Recommendation: Dynamic Capacity Refund Regime

22 November 2012

THE LANTAU GROUP
strategy & economic consulting

Problem: significant mismatch between refund factors and system conditions

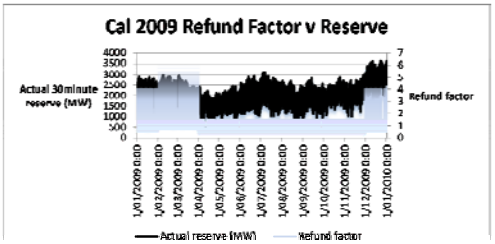
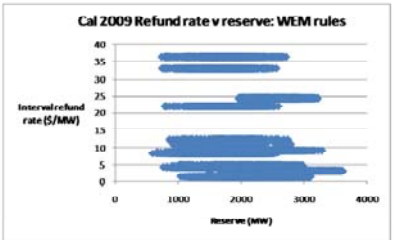


Figure 8 Refund rate versus reserve in calendar 2009: WEM rules



Proposed solution: clarify purpose of refund regime and align incentives

- Dynamic refund factors reflective of system conditions
  - Minimum refund factor to tie refund exposure to capacity credit value
  - Maximum refund factor linked to MRCP

Fix distortions

Improve incentive

- Recycling for efficiency and reduced risk of unintended consequences / distortions
  - Rebates of refund revenue based on availability
- Revenue loss to Market Customers offset by adjustments to RCM proposal
  - Offset RCR using 97 percent factor
  - Slope steepened to -3.75 from -3.25

Revenue neutrality

Sharper incentives

Non-discriminatory

- Other
  - Contractual disposition of refunds not affected / rebates can still go to party exposed to refund
  - Eligibility for rebate corresponds to exposure to refund risk

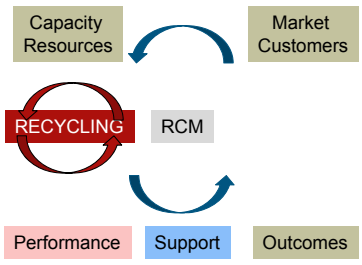
Design Choices & Evaluation

Key decisions

1. Recycle or not
2. Availability vs dispatch-based rebates?
3. Dynamic refund factor settings?
4. How much to offset Market Customer value loss?

(1) Recycle or not

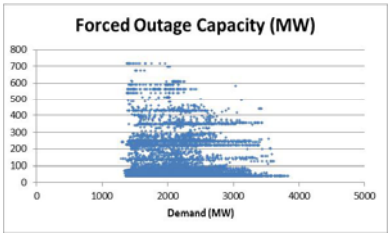
- Recycling sharpens incentives
  - Penalty increases: Refund + Loss of rebate > Refund
  - Incentive emerges: Gain of rebate
- Recycling improves system security
  - Better performance relative to average is rewarded
  - As average overall performance improves, standard gets tougher
- Recycling shifts value
  - Refunds no longer flow to Market customers
- Value shift can be compensated easily

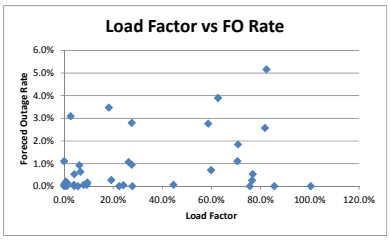


Recommendation: Recycling

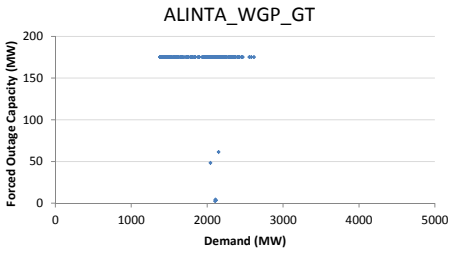
(2) Basis for rebates: availability vs. dispatch?

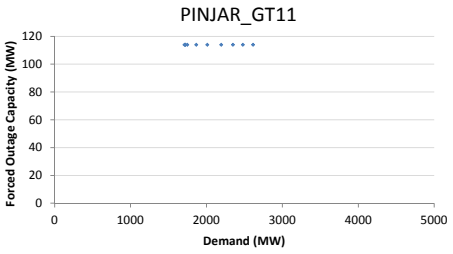
- Rebates can be
  - paid to units dispatched in times refunds are incurred, or
  - paid to units that are available
- The RCM is about incentivising availability.
  - Actual dispatch is the acid test of availability
  - But available resources have value, even if not dispatched
- Forced outages are not correlated with dispatch
  - Data does not support dispatch-based refunds
- Recommend rebate based on availability
  - Aligns with purpose of RCM
  - No discrimination in contravention of Market Objectives

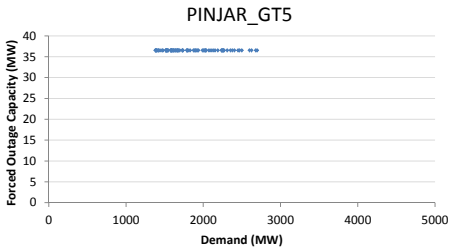


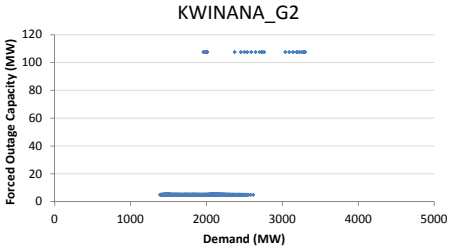


Example: Relationship between FO and Demand levels for some Peakers



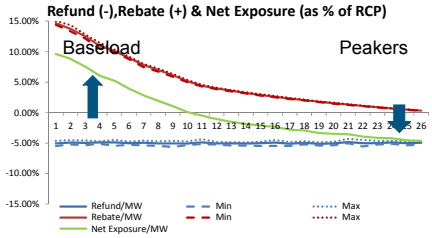


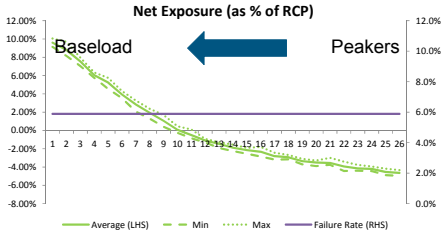




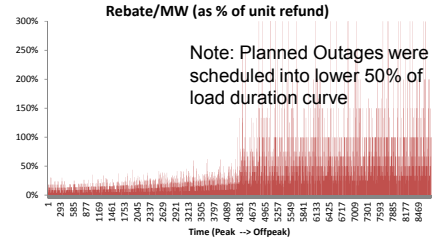
FLAT

(2) Dispatch-based rebates transfer value based on utilisation (when FO events are independent)





% of hours	Refund Factor
100%	1
75%	1
67%	1
50%	1
33%	1
25%	1
10%	1
5%	1
1%	1



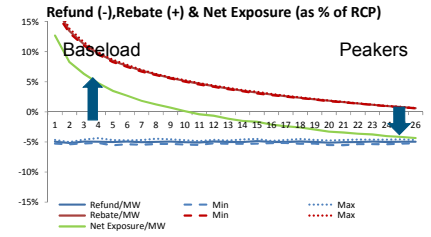
Plant No.	Net Capacity (MW)	FOR (%)	Load Factor (%)	Availability (%)	Plant No.	Net Capacity (MW)	FOR (%)	Load Factor (%)	Availability (%)
1	200	5.0%	80.0%	85.0%	14	200	5.0%		85.0%
2	200	5.0%	77.0%	85.0%	15	200			85.0%
3	200	5.0%	74.0%	85.0%	16	200		35.0%	85.0%
4	200	5.0%	71.0%	85.0%	17			32.0%	85.0%
5	200	5.0%	68.0%	85.0%			5.0%	29.0%	85.0%
6	200	5.0%	65.0%			200	5.0%	26.0%	85.0%
7	200	5.0%			20	200	5.0%	23.0%	85.0%
8	200	5.0%		53.0%	21	200	5.0%	20.0%	85.0%
9	200			85.0%	22	200	5.0%	17.0%	85.0%
10	200		53.0%	85.0%	23	200	5.0%	14.0%	85.0%
11	200	5.0%	50.0%	85.0%	24	200	5.0%	11.0%	85.0%
12	200	5.0%	47.0%	85.0%	25	200	5.0%	8.0%	85.0%
13	200	5.0%	44.0%	85.0%	26	200	5.0%	5.0%	85.0%

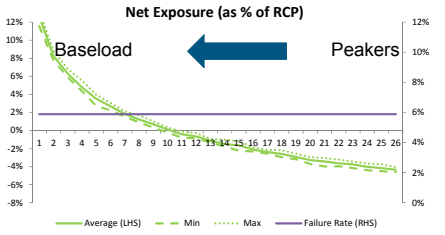
26 Identical units differing only by load factor

Note: Failure rate = FOR / Availability. Higher failure rate implies the chance that the facility would run into FO during its available period is higher.

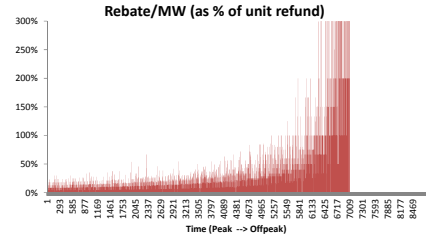
FLAT

(2) Dispatch-based rebates transfer value based on utilisation (when FO events are independent)





% of hours	Refund Factor
100%	1
75%	1
67%	1
50%	1
33%	1
25%	1
10%	1
5%	1
1%	1



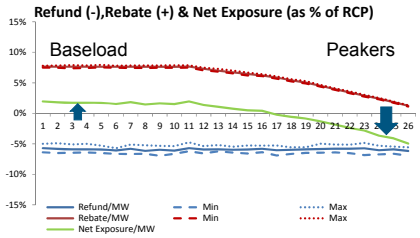
Plant No.	Net Capacity (MW)	FOR (%)	Load Factor (%)	Availability (%)	Plant No.	Net Capacity (MW)	FOR (%)	Load Factor (%)	Availability (%)
1	200	5.0%	80.0%	85.0%	14	200	5.0%		85.0%
2	200	5.0%	77.0%	85.0%	15	200			85.0%
3	200	5.0%	74.0%	85.0%	16	200		35.0%	85.0%
4	200	5.0%	71.0%	85.0%	17			32.0%	85.0%
5	200	5.0%	68.0%	85.0%			5.0%	29.0%	85.0%
6	200	5.0%	65.0%			200	5.0%	26.0%	85.0%
7	200	5.0%			20	200	5.0%	23.0%	85.0%
8	200	5.0%		53.0%	21	200	5.0%	20.0%	85.0%
9	200			85.0%	22	200	5.0%	17.0%	85.0%
10	200		53.0%	85.0%	23	200	5.0%	14.0%	85.0%
11	200	5.0%	50.0%	85.0%	24	200	5.0%	11.0%	85.0%
12	200	5.0%	47.0%	85.0%	25	200	5.0%	8.0%	85.0%
13	200	5.0%	44.0%	85.0%	26	200	5.0%	5.0%	85.0%

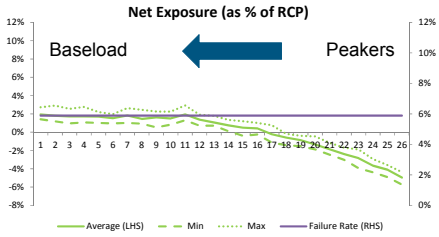
26 Identical units differing only by load factor

Note: Failure rate = FOR / Availability. Higher failure rate implies the chance that the facility would run into FO during its available period is higher.

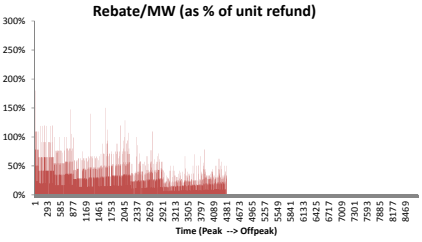
PROFILED

(2) Dispatch-based rebates transfer value based on utilisation (when FO events are independent)





% of hours	Refund Factor
100%	0
75%	0
67%	0
50%	1
33%	2
25%	3
10%	4
5%	5
1%	6



Hypothetical system of identical units with same FO and availability but different load factors

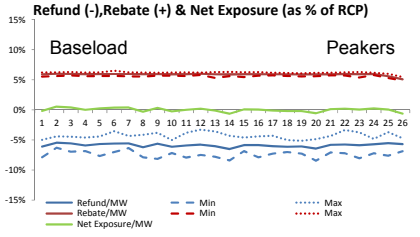
Plant No.	Net Capacity (MW)	FOR (%)	Load Factor (%)	Availability (%)	Plant No.	Net Capacity (MW)	FOR (%)	Load Factor (%)	Availability (%)
1	200	5.0%	80.0%	85.0%	14	200	5.0%		85.0%
2	200	5.0%	77.0%	85.0%	15	200			85.0%
3	200	5.0%	74.0%	85.0%	16	200		35.0%	85.0%
4	200	5.0%	71.0%	85.0%	17			32.0%	85.0%
5	200	5.0%	68.0%	85.0%			5.0%	29.0%	85.0%
6	200	5.0%	65.0%			200	5.0%	26.0%	85.0%
7	200	5.0%			20	200	5.0%	23.0%	85.0%
8	200	5.0%		53.0%	21	200	5.0%	20.0%	85.0%
9	200			85.0%	22	200	5.0%	17.0%	85.0%
10	200		53.0%	85.0%	23	200	5.0%	14.0%	85.0%
11	200	5.0%	50.0%	85.0%	24	200	5.0%	11.0%	85.0%
12	200	5.0%	47.0%	85.0%	25	200	5.0%	8.0%	85.0%
13	200	5.0%	44.0%	85.0%	26	200	5.0%	5.0%	85.0%

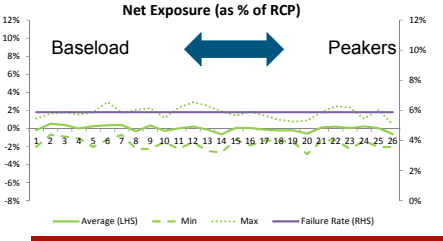
26 Identical units differing only by load factor

Note: Failure rate = FOR / Availability. Higher failure rate implies the chance that the facility would run into FO during its available period is higher.

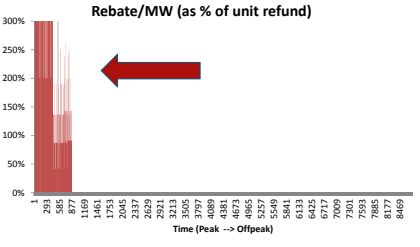
SUPER PROFILED

(2) Extremely steep refund factors might offset dispatch-based discrimination – but at a substantial increase in financial risk





% of hours	Refund Factor
100%	0
75%	0
67%	0
50%	0
33%	0
25%	0
10%	10
5%	50
1%	100



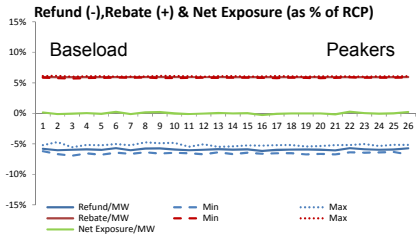
Hypothetical system of identical units with same FO and availability but different load factors

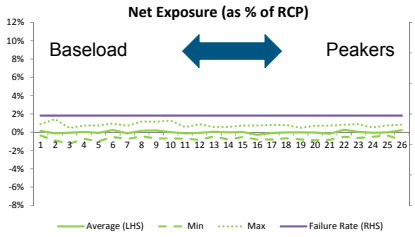
Plant No.	Net Capacity (MW)	FOR (%)	Load Factor (%)	Availability (%)	Plant No.	Net Capacity (MW)	FOR (%)	Load Factor (%)	Availability (%)
1	200	5.0%	80.0%	85.0%	14	200	5.0%		85.0%
2	200	5.0%	77.0%	85.0%	15	200			85.0%
3	200	5.0%	74.0%	85.0%	16	200		35.0%	85.0%
4	200	5.0%	71.0%	85.0%	17			32.0%	85.0%
5	200	5.0%	68.0%	85.0%			5.0%	29.0%	85.0%
6	200	5.0%	65.0%			200	5.0%	26.0%	85.0%
7	200	5.0%			20	200	5.0%	23.0%	85.0%
8	200	5.0%		53.0%	21	200	5.0%	20.0%	85.0%
9	200			85.0%	22	200	5.0%	17.0%	85.0%
10	200		53.0%	85.0%	23	200	5.0%	14.0%	85.0%
11	200	5.0%	50.0%	85.0%	24	200	5.0%	11.0%	85.0%
12	200	5.0%	47.0%	85.0%	25	200	5.0%	8.0%	85.0%
13	200	5.0%	44.0%	85.0%	26	200	5.0%	5.0%	85.0%

26 Identical units differing only by load factor

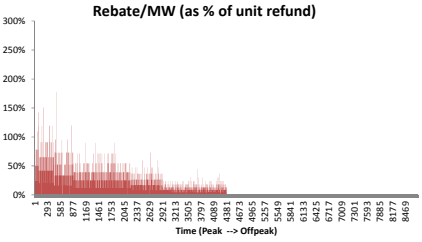
Note: Failure rate = FOR / Availability. Higher failure rate implies the chance that the facility would run into FO during its available period is higher.

(2) Availability-based rebates are indifferent to load-factor – and so focus on the incentive without the difficult-to-manage value transfer





% of hours	Refund Factor
100%	0
75%	0
67%	0
50%	1
33%	2
25%	3
10%	4
5%	5
1%	6



Hypothetical system of identical units with same FO and availability but different load factors

Plant No.	Net Capacity (MW)	FOR (%)	Load Factor (%)	Availability (%)	Plant No.	Net Capacity (MW)	FOR (%)	Load Factor (%)	Availability (%)
1	200	5.0%	80.0%	85.0%	14	200	5.0%		85.0%
2	200	5.0%	77.0%	85.0%	15	200			85.0%
3	200	5.0%	74.0%	85.0%	16	200		35.0%	85.0%
4	200	5.0%	71.0%	85.0%	17		5.0%	32.0%	85.0%
5	200	5.0%	68.0%	85.0%			5.0%	29.0%	85.0%
6	200	5.0%	65.0%			200	5.0%	26.0%	85.0%
7	200	5.0%	62.0%		20	200	5.0%	23.0%	85.0%
8	200	5.0%		85.0%	21	200	5.0%	20.0%	85.0%
9	200	5.0%		85.0%	22	200	5.0%	17.0%	85.0%
10	200	5.0%	53.0%	85.0%	23	200	5.0%	14.0%	85.0%
11	200	5.0%	50.0%	85.0%	24	200	5.0%	11.0%	85.0%
12	200	5.0%	47.0%	85.0%	25	200	5.0%	8.0%	85.0%
13	200	5.0%	44.0%	85.0%	26	200	5.0%	5.0%	85.0%

26 Identical units differing only by load factor

Note: Failure rate = FOR / Availability. Higher failure rate implies the chance that the facility would run into FO during its available period is higher.

(2) Availability vs Dispatch

- Availability-based rebates eliminate risk of distortions and significant wealth transfers
  - Because FO risk is not tightly correlated to dispatch (according to the data), there is no sufficient nexus between dispatch and the "earning" of a rebate for avoiding a FO
  - Instead, "earning" a rebate requires being available and not on FO
- Some risk of rewarding phantom availability – resources receiving rebates that are not really available
- But this risk already exists in the RCM and can only be mitigated by
  - Reducing the amount of excess reserve capacity
  - Testing and validation processes

Recommendation: Availability-based recycling

(3) Setting the refund factors

- Current refund factors are time-based
- Dynamic refund factors reflect system conditions
  - Option A – IMO Proposal
  - Option B – Modified IMO Proposal with minimum refund factor
  - Option C – Option B with MRCP-linked maximum refund factors

OPTION A

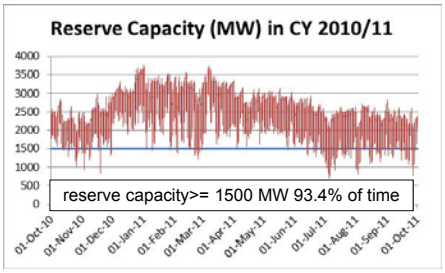
(3) Starting Point: IMO Dynamic Refund Proposal per RDIWG Meeting No. 11

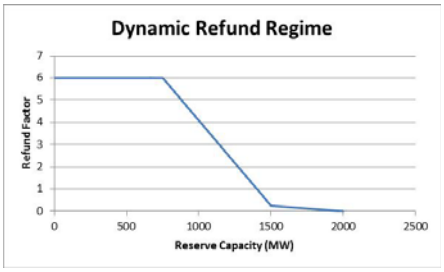
- In RDIWG Meeting No.11 note, the IMO proposed
  - a capped refund factor that would apply whenever the reserve capacity is below the required minimum reserve used by System Management in outage planning, say 2*min reserve ~ 750MW;
  - a lower minimum floor level to apply once reserve rises to more than a nominated factor above the minimum capacity requirement be set equal to 4* min reserve ~ 1500MW; and
  - a final break point set such that the refund factor is zero when reserve is greater than 6 * min reserve ~ 2000MW.
  - the cap on cumulative refunds and translation factor, Y, is retained

Y = Annual Reserve Capacity Price / 12 months / Number of Trading Intervals per month

Interval Refund rate ($/MW) = Refund factor * Y

Reserve Capacity = Capacity Credits – Demand – Planned Outage – Forced Outage





OPTION A

(3) Assessment of Starting Point: IMO Dynamic Refund Proposal

- Pros
  - Implements dynamic refund factors that reflect system conditions
  - Significant improvement on existing time-based arrangements (as noted in previous meetings)
- Cons
  - A larger spread of refund factors would better reflect the economic value implications of differing reserve capacity levels in real time
  - Possible gaming under extreme conditions
    - A unit on prolonged FO could theoretically retain some of its capacity payment revenue if refund factors are low enough
  - Inconsistent treatment of similar situations
    - If TI reserve capacity is 500 in two different years, the value of a TI refund will be Refund Factor * Y, where Y reflects each year's RCP
    - But if TI reserve capacity is same in both years, should not the refund exposure be the same – only the probability of hitting that exposure should be different

Pros outweigh the cons, but improvement is possible

OPTION A

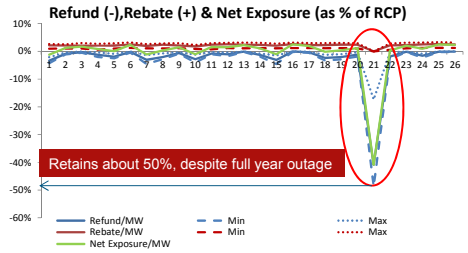
(3) Potential Improvement: Mitigate risk of unmerited CP value capture

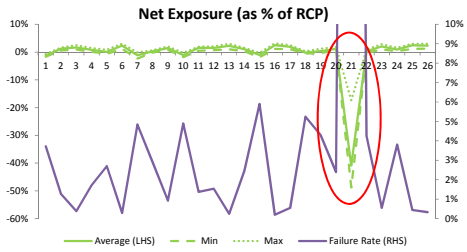
- Small possibility of retaining some capacity credit value even if year-long FO
  - Refund factors can be zero or less than 1 for substantial portions of the year
  - Higher factors may not occur enough to cause sum-of-factors to claw back full CP value
- Only happens if
  - Sufficient excess reserve capacity
  - Few other planned and forced outages (so refund factors are minimised)
- RCP pricing (slope) assists
  - Lower RCP when more excess reserve capacity reduces benefit of strategy
- Options for dealing with this
  - Ignore – small probability / cannot be assured (strategy of exploitation is not without significant risk)
  - Set minimum conditions for retention of capacity credit value
  - Set minimum refund factors to prevent situation from being possible

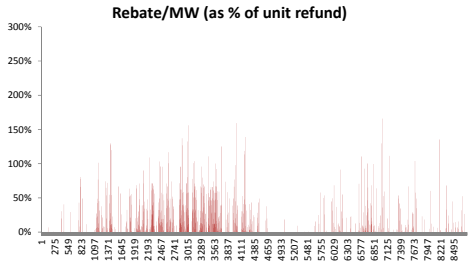
OPTION A

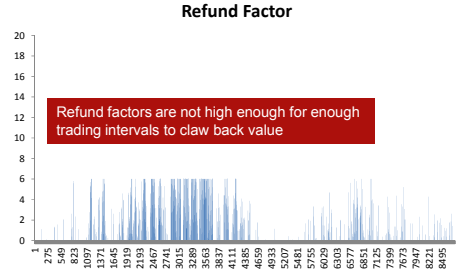
5% Excess capacity

(3) A facility on FO for a year year could (theoretically) retain some capacity credit value – at least in this hypothetical simulation



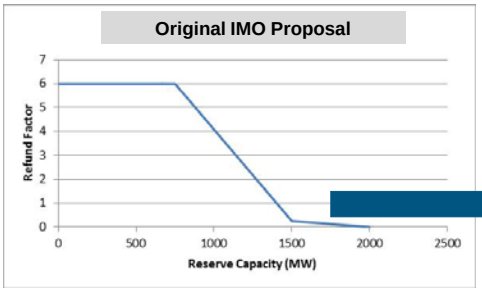


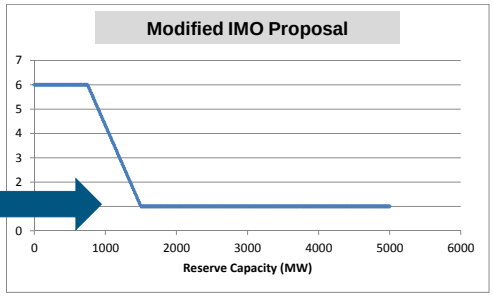




OPTION B

(3) Modify Option A to include a Minimum Refund Factor Level





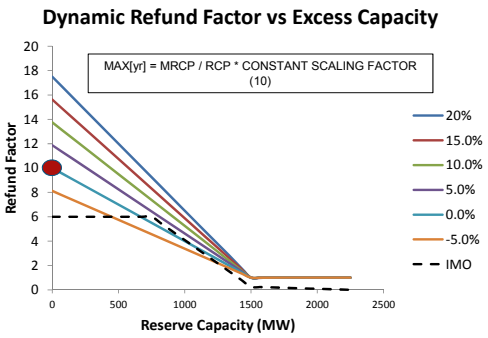
- **Pros**
  - Impossible to avoid refund exposure or full clawback for complete non-performance
  - Signals that any period is potentially a value period, so reduces incentive to game FO into ultra low periods – improving truthful declaration

- **Cons**
  - Exposure to refunds, even in low value periods
  - Reduces "spread" between highest refund factor period and lowest – dulling the overall incentive mildly
    - (0 to 6 is a larger spread than 1 to 6)

OPTION C

(3) Modify Option B to Incorporate MRCP-sensitive refund factors

- Same as Option B
- Except that
  - Annual Maximum refund factor is linked to ratio of MRCP/RCP
  - Linear with no cap – so potentially higher refund risk in an excess capacity world
- Rebate / recycling eliminates arbitrary component of financial risk



Principle: TI refund risk should be similar for similar reserve levels over time unless MRCP has changed

No matter what the excess capacity is for the year (reflected in the RCP), at the point of zero reserve capacity in a TI, the refund exposure per MW should be linked to the MRCP / TI

OPTION C

(3) Comment regarding Option C : MRCP-linked refund factors

- Linking the maximum refund factor might seem to increase financial risk
- The reality is not so simple.
  - Reduces financial risk related to year to year changes in the RCP due to changes in excess reserve capacity
  - Increases performance incentive related to availability incentive
- Option 3 reduces financial noise and focusses the incentive on performance
  - The constant scalar factor (10) can be selected to manage overall financial risk – current selection is “10”, which approximates uncapped slope in the IMO DR proposal

Evaluation using Simulation Model

Evaluation Scenarios

Refund Regime	IMO with Floor 1
Availiability or Dispatched Based Rebate	Availability
Excess Capacity	5%
Maximum Reserve Capacity Price ($/MW)	163900
Reserve Capacity Price ($/MW)	138021
Unit Refund ($/MWh)	138685

Plant No.	Net Capacity (MW)	FOR (%)	Load Factor (%)	Availability (%)	Plant No.	Net Capacity (MW)	FOR (%)	Load Factor (%)	Availability (%)
1	320	1.0%	90.0%	91.0%	14	40	1.0%	52.3%	96.0%
2	200	3.0%	85.0%	88.0%	15	320	0.2%	48.8%	95.0%
3	100	100.0%	0.0%	100.0%	16	200	1.0%	9.7%	50.0%
4	100	1.0%	97.0%	98.0%	17	200	0.5%	13.4%	65.0%
5	100	0.2%	94.8%	95.0%	18	100	0.1%	11.1%	95.0%
6	320	0.5%	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	90.0%
7	40	0.5%	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	98.0%
8	20	6.0%	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	99.0%
9	200	6.0%	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	95.0%
10	200	1.0%	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	98.0%
11	20	1.0%	75.2%	95.0%	24	100	0.1%	0.6%	50.0%
12	200	0.2%	70.4%	90.0%	25	20	2.0%	0.2%	80.0%
13	100	0.5%	50.7%	80.0%	26	50	0.5%	0.0%	25.0%

Unit 3 on Full-Year (100%) FO
Excess Reserve Capacity = 5%

Plant No.	Net Capacity (MW)	FOR (%)	Load Factor (%)	Availability (%)	Plant No.	Net Capacity (MW)	FOR (%)	Load Factor (%)	Availability (%)
1	320	1.0%	90.1%	91.0%	14	40	1.0%	44.2%	96.0%
2	200	3.0%	85.0%	88.0%	15	320	0.2%	40.8%	95.0%
3	100	10.0%	79.8%	90.0%	16	200	1.0%	8.7%	50.0%
4	100	1.0%	97.0%	98.0%	17	200	0.5%	8.5%	65.0%
5	100	0.2%	94.8%	95.0%	18	100	0.1%	8.1%	95.0%
6	320	0.5%	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	90.0%
7	40	0.5%	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	98.0%
8	20	6.0%	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	99.0%
9	200	6.0%	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	95.0%
10	200	1.0%	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	98.0%
11	20	1.0%	69.7%	95.0%	24	100	0.1%	0.4%	50.0%
12	200	0.2%	64.5%	90.0%	25	20	2.0%	0.2%	80.0%
13	100	0.5%	45.1%	80.0%	26	50	0.5%	0.0%	25.0%

Unit 3 on Normal (10%) FO
Excess Reserve Capacity = 5%

Refund Regime	IMO with Floor 1
Availiability or Dispatched Based Rebate	Availability
Excess Capacity	15%
Maximum Reserve Capacity Price ($/MW)	163900
Reserve Capacity Price ($/MW)	107636
Unit Refund ($/MWh)	11.97

Plant No.	Net Capacity (MW)	FOR (%)	Load Factor (%)	Availability (%)	Plant No.	Net Capacity (MW)	FOR (%)	Load Factor (%)	Availability (%)
1	320	1.0%	90.0%	91.0%	14	40	1.0%	36.9%	96.0%
2	200	3.0%	85.0%	88.0%	15	320	0.2%	33.4%	95.0%
3	100	100.0%	0.0%	100.0%	16	200	1.0%	6.7%	50.0%
4	100	1.0%	97.0%	98.0%	17	200	0.5%	6.7%	65.0%
5	100	0.2%	94.8%	95.0%	18	100	0.1%	6.5%	95.0%
6	320	0.5%	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
7	40	0.5%	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
8	20	6.0%	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
9	200	6.0%	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10	200	1.0%	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
11	20	1.0%	65.0%	95.0%	24	100	0.1%	0.2%	50.0%
12	200	0.2%	59.5%	90.0%	25	20	2.0%	0.1%	80.0%
13	100	0.5%	39.3%	80.0%	26	50	0.5%	0.0%	25.0%

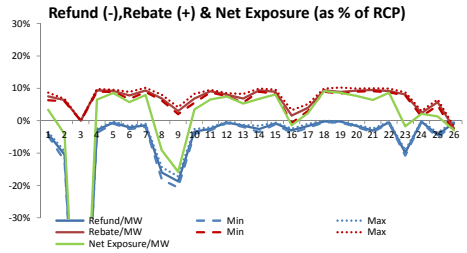
Unit 3 on Full-Year FO
Excess Reserve Capacity = 15%

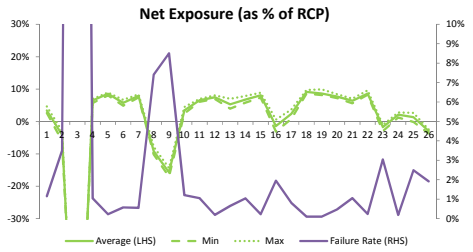
Plant No.	Net Capacity (MW)	FOR (%)	Load Factor (%)	Availability (%)	Plant No.	Net Capacity (MW)	FOR (%)	Load Factor (%)	Availability (%)
1	320	1.0%	90.0%	91.0%	14	40	1.0%	30.5%	96.0%
2	200	3.0%	85.0%	88.0%	15	320	0.2%	27.3%	95.0%
3	100	10.0%	79.8%	90.0%	16	200	1.0%	4.2%	50.0%
4	100	1.0%	97.0%	98.0%	17	200	0.5%	5.7%	65.0%
5	100	0.2%	94.8%	95.0%	18	100	0.1%	4.6%	95.0%
6	320	0.5%	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
7	40	0.5%	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
8	20	6.0%	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
9	200	6.0%	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10	200	1.0%	64.4%	85.0%	23	200	3.0%	0.4%	98.0%
11	20	1.0%	57.3%	95.0%	24	100	0.1%	0.2%	50.0%
12	200	0.2%	52.7%	90.0%	25	20	2.0%	0.0%	80.0%
13	100	0.5%	32.0%	80.0%	26	50	0.5%	0.0%	25.0%

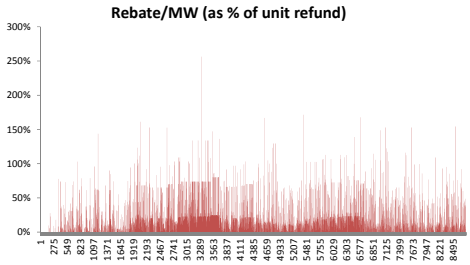
Unit 3 on Normal (10%) FO
Excess Reserve Capacity = 15%

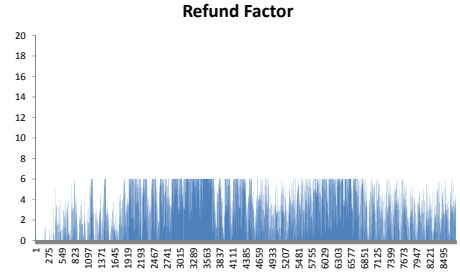
Unit 3 on Full-Year (100%) FO
Excess Reserve Capacity = 5%

Option A: IMO DR Proposal



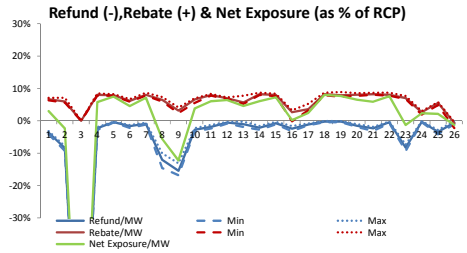


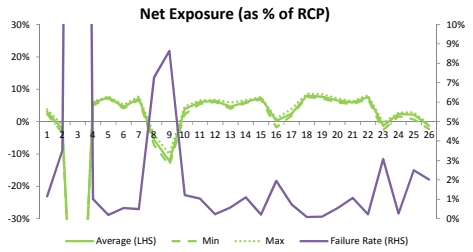


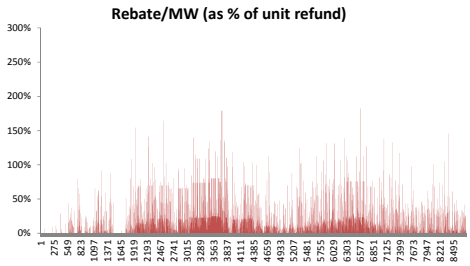


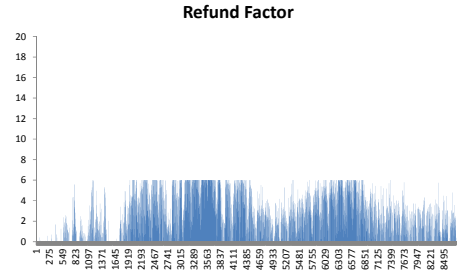
Unit 3 on Full-Year (100%) FO
Excess Reserve Capacity = 15%

Option A: IMO DR Proposal



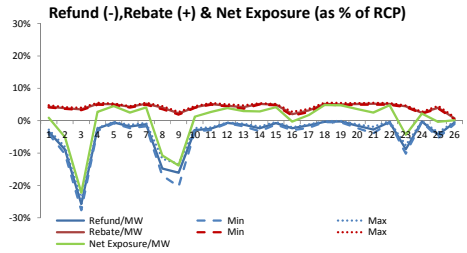


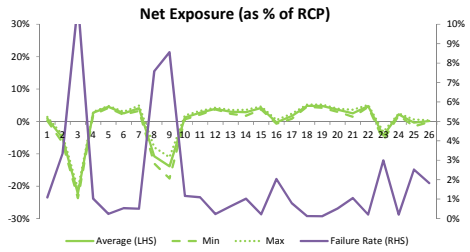


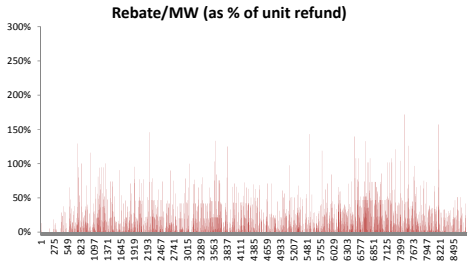


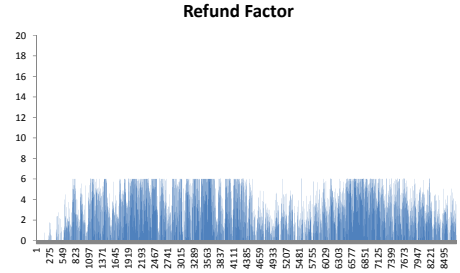
Unit 3 on Normal (10%) FO
Excess Reserve Capacity = 5%

Option A: IMO DR Proposal



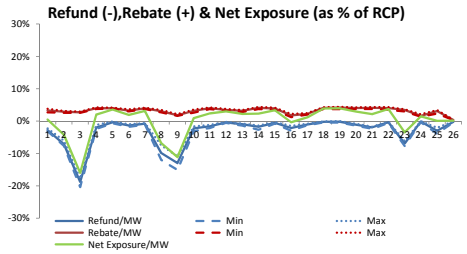


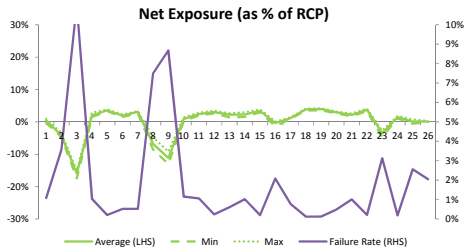


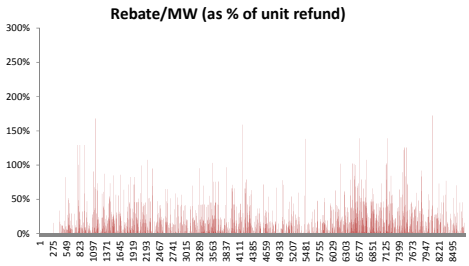


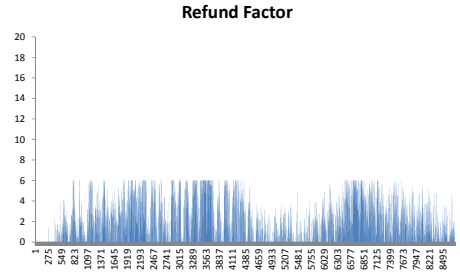
Unit 3 on Normal (10%) FO
Excess Reserve Capacity = 15%

Option A: IMO DR Proposal



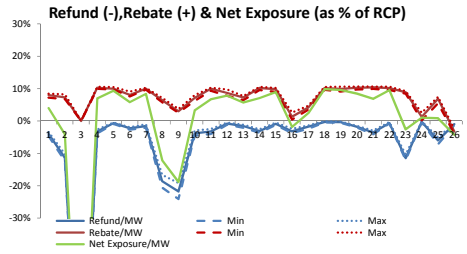


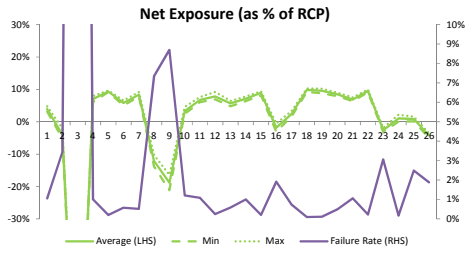


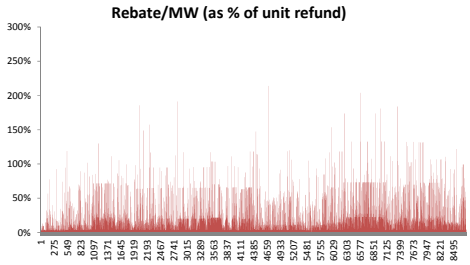


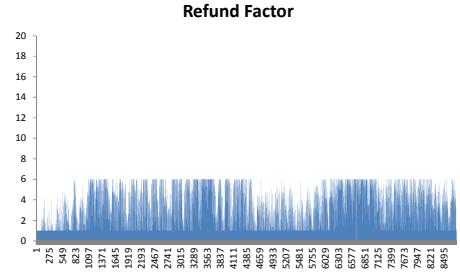
Unit 3 on Full-Year (100%) FO
Excess Reserve Capacity = 5%

Option B: IMO DR Proposal w/ Minimum Refund Factor = 1



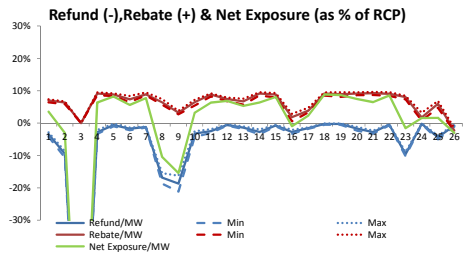


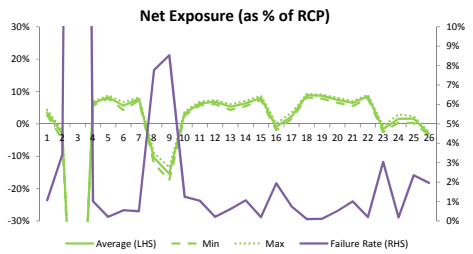


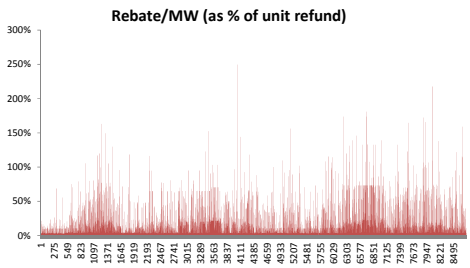


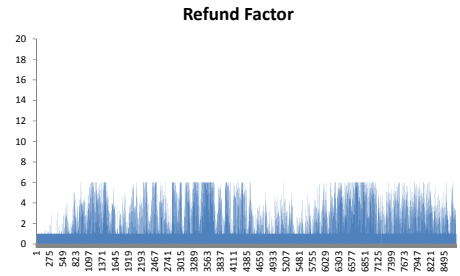
Unit 3 on Full-Year (100%) FO
Excess Reserve Capacity = 15%

Option B: IMO DR Proposal w/ Minimum Refund Factor = 1



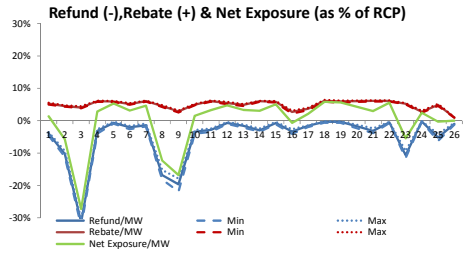


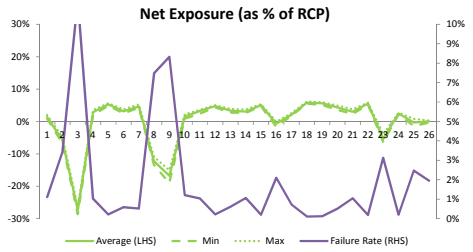


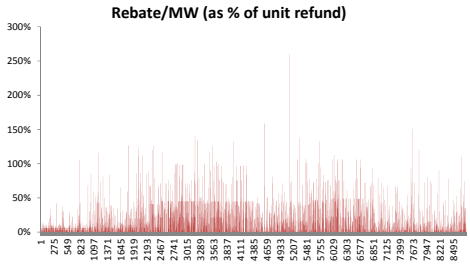


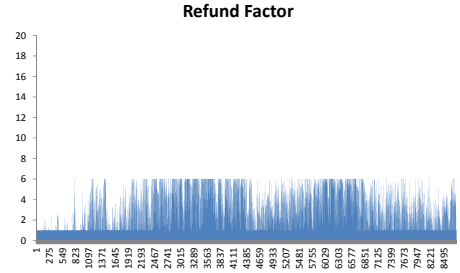
Unit 3 on Normal (10%) FO
Excess Reserve Capacity = 5%

Option B: IMO DR Proposal w/ Minimum Refund Factor = 1



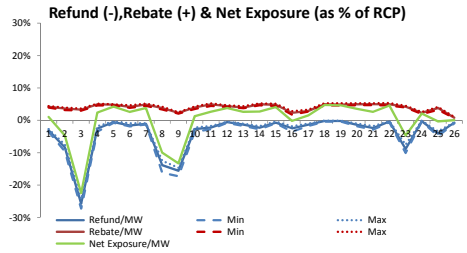


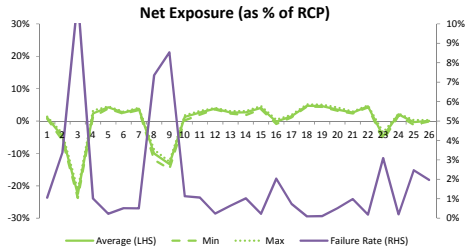


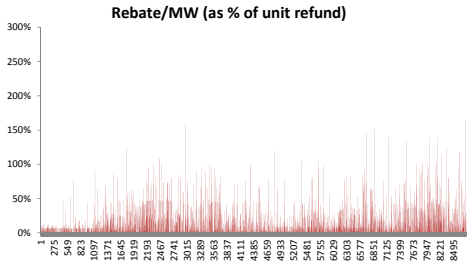


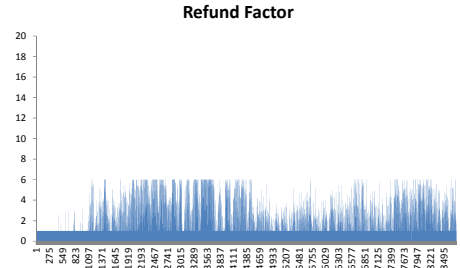
Unit 3 on Normal (10%) FO
Excess Reserve Capacity = 15%

Option B: IMO DR Proposal w/ Minimum Refund Factor = 1

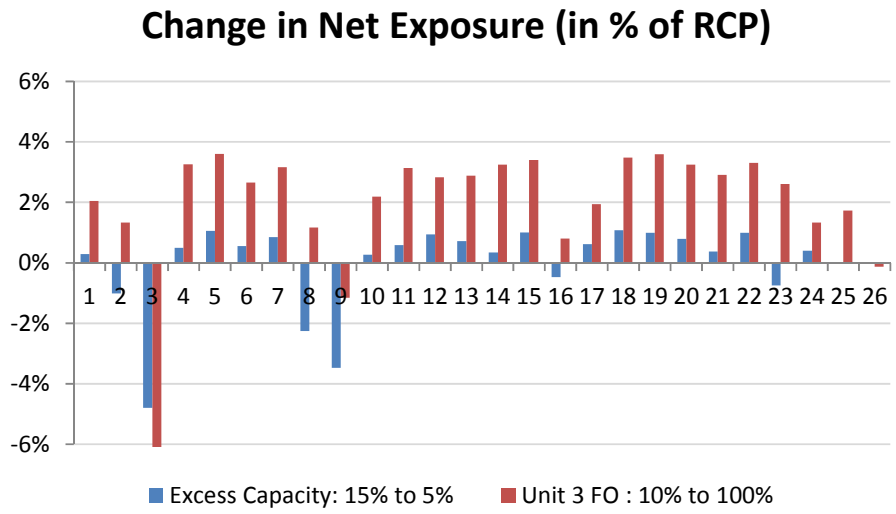








Option B: IMO DR Proposal w/ Minimum Refund Factor = 1

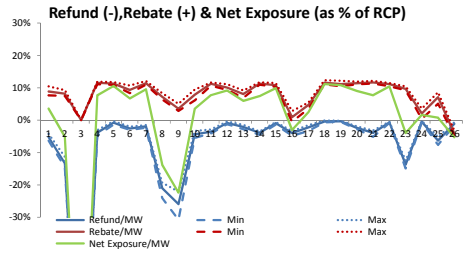


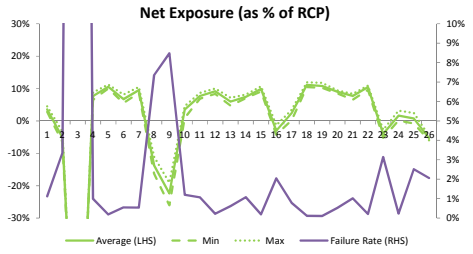
(3) Assessment of Options A and B

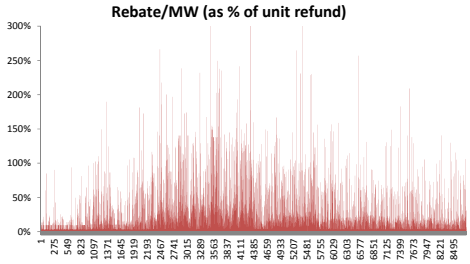
- Option B addresses the risk of incomplete value recapture under extreme situations and does not introduce material additional risk
- Option B is recommended over Option A

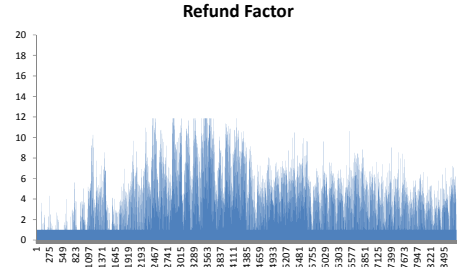
Unit 3 on Full-Year (100%) FO
Excess Reserve Capacity = 5%

Option C: MRCP-Linked Maximum Refund Factors added to Option B



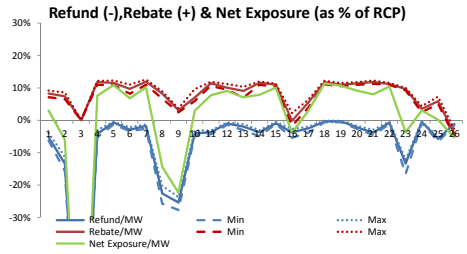


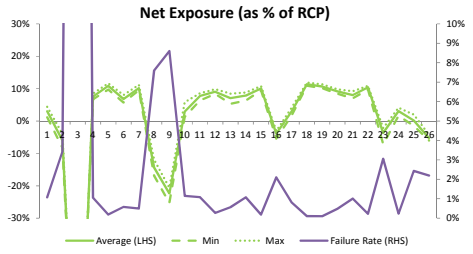


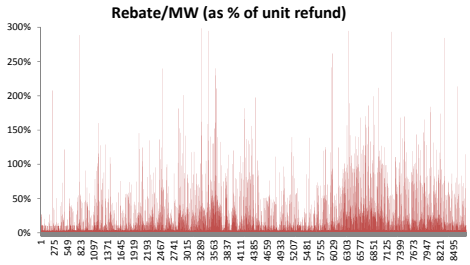


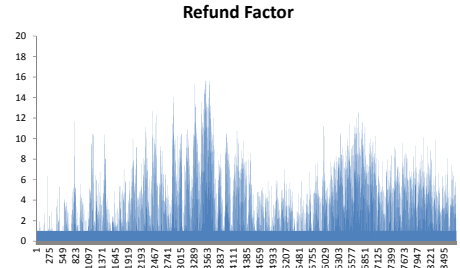
Unit 3 on Full-Year (100%) FO
Excess Reserve Capacity = 15%

Option C: MRCP-Linked Maximum Refund Factors added to Option B



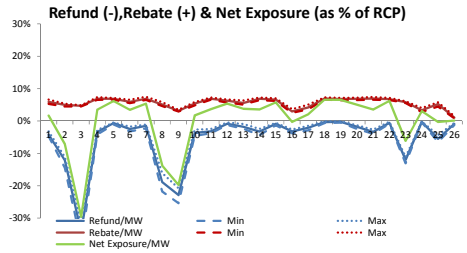


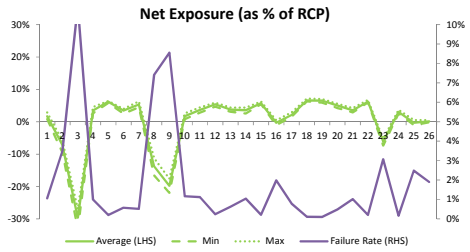


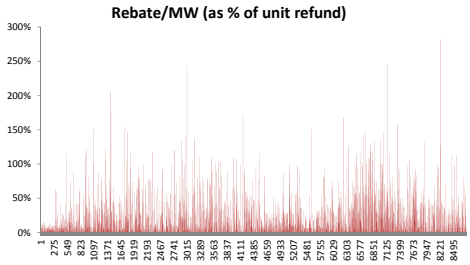


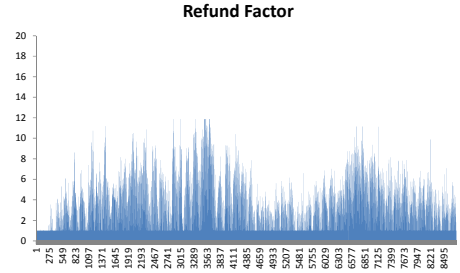
Unit 3 on Normal (10%) FO
Excess Reserve Capacity = 5%

Option C: MRCP-Linked Maximum Refund Factors added to Option B



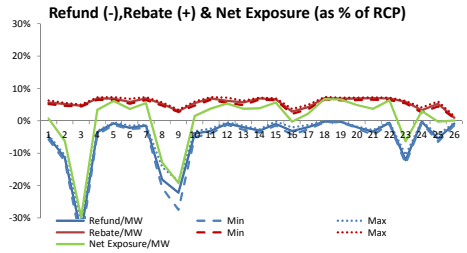


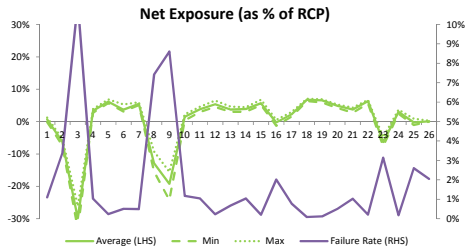


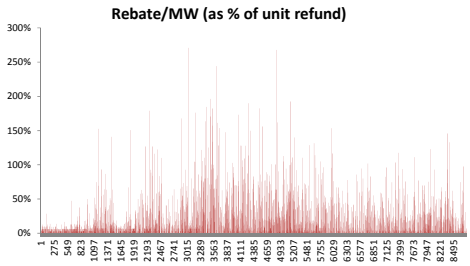


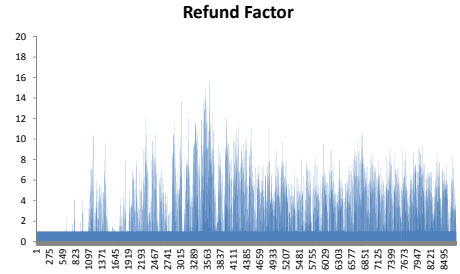
Unit 3 on Normal (10%) FO
Excess Reserve Capacity = 15%

Option C: MRCP-Linked Maximum Refund Factors added to Option B

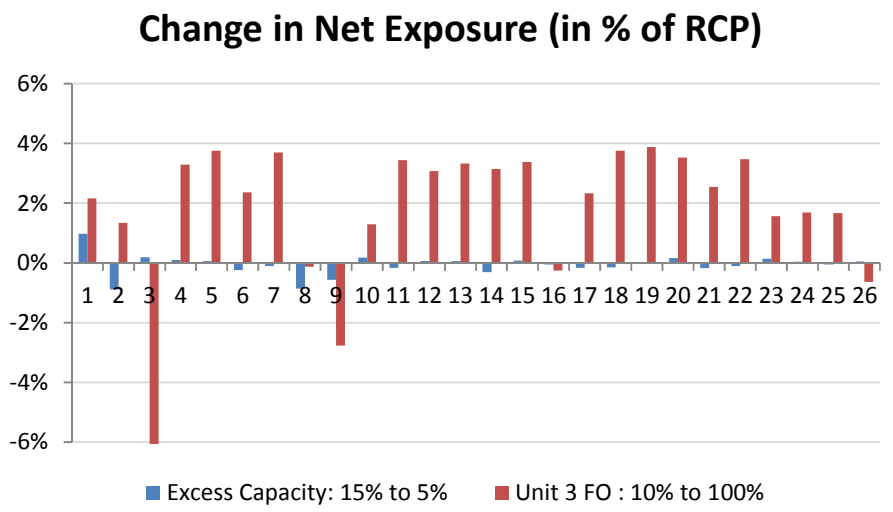








Option C: MRCP-Linked Maximum Refund Factors added to Option B



Summary across options

Option	Excess Reserve Capacity	Unit 3 FO Status	Variance in Net Refunds	Standard Deviation in Net Refund %	Max Positive Net Refund%	Min Positive Net Refund%	Average Positive Net Refund%	Average Negative Net Refund%	Max Negative Net Refund	Min Negative Net Refund	Average Net Refund (Unweighted)
IMO DR	5%	Full Year	4.4%	21.0%	8.5%	0.1%	5.6%	-21.9%	-0.2%	-100.0%	-0.7%
	5%	Normal	0.4%	6.5%	4.8%	0.1%	3.0%	-8.1%	-0.3%	-22.3%	0.0%
	15%	Full Year	4.3%	20.7%	7.7%	0.0%	4.9%	-24.1%	-1.4%	-100.0%	-0.7%
	15%	Normal	0.2%	4.8%	4.0%	0.1%	2.2%	-7.0%	-0.4%	-16.0%	0.1%
IMO DR MIN 1	5%	Full Year	4.5%	21.3%	9.2%	0.5%	5.9%	-22.9%	-0.2%	-100.0%	-0.7%
	5%	Normal	0.6%	7.8%	5.8%	0.0%	3.5%	-9.8%	-0.3%	-27.3%	-0.1%
	15%	Full Year	4.4%	21.0%	8.2%	0.6%	5.5%	-21.5%	-0.1%	-100.0%	-0.8%
	15%	Normal	0.4%	6.4%	4.7%	0.1%	2.9%	-8.0%	-0.2%	-22.5%	0.0%
RCP-Linked MIN 1	5%	Full Year	4.7%	21.7%	10.4%	0.9%	6.9%	-20.9%	-0.4%	-100.0%	-0.6%
	5%	Normal	0.8%	8.8%	6.6%	0.1%	4.1%	-11.0%	-0.3%	-29.6%	0.0%
	15%	Full Year	4.7%	21.7%	10.5%	1.4%	7.0%	-20.8%	-0.5%	-100.0%	-0.5%
	15%	Normal	0.8%	8.7%	6.7%	0.1%	4.0%	-10.7%	-0.2%	-29.8%	0.1%
Current	5%	Full Year	3.8%	19.4%	0	0	0	-5.4%	-0.1%	-100.0%	-5.4%
	5%	Normal	0.1%	3.0%	0	0	0	-2.0%	-0.1%	-12.4%	-2.0%
	15%	Full Year	3.8%	19.4%	0	0	0	-5.3%	-0.1%	-100.0%	-5.3%
	15%	Normal	0.1%	3.0%	0	0	0	-2.0%	-0.1%	-13.1%	-2.0%

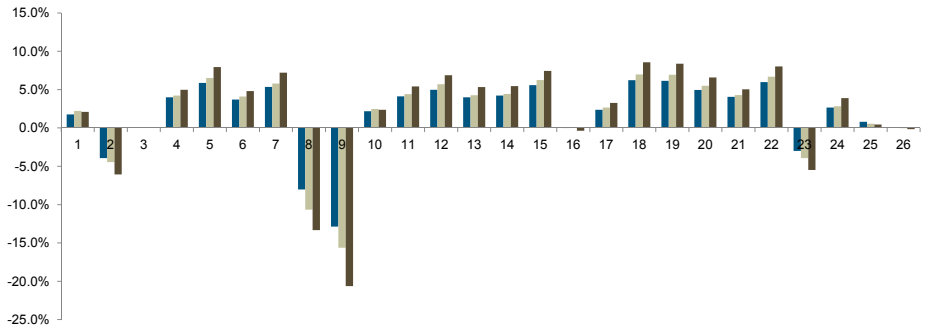
Detail summary across options and “units” (1 of 2)

Option	Excess Reserve Capacity MW	Unit 3 FO Status	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7	Unit 8	Unit 9	Unit 10	Unit 11	Unit 12	Unit 13
			320	200	100	100	100	320	40	20	200	200	20	200	100
Average FO Rate with Unit 3 on 100% FO			4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%
Average FO Rate with Unit 3 on 10% FO			1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%
	FO		1.0%	3.0%	VARIES	1.0%	0.2%	0.5%	0.5%	6.0%	6.0%	1.0%	1.0%	0.2%	0.5%
	PO		9.0%	12.0%	10.0%	2.0%	5.0%	10.0%	5.0%	20.0%	30.0%	15.0%	5.0%	10.0%	20.0%
IMO DR	5%	Full Year	2.9%	-4.0%	-100.0%	5.8%	8.2%	5.4%	7.5%	-9.2%	-15.1%	3.6%	5.9%	6.9%	5.6%
	5%	Normal	0.9%	-5.1%	-22.3%	2.7%	4.5%	2.5%	4.1%	-10.8%	-13.8%	1.2%	2.7%	3.9%	3.0%
	15%	Full Year	2.7%	-2.4%	-100.0%	5.5%	7.2%	5.0%	6.7%	-5.3%	-11.4%	2.9%	5.5%	6.1%	5.2%
	15%	Normal	0.5%	-4.2%	-16.0%	2.0%	3.6%	1.9%	3.1%	-6.8%	-11.1%	0.9%	2.4%	3.0%	2.2%
		Std Deviation	1.2%	1.1%	46.8%	1.9%	2.2%	1.8%	2.1%	2.4%	1.9%	1.3%	1.8%	1.8%	1.7%
		Average	1.8%	-3.9%	-59.6%	4.0%	5.9%	3.7%	5.3%	-8.0%	-12.9%	2.2%	4.1%	5.0%	4.0%
IMO DR MIN 1	5%	Full Year	3.4%	-4.0%	-100.0%	6.1%	8.7%	5.5%	7.8%	-11.4%	-18.0%	3.6%	6.0%	7.6%	5.6%
	5%	Normal	1.3%	-5.8%	-27.3%	2.9%	5.3%	3.1%	4.6%	-12.3%	-16.7%	1.5%	3.2%	4.8%	3.3%
	15%	Full Year	3.1%	-3.4%	-100.0%	5.6%	7.8%	5.2%	6.9%	-8.9%	-14.4%	3.5%	5.8%	6.6%	5.5%
	15%	Normal	1.1%	-4.7%	-22.5%	2.4%	4.2%	2.6%	3.8%	-10.0%	-13.3%	1.3%	2.7%	3.8%	2.6%
		Std Deviation	1.2%	1.0%	43.4%	1.9%	2.1%	1.5%	1.9%	1.5%	2.2%	1.2%	1.7%	1.7%	1.5%
		Average	2.2%	-4.5%	-62.4%	4.2%	6.5%	4.1%	5.8%	-10.7%	-15.6%	2.5%	4.4%	5.7%	4.3%
RCP-Linked MIN 1	5%	Full Year	3.2%	-5.9%	-100.0%	6.3%	9.6%	6.1%	8.9%	-13.6%	-21.5%	3.5%	6.9%	8.4%	6.8%
	5%	Normal	1.7%	-7.2%	-29.6%	3.5%	6.2%	3.5%	5.3%	-13.8%	-19.8%	1.7%	3.6%	5.4%	3.8%
	15%	Full Year	2.8%	-4.9%	-100.0%	6.7%	9.9%	6.1%	9.2%	-13.0%	-22.0%	2.8%	7.2%	8.4%	7.0%
	15%	Normal	0.7%	-6.3%	-29.8%	3.4%	6.1%	3.7%	5.5%	-12.9%	-19.2%	1.5%	3.8%	5.3%	3.7%
		Std Deviation	1.1%	0.9%	40.6%	1.8%	2.1%	1.4%	2.1%	0.4%	1.3%	0.9%	1.9%	1.8%	1.8%
		Average	2.1%	-6.1%	-64.8%	5.0%	7.9%	4.8%	7.2%	-13.3%	-20.6%	2.4%	5.4%	6.9%	5.3%
Current	5%	Full Year	-1.3%	-3.8%	-100.0%	-1.4%	-0.3%	-0.6%	-0.6%	-7.7%	-7.8%	-1.4%	-1.3%	-0.3%	-0.6%
	5%	Normal	-1.3%	-4.0%	-12.4%	-1.3%	-0.2%	-0.6%	-0.7%	-7.5%	-8.3%	-1.2%	-1.4%	-0.3%	-0.7%
	15%	Full Year	-1.2%	-3.8%	-100.0%	-1.3%	-0.2%	-0.6%	-0.6%	-8.2%	-7.2%	-1.3%	-1.4%	-0.3%	-0.7%
	15%	Normal	-1.4%	-3.8%	-13.1%	-1.3%	-0.2%	-0.7%	-0.7%	-7.6%	-7.4%	-1.3%	-1.3%	-0.3%	-0.6%
		Std Deviation	0.1%	0.1%	50.4%	0.0%	0.0%	0.0%	0.1%	0.3%	0.5%	0.1%	0.1%	0.0%	0.0%
		Average	-1.3%	-3.9%	-56.4%	-1.3%	-0.3%	-0.6%	-0.6%	-7.7%	-7.7%	-1.3%	-1.3%	-0.3%	-0.7%

Detail summary across options and “units” (2 of 2)

Option	Excess Reserve Capacity MW	Unit 3 FO Status	Unit 14	Unit 15	Unit 16	Unit 17	Unit 18	Unit 19	Unit 20	Unit 21	Unit 22	Unit 23	Unit 24	Unit 25	Unit 26
			40	320	200	200	100	40	200	100	40	200	100	20	50
Average FO Rate with Unit 3 on 100% FO			4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%
Average FO Rate with Unit 3 on 10% FO			1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%
	FO		1.0%	0.2%	1.0%	0.5%	0.1%	0.1%	0.5%	1.0%	0.2%	3.0%	0.1%	2.0%	0.5%
	PO		4.0%	5.0%	50.0%	35.0%	5.0%	10.0%	2.0%	1.0%	5.0%	2.0%	50.0%	20.0%	75.0%
IMO DR	5%	Full Year	6.0%	7.9%	0.1%	3.5%	8.5%	8.3%	6.9%	6.0%	8.1%	-2.7%	3.8%	1.6%	-0.2%
	5%	Normal	2.8%	4.2%	-0.3%	1.7%	4.8%	4.8%	3.6%	2.5%	4.7%	-4.4%	2.2%	-0.4%	0.1%
	15%	Full Year	5.7%	6.8%	0.5%	3.2%	7.7%	7.6%	6.4%	5.6%	7.4%	-1.4%	3.2%	1.8%	0.0%
	15%	Normal	2.3%	3.4%	-0.4%	1.2%	3.9%	4.0%	2.9%	2.1%	3.7%	-3.5%	1.5%	0.1%	0.1%
		Std Deviation	1.9%	2.2%	0.4%	1.1%	2.2%	2.1%	2.0%	2.0%	2.1%	1.3%	1.1%	1.1%	0.2%
		Average	4.2%	5.6%	0.0%	2.4%	6.2%	6.2%	5.0%	4.1%	6.0%	-3.0%	2.7%	0.8%	0.0%
IMO DR MIN 1	5%	Full Year	6.1%	8.4%	0.5%	3.5%	9.2%	9.2%	7.3%	6.1%	8.8%	-3.6%	3.4%	1.5%	-0.2%
	5%	Normal	3.0%	5.1%	-0.7%	2.1%	5.8%	5.6%	4.3%	3.0%	5.5%	-5.4%	2.5%	-0.3%	0.0%
	15%	Full Year	5.9%	7.5%	0.6%	3.5%	8.2%	8.2%	6.8%	5.5%	7.9%	-2.1%	3.4%	1.4%	-0.1%
	15%	Normal	2.7%	4.1%	-0.2%	1.5%	4.7%	4.6%	3.5%	2.6%	4.6%	-4.7%	2.1%	-0.3%	0.1%
		Std Deviation	1.8%	2.0%	0.6%	1.0%	2.1%	2.1%	1.8%	1.8%	2.0%	1.5%	0.7%	1.0%	0.1%
		Average	4.4%	6.2%	0.1%	2.7%	7.0%	6.9%	5.5%	4.3%	6.7%	-3.9%	2.8%	0.6%	0.0%
RCP-Linked MIN 1	5%	Full Year	7.3%	9.3%	-0.4%	4.0%	10.4%	10.0%	8.1%	6.6%	9.7%	-4.8%	4.7%	0.9%	-0.4%
	5%	Normal	3.6%	5.7%	-0.3%	2.1%	6.6%	6.5%	5.0%	3.5%	6.2%	-6.2%	3.1%	-0.3%	0.1%
	15%	Full Year	7.0%	9.0%	-0.5%	4.6%	10.5%	10.4%	8.4%	6.3%	9.8%	-4.7%	4.7%	1.4%	-0.5%
	15%	Normal	3.9%	5.7%	-0.3%	2.3%	6.7%	6.5%	4.9%	3.7%	6.3%	-6.3%	3.0%	-0.2%	0.1%
		Std Deviation	2.0%	2.0%	0.1%	1.2%	2.2%	2.1%	1.9%	1.6%	2.0%	0.9%	1.0%	0.9%	0.3%
		Average	5.5%	7.4%	-0.4%	3.3%	8.6%	8.4%	6.6%	5.0%	8.0%	-5.5%	3.9%	0.4%	-0.2%
Current	5%	Full Year	-1.3%	-0.2%	-1.4%	-0.6%	-0.1%	-0.1%	-0.6%	-1.4%	-0.3%	-4.0%	-0.2%	-2.0%	-0.6%
	5%	Normal	-1.2%	-0.2%	-1.3%	-0.6%	-0.1%	-0.1%	-0.6%	-1.3%	-0.2%	-3.7%	-0.2%	-2.1%	-0.6%
	15%	Full Year	-1.4%	-0.3%	-1.1%	-0.7%	-0.1%	-0.1%	-0.6%	-1.2%	-0.3%	-3.9%	-0.2%	-2.0%	-0.5%
	15%	Normal	-1.3%	-0.2%	-1.4%	-0.5%	-0.1%	-0.1%	-0.7%	-1.3%	-0.3%	-4.0%	-0.2%	-2.0%	-0.6%
		Std Deviation	0.1%	0.0%	0.1%	0.1%	0.0%	0.0%	0.0%	0.1%	0.0%	0.1%	0.0%	0.1%	0.1%
		Average	-1.3%	-0.2%	-1.3%	-0.6%	-0.1%	-0.1%	-0.6%	-1.3%	-0.3%	-3.9%	-0.2%	-2.0%	-0.6%

Net Refund Summary



	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7	Unit 8	Unit 9	Unit 10	Unit 11	Unit 12	Unit 13	Unit 14	Unit 15	Unit 16	Unit 17	Unit 18	Unit 19	Unit 20	Unit 21	Unit 22	Unit 23	Unit 24	Unit 25	Unit 26
MW	320	200	100	100	100	320	40	20	200	200	20	200	100	40	320	200	200	100	40	200	100	40	200	100	20	50
FO	1.0%	3.0%	**VARIES**	1.0%	0.2%	0.5%	0.5%	6.0%	6.0%	1.0%	1.0%	0.2%	0.5%	1.0%	0.2%	1.0%	0.5%	0.1%	0.1%	0.5%	1.0%	0.2%	3.0%	0.1%	2.0%	0.5%
PO	9.0%	12.0%	10.0%	2.0%	5.0%	10.0%	5.0%	20.0%	30.0%	15.0%	5.0%	10.0%	20.0%	4.0%	5.0%	50.0%	35.0%	5.0%	10.0%	2.0%	1.0%	5.0%	2.0%	50.0%	20.0%	75.0%

(3) Assessment of Options B and C

- Option C virtually eliminates risk associated with net refund levels as a function of excess reserve capacity
- Option C is slightly more “sharp” with respect to incentives for performance
- Option C is recommended over Option B

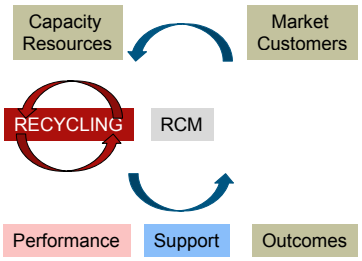
Recommendation: Option C (MRCP-linked Maximum Refund Factors)

(4) Value transfer adjustment to keep Market Customers whole

In the capacity year 2010/11:

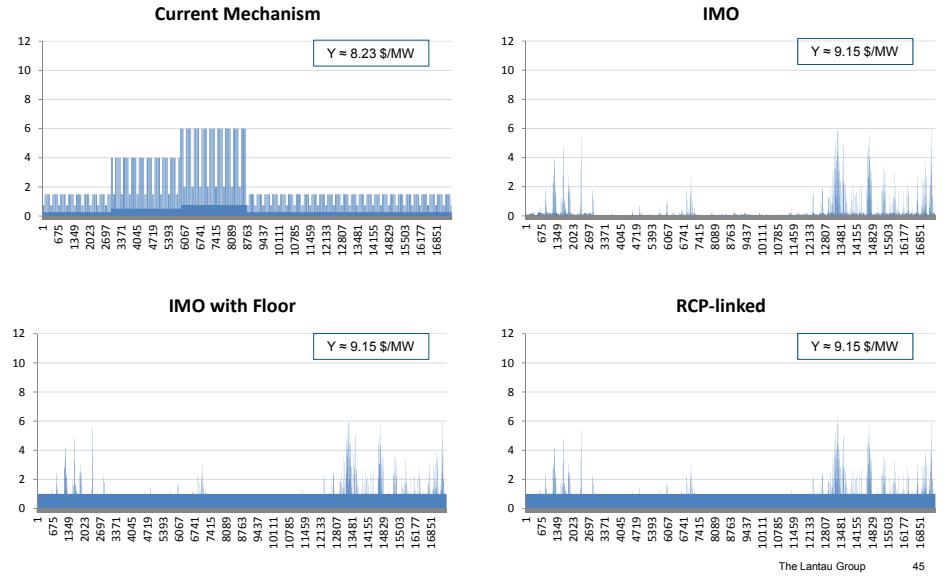
		Rebate (k$)	Proportion
STMRFINT	Participant 30 Min Interval Net STEM Refund	716	3.7%
ILCREF	Intermittent Load Capacity Refund Amount	322	1.7%
FRCDRF_FO	Facility Reserve Capacity Deficit Refund for Forced Outage	0	0.0%
FRCDRF_NGC	New Generation System Test Refund for 30 Minute Interval	0	0.0%
FFORFINT	Facility Forced Outage Refund for 30 Minute Interval	18153	94.6%
Total		19191	100.0%

FFORFINT Refund as Capacity Payment (at MRCP)	2.42%
FFORFINT Refund as Capacity Payment (at RCP)	2.91%



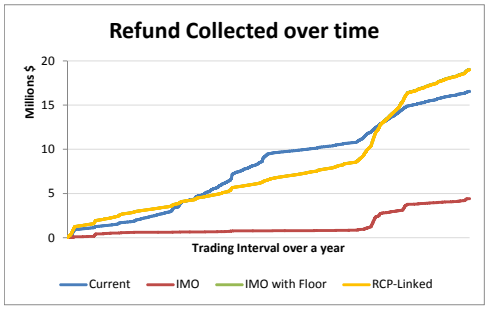
- Proposal
  - Adjust RCP through slope and offset parameters to ensure Market Customers are at least as well off overall from combination of all RCM changes including refund regime

Refund Factor and Unit Refund (Y) over Capacity Year 2010/11

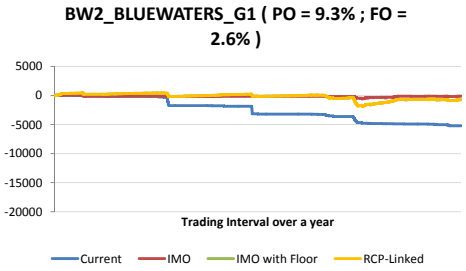


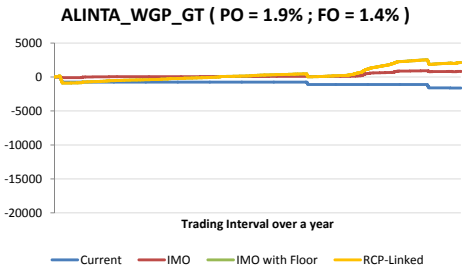
Cumulative Refund

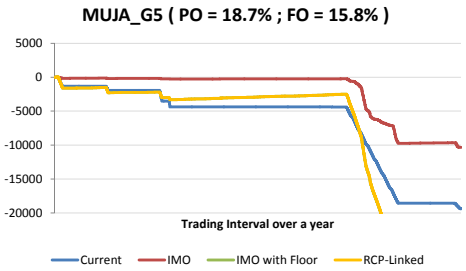
- For the current mechanism, refund collected will be distributed to market customers according to their IRCR.
- Under the new proposals (IMO, IMO with Floor and RCP-Linked), all the refund collected will be recycled and distributed to facilities that are available.

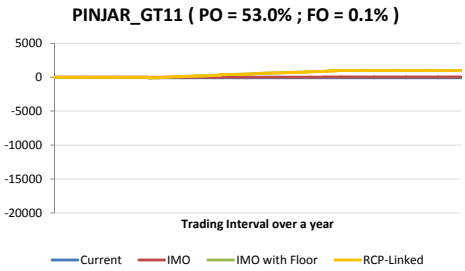


Net Exposure of Facilities (per MW) under different proposals









Note: System average PO and FO rates are 15.4% and 2.0% respectively

Evaluation Criteria: WEM Market Objectives

- Promote the economically efficient, safe and reliable production and supply of electricity and electricity related services in the South West interconnected system;
- Encourage competition among generators and retailers in the South West interconnected system, including by facilitating efficient entry of new competitors;
- Avoid discrimination in that market against particular energy options and technologies, including sustainable energy options and technologies such as those that make use of renewable resources or that reduce overall greenhouse gas emissions;
- Minimise the long-term cost of electricity supplied to customers from the South West interconnected system; and
- Encourage the taking of measures to manage the amount of electricity used and when it is used.

Overall Recommendation

	Efficiency	Competition	Discrimination	Cost	Usage
	1	2	3	4	5
• Dynamic refund factors reflective of system conditions – Minimum refund factor to tie refund exposure to capacity credit value – Maximum refund factor linked to MRCP	Y	O	Y	O	O
• Recycling for efficiency and reduced risk of unintended consequences / distortions – Rebates of refund revenue based on availability • Revenue loss to Market Customers offset by adjustments to RCM proposal – Offset RCR using 97 percent factor – Slope steepened to -3.75 from -3.25	Y	Y	Y	O	O

Y = promote
O = neutral
X = conflict

- Other
  - Contractual disposition of refunds not affected / rebates can still go to party exposed to refund
  - Eligibility for rebate corresponds to exposure to refund risk