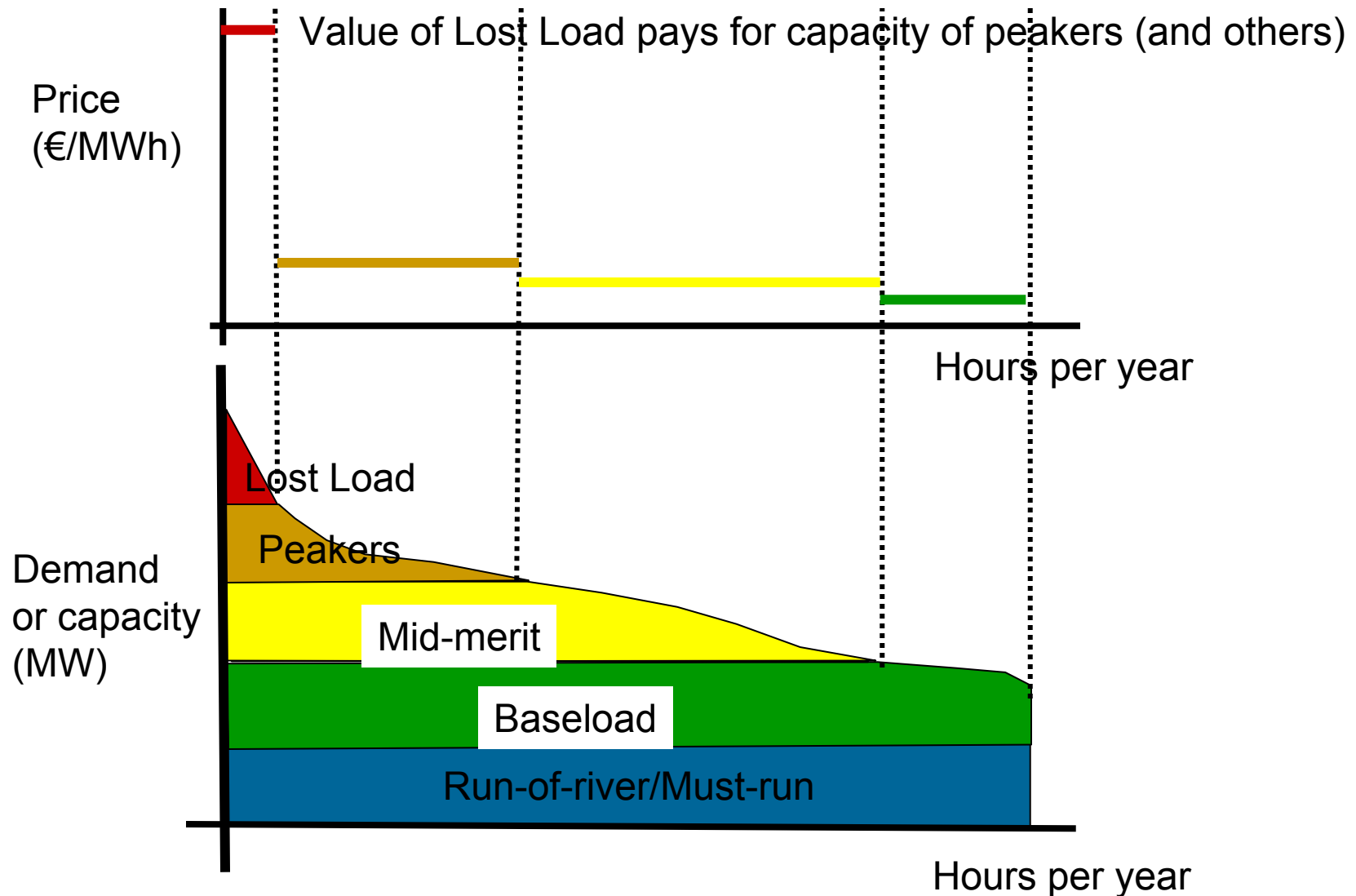
However, no private investor will be interested unless the sector can recover its costs from consumers

Recommendations for SEEREM

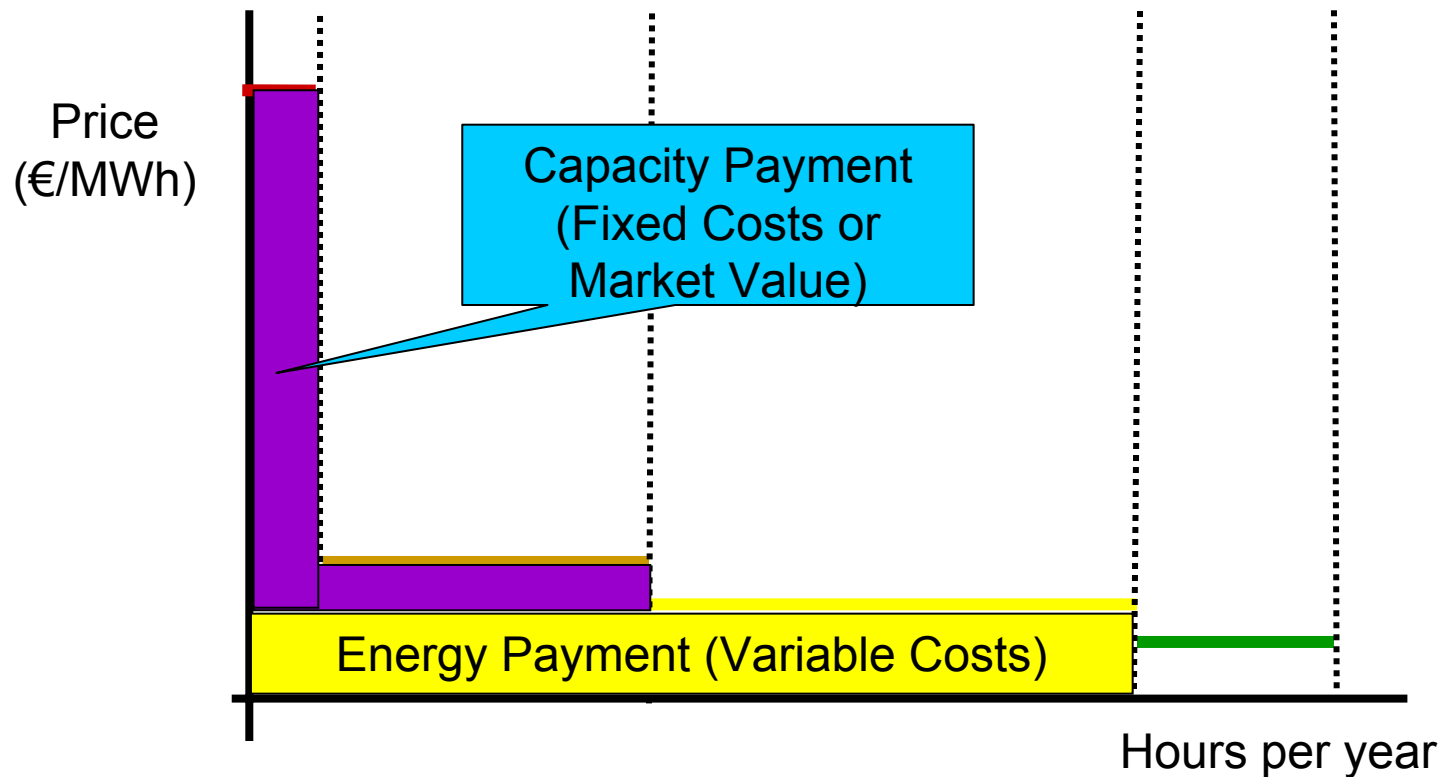


- Preconditions
 - Reasonable Prospect of Cost Recovery
 - Existing Costs
 - Stranded Costs
 - Selective Use of Long-Term PPAs
- Steps Towards Harmonised System of Capacity Obligations
 1. Regional Allocation of Capacity Obligations to Each SEE Country
 2. Allocation of Capacity Obligations within the Country
 - Incorporate Downward Sloping Demand Curves
 - Allow Possibility of Capacity Zones
 3. Setting up Capacity Registration and Measurement Schemes
 4. Defining the Terms of the Capacity Contract to Fulfil the Capacity Obligation
 5. Develop a Short Term Capacity Market for TSOs to Make Up Shortfalls
 6. Pass Through Costs to Customers

Market Paradigm: Free Markets Can Provide Incentives to Invest (in Theory)

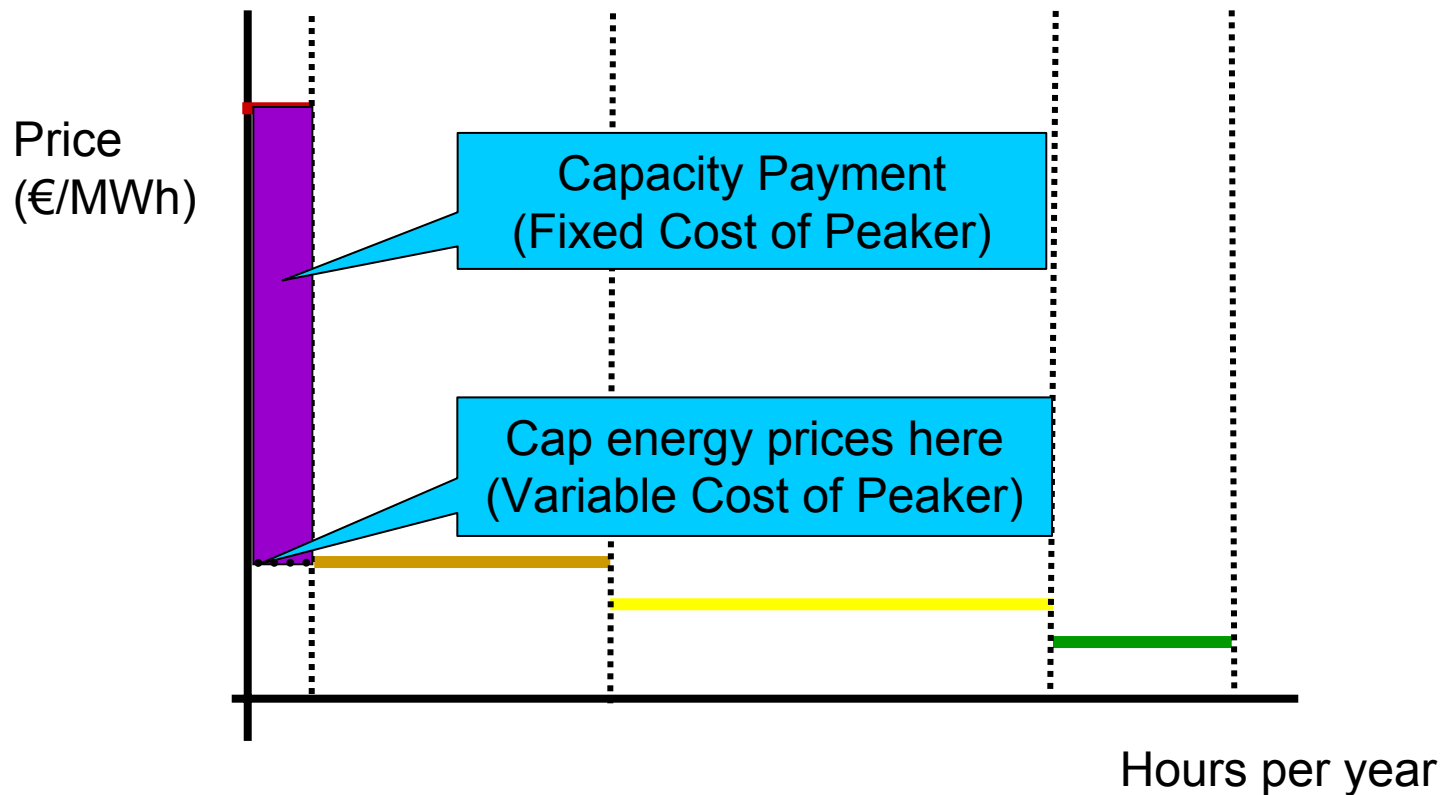


PPAs split payments into energy (variable costs) & capacity (fixed costs)



The incentive to sign Power Purchase Agreements comes from
Energy Market Prices or Capacity Obligations

Capacity payments replace price spikes with a fixed payment for all capacity



- To prevent double collection of capacity value:
 - Include price cap in energy market rules; or
 - Let energy market price vary, but if it rises above the price cap,
 - generators pay back (Energy market price – Energy price cap)

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