I-SEM Capacity Remuneration Mechanism Work Stream

Project Update

16th March 2016

SEM committee

Presentation Overview

- Introductions
- Project overview
- Overview of recent activities
- Upcoming activities
- Overview of today's workshop

Project Overview

- 3 stage policy consultation and decision process

Consultation1	• Capacity requirement • Eligibility • Product Design • Supplier arrangements • Institutional arrangements	Decision - Dec 15
Consultation 2	•Interconnector and cross-border capacity •Secondary trading •Detailed Reliability Option design •Level of Administered Scarcity Price •Transitional issues	Publish - Dec 15 Decision - May 16
Consultation 3	• Auction Design Framework • Auction Frequency & Volumes • Market Power Mitigation Measures • Auction Parameters • Governance & other issues	Publish - Mar 16 Decision - Jul 16

- Further consultation on parameters
- First CRM auction date scheduled for **June 2017**

Recent Activities

- Issued Consultation 3 on 11th March
  - Responses due back 27th April
- Consultation 2 closed on 8th February
  - 25-30 responses were received (published on SEMC website)
  - Developing decision paper – further workshop April
- State Aid Update
- CRM Rules Development
- Detailed methodologies for De-rating and Cap. Requirement

Upcoming Activities

- Further workshop in Consultation 2 Emerging Thinking - April
- De-rating and Capacity requirement detailed methodologies consultation - July
- CRM Parameters Consultation Q3 2016
- Rules development
- DS3 interaction – Qualification Process
- Ongoing work policy development

Workshop Overview

- Present SEMC 'minded to' positions on certain items of Consultation 2
- Present overview of Consultation 3 published 11th March
- Opportunity for discussion and feedback

Agenda:

10.30-10.40	Welcome and Project Update
10.40-11.10	CRM 2 minded to positions
11.10-11.40	Strike Price/Socialisation/Governance
11.40-12.50	Auction Framework and Market Power
Lunch	
01.30-2.30	Detailed Auction Design & Parameters
Close	

- Notes from today's session will be taken

CRM Consultation 2

Minded to positions “Tranche 1”

Agenda

- Context
- Contract (Price Fix) Length
- Plant “Lead Time”
- Transition

Context

- Some areas of Consultation 2 impact Auction Design (Consultation 3):
  - Contract (Price fix) length
  - Lead time for new build
  - Transition
- Minded to position to inform response to Consultation 3
- Remainder of Consultation 2 covered separately:
  - Cross Border
  - Secondary Trading
  - Administered Scarcity Price
  - Implementation Agreement
  - Stop Loss
  - Option Fee Indexation

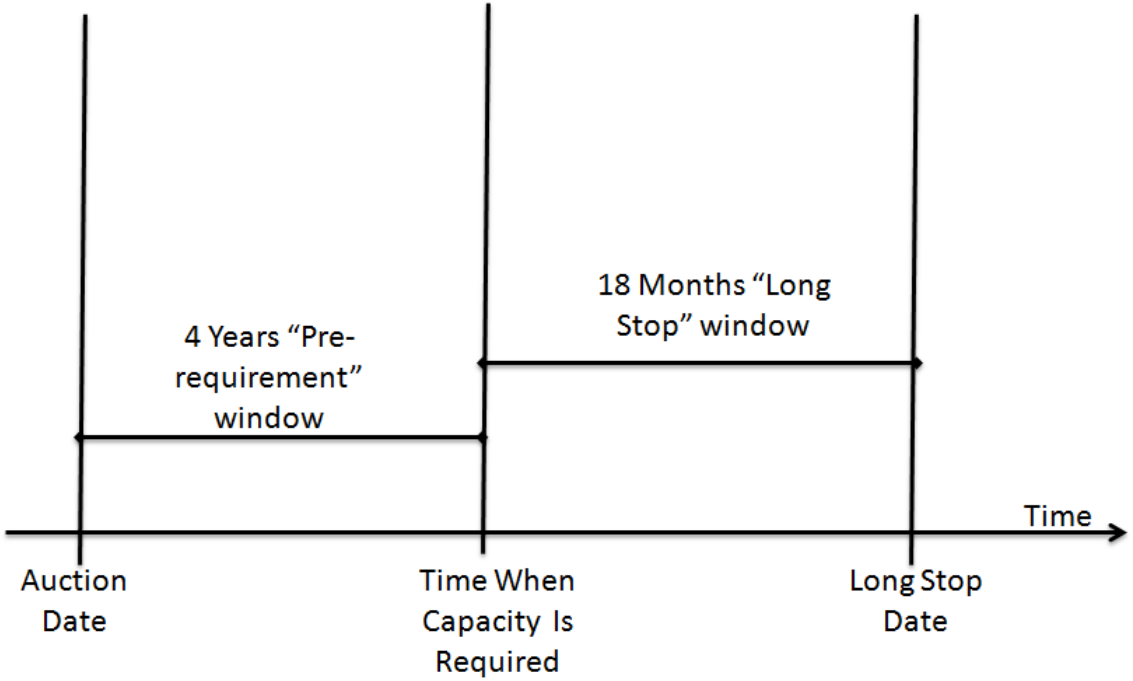
Contract (Price Fix Length)

- Option 1 (Same length contracts for new and existing capacity):
  - Option 1a (Short): All for 1 year only
  - Option 1b (Long): All for multiple years
- Option 2 (Different length contracts). Multi-year for new plant; existing plant receive a one year contract.
  - Upgrade category?
  - Flexibility in contract length?
- Respondents split
  - All short (1-3 years). Mainly existing portfolio players.
  - Mirror GB approach. Largest group of respondents.
- Key considerations include:
  - Competition – balancing "lowering" of new entry costs with subsequent reduced competition.
  - Risk of a price fix beyond the true economic life of plant (stranding).

Minded To Position

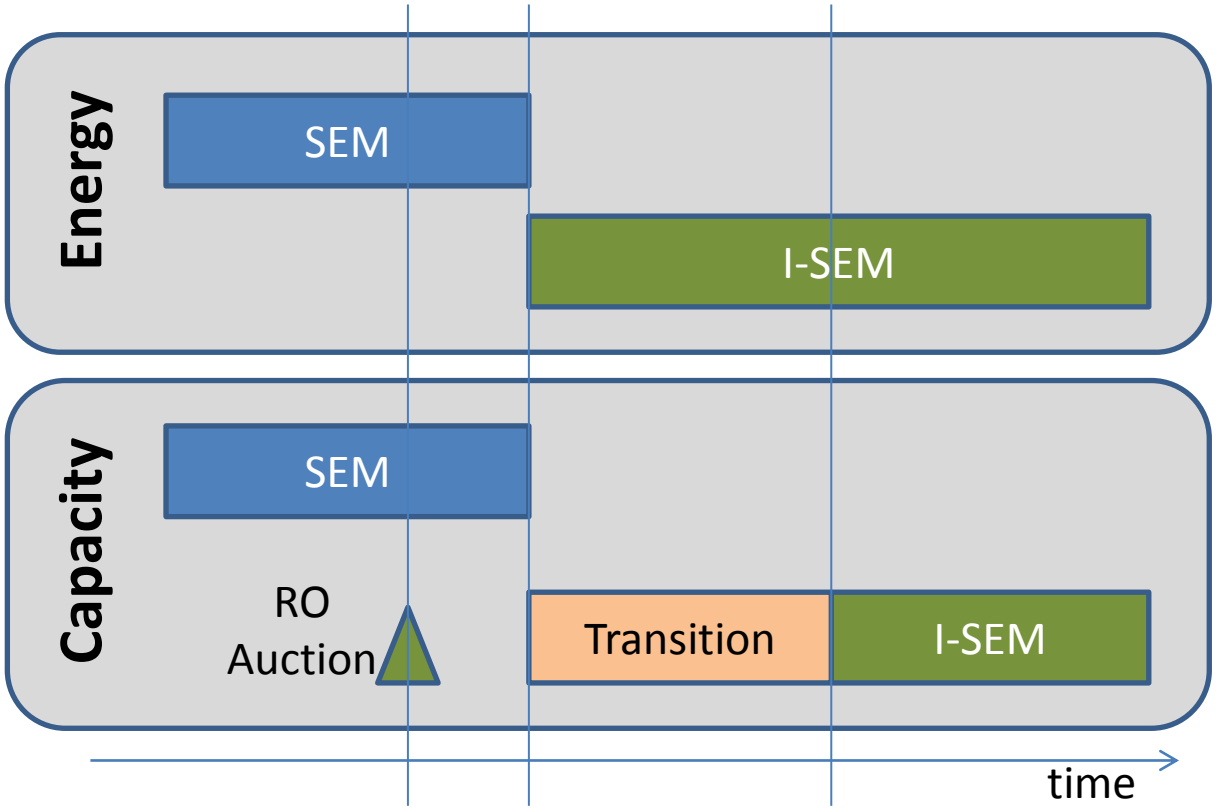
- Existing capacity should be limited to receiving a one year duration contract;
- Plant requiring significant new investment will be able to opt for a multi-year contract;
- The maximum contract duration may be 10 years, although new investment may opt for a contract of less than this maximum duration;
- The financial threshold for such new investment will be high;
- There will not be a separate ‘upgraded’ category;
- In any given auction different bidders seeking a range of single year and multi-year contracts of different durations may compete alongside each other; and
- These decisions will be kept under review with a view to moving to shorter term contracts in the future.

Plant Lead Time



- Minded to have approximately 4 years "pre requirement" window and 18 month "long stop" window
- Broad support from respondents
- Flexibility considered in Consultation 3

"Transitional" arise from need to allow time for new-entrants to build



3 Options

- **Option 1**: Auction for each transitional year
- **Option 2**: Auction transitional period as a block
- **Option 3:** Do nothing

Transition – Minded to position

- Option 1 - auction each transitional year separately
  - Further consideration will be given to the demand curve in the transitional period so as to mitigate a capacity shortage in later years
- Respondents broadly support this option
- Avoids the need to employ a more complex auction format

CRM Consultation 3

Auction Governance
Strike Price Formula
Socialisation

Auction Governance

Important to ensure I-SEM CRM framework:

- protects consumers interests;
- delivers competitive outcomes; and
- long run market confidence.

Auction Governance Arrangements will include:

- Transmission System Operator Licences;
- A new Capacity Market Code (auction process);
- Trading and Settlement Code (Reliability Option settlement);
- Market Monitoring;
- Independent Auction Monitor to oversee and audit the CRM Delivery Body;
- Capacity Market Code modification process; and
- Disputes process.

Auction Governance

- **Capacity Market Code**
  - Parties would accede to the Code (similar to TSC)
  - Specify qualification process
  - Specify roles and responsibilities
  - Specify operation of the Capacity Market Auction
  - Specify key terms and conditions of the Reliability Option contract (except settlement)
  - Specify TSOs obligation to maintain a Capacity Market Register
  - Specify contractual rules re Implementation Agreements

- **Independent Auction Monitor and Audit**
  - International best practice
  - Effective monitoring for anti-competitive behaviour
  - Be present at auctions, including access to alls bids and all communications
  - Annual assurance (audit) report to SEM Committee

Strike Price Formula

Decision 1:

- Based on hypothetical low efficiency peaking unit

- Strike Price Formula including DSU element is

Strike Price = Max [1/T% x Max [GRP, ORP], DSU]

- Supports a Floating Strike Price

Strike Price Formula

CRM Consultation 3:

- Proposes extending formula to include carbon pricing

  Strike Price = Max [1/T% x Max [GRP + CIG x CP, ORP + CIO x CP], DSU]

- Proposes using month-ahead value for both gas and oil prices

  E.g. Forward value of gas and oil would be based on the forward value on the last day of the preceding month

- Proposes a Thermal Efficiency (T%) of 15%

- Proposes governance and process for fuel and carbon input data

Socialisation Arrangements

Decision 1:

- Any shortfall in RO difference payments will be socialised across Suppliers.

- Socialisation will be funded by any surplus difference payments and by a small addition to the capacity charges recovered from Suppliers.

- Any shortfall or surplus in the fund will be used to adjust the total charge recovered from Suppliers in subsequent years.

Socialisation Arrangements

CRM Consultation 3:

Other socialisation arrangements are also being considered within the wider I-SEM programme.

- Propose the I-SEM Market Rules Working Group is best placed to consider the detail.
- Propose principles for setting the Suppliers contribution rate to the fund
- Proposes socialisation options if there are insufficient funds
  - Suspend and Accrue option
  - Immediate Additional Charge option

I-SEM CRM
Consultation 3

Auction Design Framework
Frequency and Volumes

SEM committee

Auction Design Framework

Transitional Auctions | T-1 Auctions | T-4 Auctions

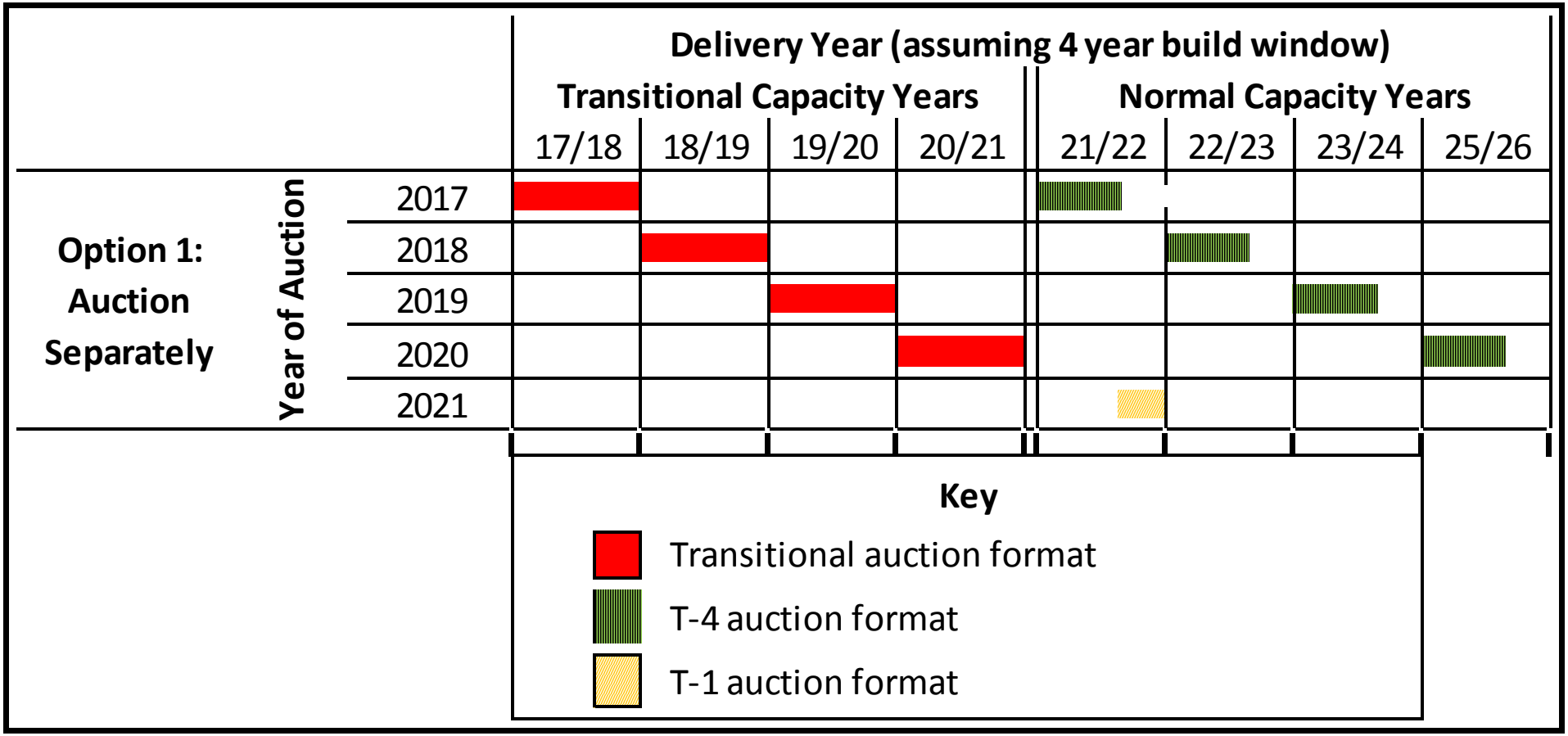
Auction Design and Rules

- Auction format (Simple sealed bid, multiple round descending clock auction, combinatorial)
- Winner determination (including "lumpiness" issue)
- Price determination
- Information and communication policies
- Structure of bids
- Tied bids

Market power controls

- Mandatory bidding
- Adjusting the capacity requirement
- Prohibition on dominant generators acting as Capacity Aggregators
- Sloping demand curve
- Controls on price bids (Auction Price Cap, Other Bid Limits)
- Information and communication policies

Auction Frequency and Volumes



If any new capacity fails to meet its Implementation Agreement milestones, SEM Committee may choose to re-auction the capacity for that Capacity Delivery Year as a T-3 or T-2 auction

I-SEM CRM
Consultation 3

Market Power Mitigation

SEM committee

Introduction: Market Power in Capacity Auctions

- Gaming and abuse of market power can be significant problems with capacity auctions:
  - Elasticity of supply curve
  - Market size and structure
  - Vertical demand curve

- 'Supply side' market power relates to ability and incentive to raise market prices above competitive levels

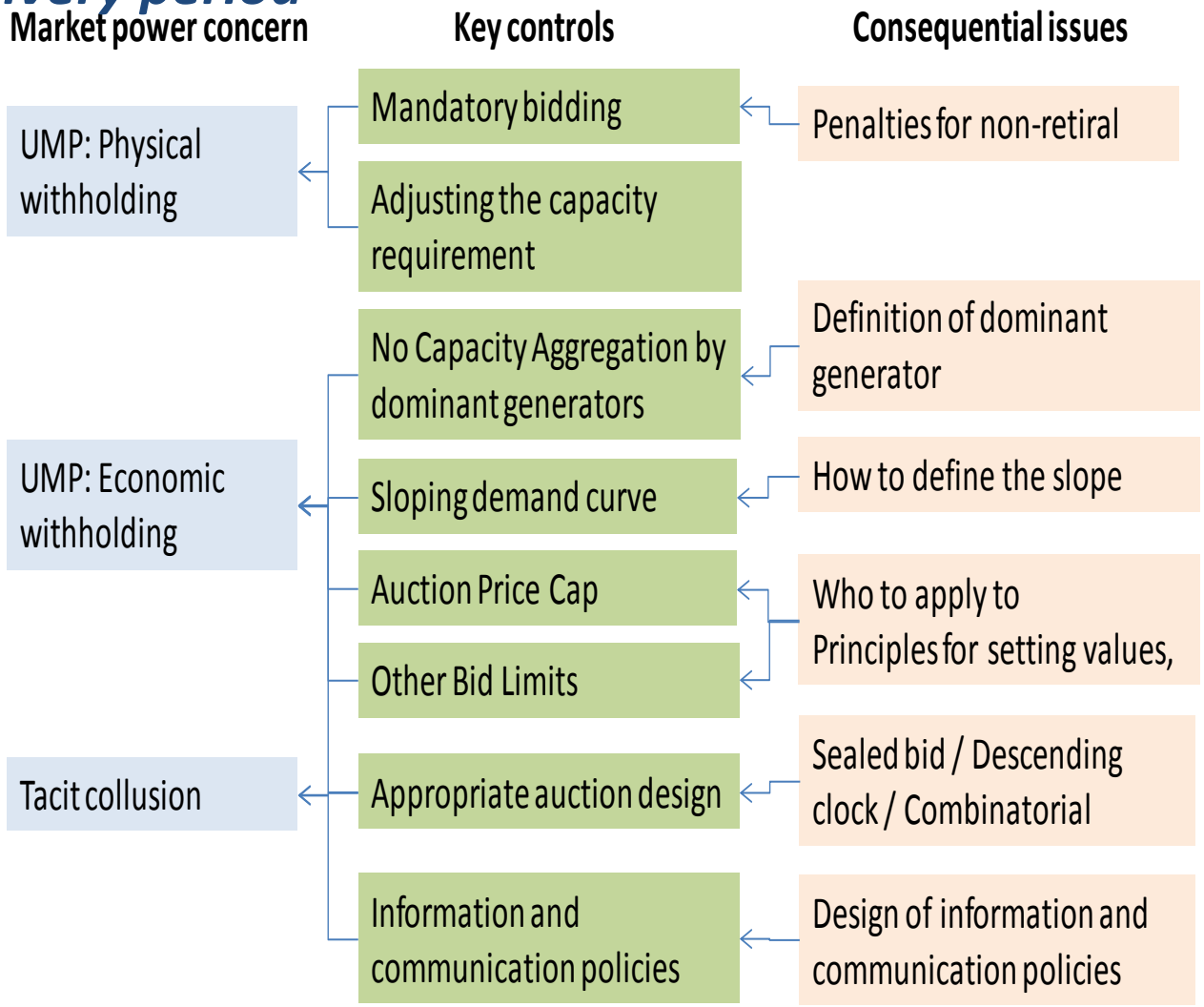
- ESRI (Jan.2015 Paper) raised concerns that market power in I-SEM capacity auctions will lead to auction clearing at high price

- Strong experience in US capacity markets of market power mitigation in auction design

- Application of EU competition law and REMIT

Overview of Market Power in the CRM

- ***Relevant Market – single zone forward capacity market per delivery period***



Key Market Power Concerns

- **Coordinated Market Power Abuse**
  - Explicit Coordination
  - Tacit Coordination
  - Cartel

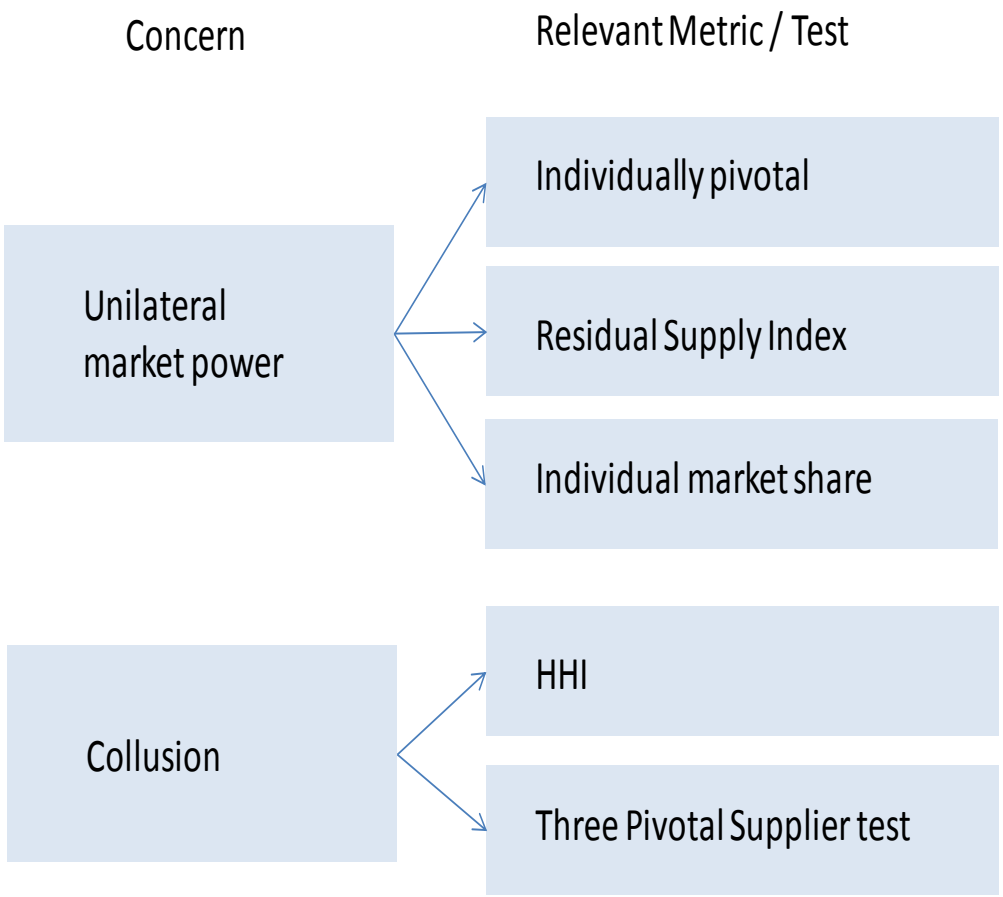
- **Abuse of Unilateral Market Power**
  - Physical capacity witholding
  - Economic capacity witholding
  - Predatory pricing

Key Market Power Concerns: Unilateral Market Power

- **Physical capacity withholding:** Market participants decide not to enter capacity in the auction
- **Economic capacity withholding**: Market participants decide to withdraw capacity from the auction by bidding significantly above costs
- **Predatory pricing:** below cost bidding to supress auction clearing prices

- **Potential for Market Power Abuse**
  - Potential for new entry – Transitional, T-1 and T-4
  - Level of market concentration
  - Excess capacity
  - Ex-ante market design and ex-post competition monitoring and enforcement

Appropriate Market Power Metrics



Market Power of Existing Market Participants

	Name-plate MW	Estimated de-rated MW	De-rated market share	HHI Contribution (de-rated capacity)
ESB PG (Non Wind)	4,073	3,590	38%	1,451
SSE (Non Wind)	1,264	1,065	11%	128
AES	1,022	896	10%	90
Viridian Huntstown 1&2	736	648	7%	47
NIE PPB	587	517	5%	30
BG Energy	444	391	4%	17
Tynagh Energy	386	340	4%	13
BnM	234	212	2%	5
Aughinish	162	146	2%	2
Other dispatchable generators	185	163	2%	
Demand Side	235	235	2%	
Moyle Interconnector	450	338	4%	13
EWIC Interconnector	500	375	4%	16
Total wind	3,573	511	5%	
Total	13,851	9,425	100%	1,813

NB: De-rating calculations indicative only (used GB values for thermal plant)

- ***Several firms are likely to h ave capabiliity to exercise***

Market Power Mitigation Approaches

- **Rules to mitigate physical withholding**
  - Mandatory bidding
  - Adjust the capacity requirement down for physical withholding (non-bidders);
  - Limit future participation by opted-out capacity

- **Price caps to mitigate economic withholding:**
  - An Auction Price Cap, which limits the amount that the auction can clear at
  - Other Bid Limits set at levels below the Auction Price Cap, to apply to existing generation which is mandated to bid

Price Caps on Bids

- **Auction Price Cap**
  - Limits new entrant market power
  - Limits gaming by plant that can bid zero volume
  - Limits consumers' exposure

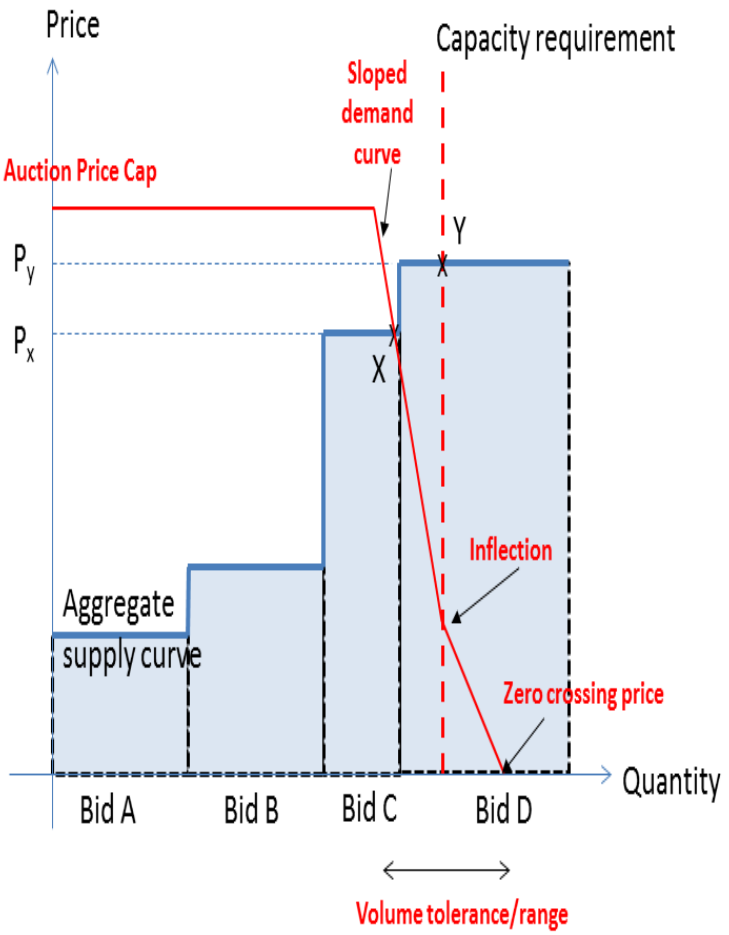
- **Bid Limits**
  - Price Taker Offer Cap
  - Assessment of Net Going Forward Costs
  - Application to all mandated bidders or only those with market power

Price Caps on Bids Considered

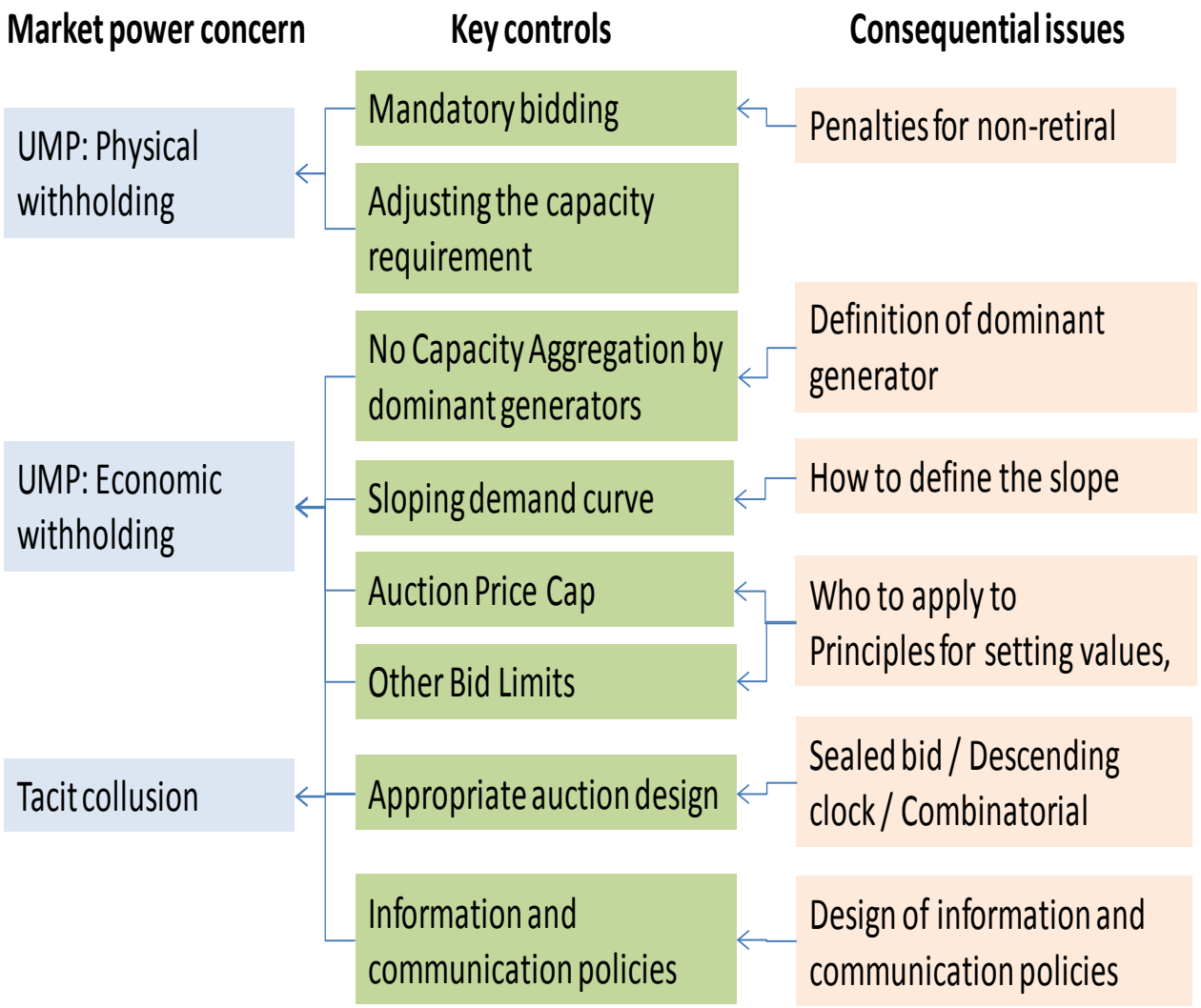
Plant type	Required to bid non-zero volume?	Maximum bid price, if bidding
Existing dispatchable firm transmission access plant	Yes	Bid limit, whether Price-taker Offer Cap or Technology Specific Going Forward Costs
Existing non-dispatchable plant	No	Auction Price Cap
Existing dispatchable non-firm transmission access plant	No	Auction Price Cap
Existing demand side units	No	Auction Price Cap
Any new plant	No	Auction Price Cap

Other Mitigation Measures

- A sloping demand curve can be a mitigation measure to limit impa withholding supply
- Balance between strictness of bid mitigation & slope of deman curve
- Prohibitions on provision of aggregation services by dominan



Overview of Market Power in the CRM



Package of Market Power Mitigation Measures

- Package of measures to be proportionate and built on lessons learned from international best practice
- Balance between measures that adequately mitigate market power & achieving the long term objective of the capacity market
- Need for robust and proactive market monitoring by the RAs
- REMIT and Ex-post competition enforcement

I-SEM CRM Consultation 3

Auction Design

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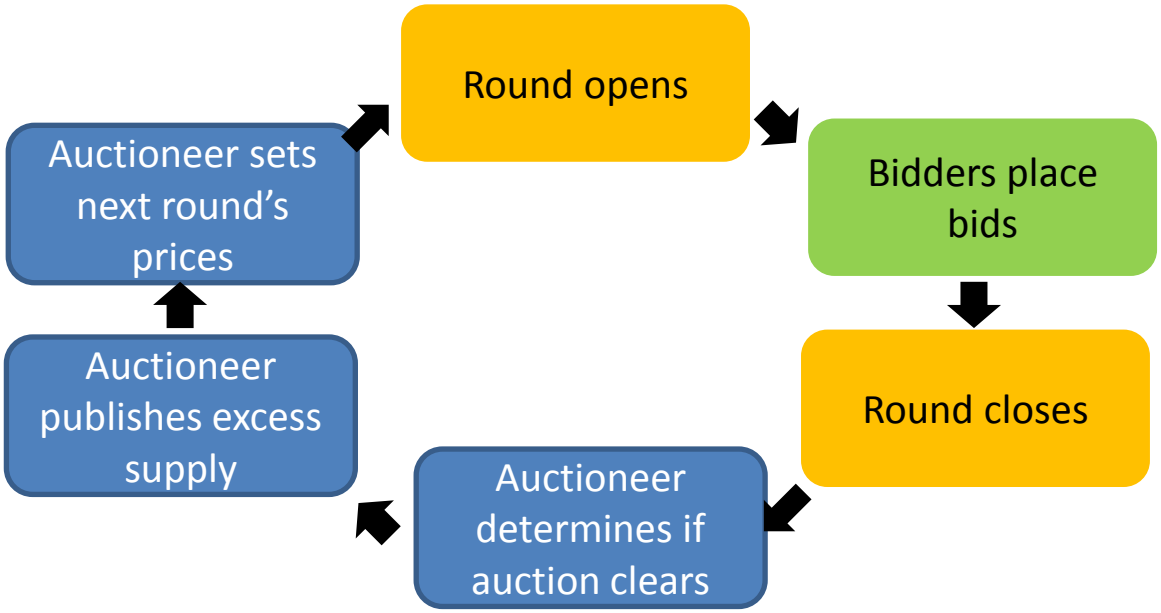
Key design elements

- Auction format
- Structure of bids
- Winner determination
- Pricing rules (pay as bid vs. pay as clear, other)
- Dealing with lumpiness/discrete bids;
- Tie break rules; and
- Information and communication rules
- Auction parameters

Auction format
Option 1: Sealed Bid

- **Option 1: Sealed-bid, multi-unit auction**
  - Bidders simultaneously submit sealed offers comprising their supply curves, or Price-Quantity Pair
  - Auctioneer aggregates bids and determines winners and clearing price based on single round of bids
- **Option 2: Multiple round descending clock auction**

Key difference is that auction takes place over multiple rounds, with information fed back to bidders between rounds



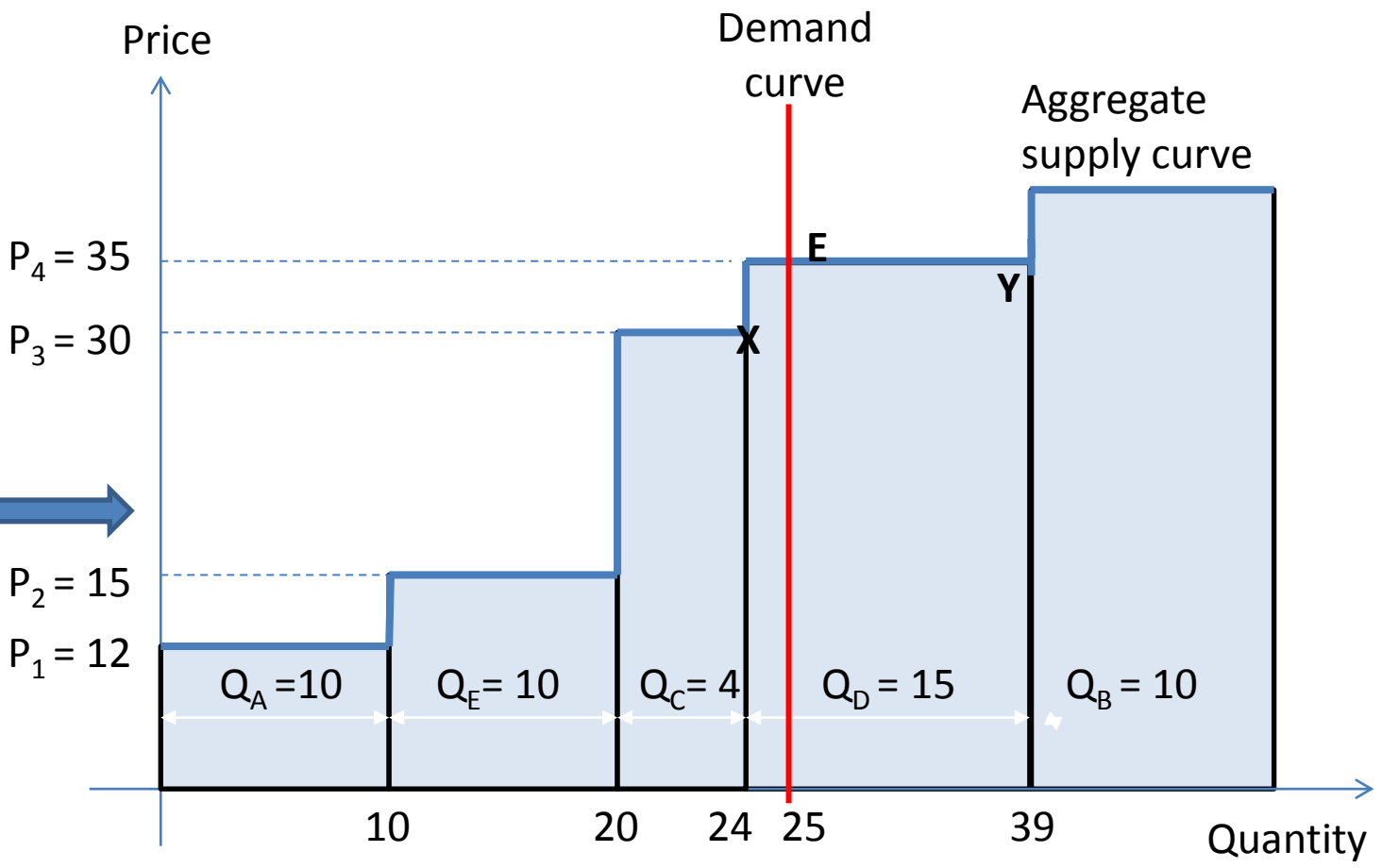
Option 1: Simple sealed bid Worked example

Step 1: Auctioneer publishes Demand Curve = Capacity Requirement = 25 MW

Step 2: Bidders submit sealed bids

Summary of bids		
Bidder	Price	Quantity
A	12	10
B	40	10
C	30	4
D	35	15
E	15	10

Step 3: Auctioneer ranks bids, determines winner and clearing prices in one stage process



Auction formats
Pros and cons

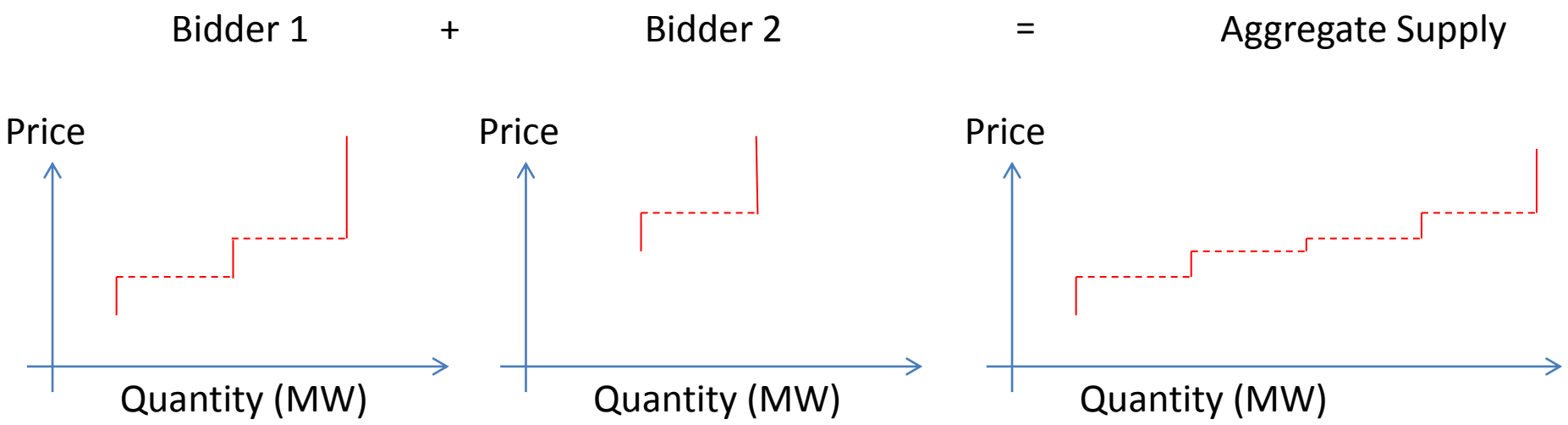
	Option 1: Sealed Bid	**Option 2: Multiple round descending clock**
Pros	Lower potential for market power abuse	Provides greater price discovery and transparency for bidders
	Quick and simple for unsophisticated bidders	
	Easy to solve and easy validate the results	
	Relatively less complex and low cost	
Cons	Does not provides price discovery and price transparency for bidders during auction	Greater potential for market power abuse, may be partially mitigated by market power controls
		May tie up bidders for 2-3 days of auction duration, and slightly more complicated

Auction formats
International case studies

Market	Capacity Auction Format
PJM	Simple sealed bid
NYISO	Simple sealed bid
ISO New England	Multiple round descending clock
GB	Multiple round descending clock
Colombia	Multiple round descending clock- but suffered from significant market power / gaming

Structure of bids

- Option 1: Simple (Price, Quantity) pair for each capacity market unit
- Option 2: Bidder submit MW as function of price....



Winner determination

How do you treat bidders wanting different contract lengths:

- Option 1: Purely on a price basis, ignoring contract duration
- Option 2: Discount rate calculation
- Option 3: Multiply each bid amount by (bid's contract length/maximum possible contract length)
- Option 4: Based on expectation of prices in future auctions

We consider Option 1 to be the most appropriate for the following reasons:

- Auction efficiency and competition: Judged purely on price offered for Capacity Delivery year, this approach will ensure efficient procurement, at least for the first delivery year
- Simplicity, practicality and cost:
  - Clearly the simplest and most transparent; and
  - Not clear how the relevant adjustments for some other options would be implemented in practice

Price determination

Variants of pricing:

- Pay-as-clear (uniform pricing):
  - Highest accepted bid

Typically employed in auctions

  - Lowest rejected bid

Strong incentives for truthful bidding, but higher cost?

- Pay-as-bid

Weak incentives for truthful bidding, favours information rich bidders?

Also an issue about pricing if you accepted an “out-of-merit bid” to deal with lumpiness issue

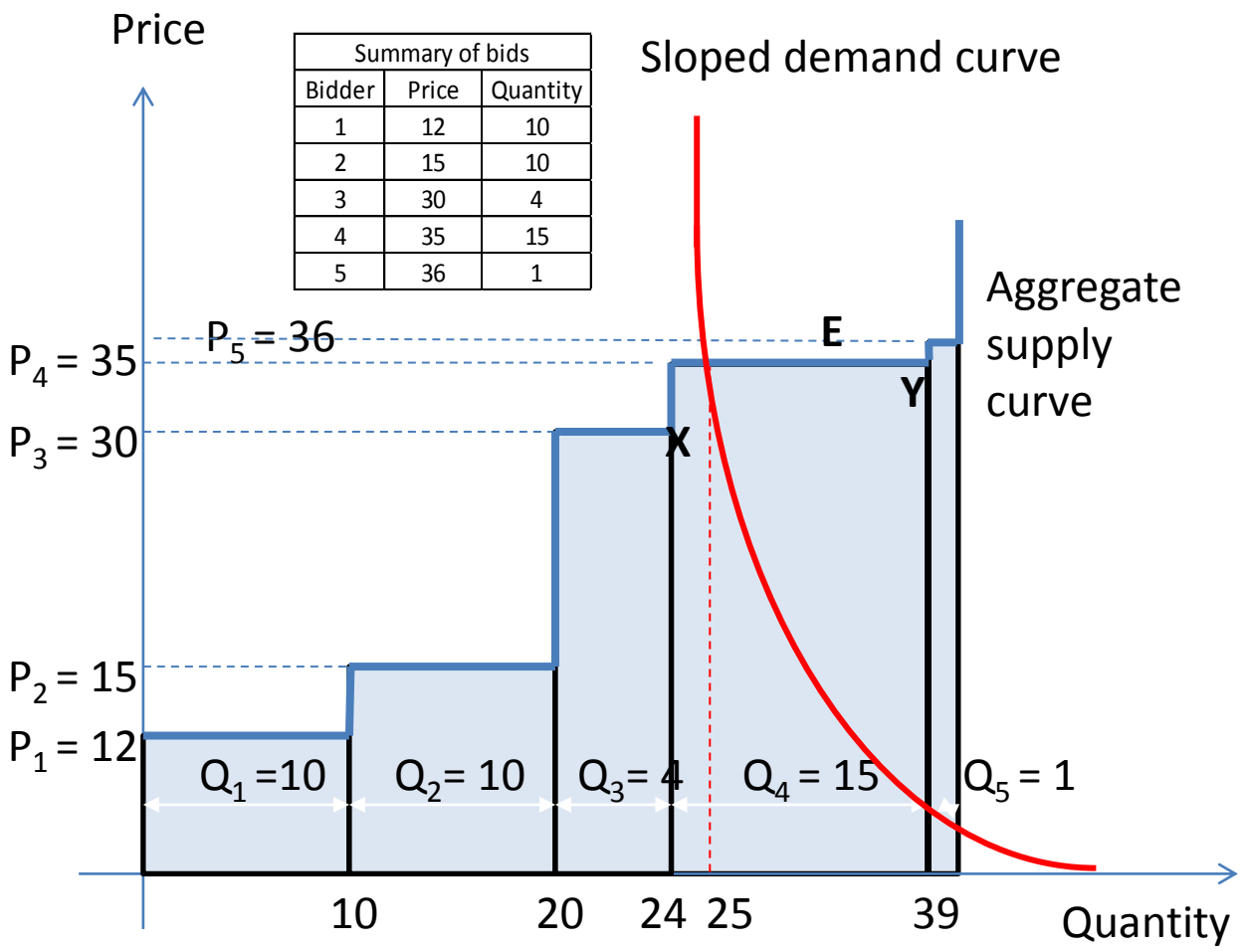
Lumpiness issue

Suppose that the Supply and Demand curves intersect at R, but we have to take all or nothing of Bid 4

Should we:
- Accept Bid 4 at clear at Y
- Reject Bid 4 and clear at X
- Take Bid 5 instead?

And what are the price implications of accepting Bid 5:
- Uniform clearing price at P=36 for all
- "Uniform" clearing at P=30 for in-merit winner, out-of-merit paid-as-bid at P=36

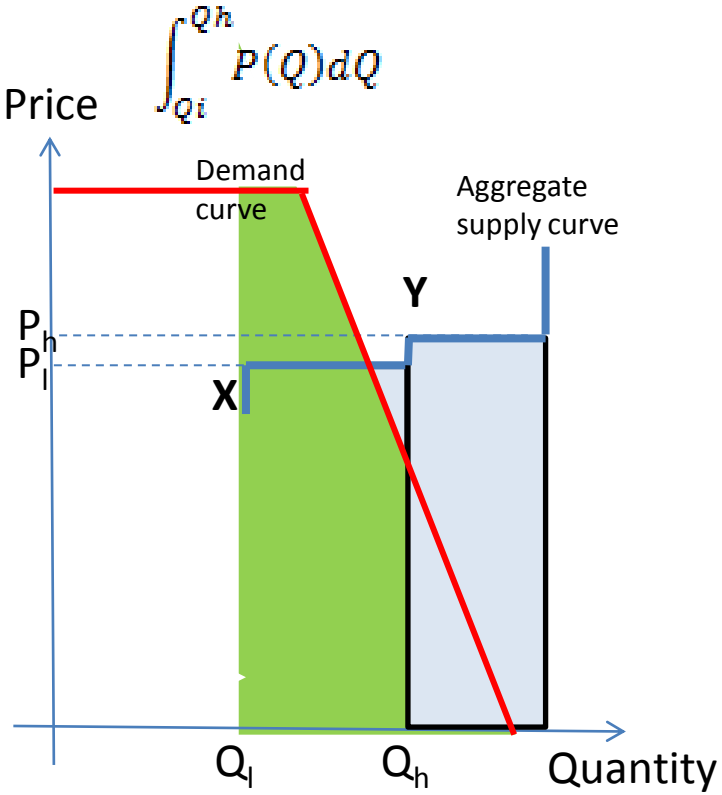
Summary of bids		
Bidder	Price	Quantity
1	12	10
2	15	10
3	30	4
4	35	15
5	36	1

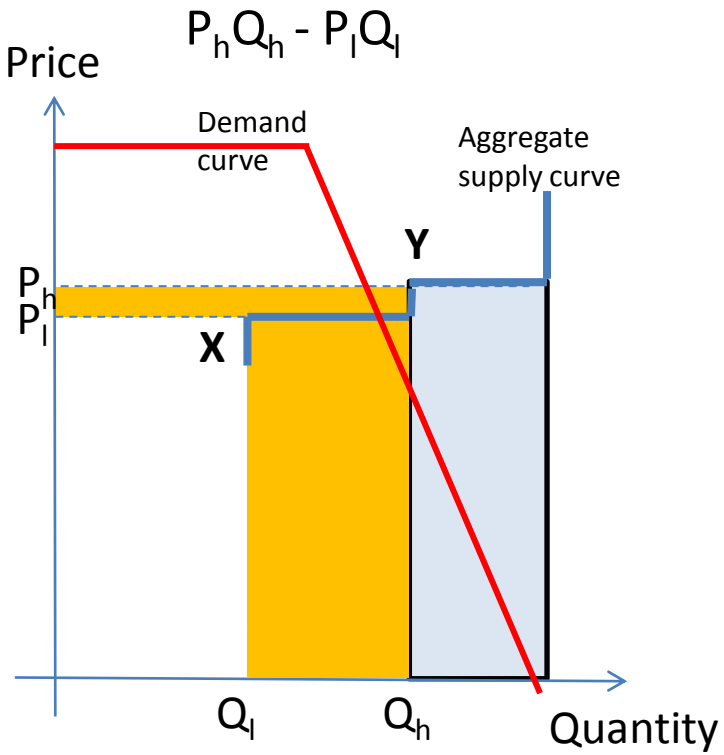


Options for dealing with lumpiness

- Option 1: Auctioneer to accept the marginal bid in all circumstances
- Option 2: requires the auctioneer to either accept or reject the marginal bid (under this option, the auctioneer is not allowed to accept an out-of-merit bid). The decision to accept the marginal bid could be based on either:
  - 2a: a net welfare function calculation, which calculates whether net welfare is greater if the marginal bid is accepted or rejected; or
  - Option 2b: some simpler rules based on MW tolerances, e.g. don't accept the marginal bid if the aggregate of cheaper bidders is within a specified number of MW of demand.
- Option 3: allows the auctioneer to accept out-of-merit bids, based on an optimisation of either:
  - Option 3a: Least total purchase cost in €m or in €/kW-year;
  - Option 3b: Net Consumer Welfare function
  - Option 3c: Net Consumer + Producer Welfare function

Net consumer welfare calculation





Positive value (integral) = increase in consumer utility

Negative value = increase in consumer payments

If value of difference is positive, then marginal bid contracted, if value negative then marginal bid not contracted

Tied bids

- Typically need rules to separate where bids tied on price (particularly if Bid Limits apply)
- Option 1: use net welfare calculation to prioritise
- Option 2: use simpler rules, e.g.
  - 1st criteria: Rank exit bids from highest to lowest capacity (so that higher capacity bids exit first)
  - 2nd criteria: Rank from shortest to longest duration (so that shorter duration bids exit first)
  - 3rd criteria: Apply random selection (each bid when entered is automatically assigned a random number).

Information and communication

Information policies

- What information should the auctioneer provide to bidders and winners:
  - Before qualification;
  - Between qualification and the start of the auction;
  - Between rounds in the case of a multiple round auction (if relevant);
  - After the end of the auction that might be of use to bidders in subsequent auctions or in the secondary market.

Communication

- What an individual bidder should be allowed to disclose publicly or to any other bidder before, during or after the auction

Key auction parameters

- Prior to Qualification:
  - The Auction Date
  - De-rating factors
  - Indicative **Demand Curve**, before adjustments, which will include the slope
  - The **Auction Price Cap**
  - **Other Bid Limits** for mandated bidders
  - Capital expenditure thresholds which define the boundary conditions for new and existing capacity
- Between Qualification and the auction:
  - Adjusted demand curve

Auction Parameters
Demand Curve Slope

Key advantages of sloped demand curve:

- Market power
- Economic efficiency
- Reduce volatility in prices