THE LANTAU GROUP
strategy & economic consulting

RCM Refunds Regime

The refunds regime works in conjunction with the RCM

- Refunds are paid by capacity sources when they do not perform

- The basis for payment can be interpreted many ways
  - As a failure to meet a contractual performance obligation (time value invariant)
  - As a failure to deliver value paid for (time-value sensitive)
  - As a way to incentivise specific desirable behaviours (maintenance, availability)

- The key question, though, is how can the refunds regime deliver the most value
  - Incentivising availability and readiness
  - Enhancing the credibility of the RCM by promoting performance worthy of a capacity credit
  - Aligning refund risk with value created

- In this presentation, we present a proposal to better align the Refunds Regime (RR) with the RCM

The exposure to refund risk should operate in two dimensions

- With respect to the amount of excess reserve capacity that is available at any point in time
- With respect to the performance of capacity that is expected to be available at any point in time
- Incorporating both market conditions and unit performance into the refund regime maximises the value received for the price paid for a capacity credit

Value based on market conditions

Capacity: Reliable **Market: Shortage**	**Capacity: Unreliable** **Market: Shortage**
Capacity: Reliable **Market: Surplus**	**Capacity: Unreliable** **Market: Surplus**

Value based on capacity performance

The market value of refund exposure is linked to the amount of excess reserve capacity available at any point in time

- The IMO's dynamic refund factor proposal attempts to capture these impacts.

- The factors are muted somewhat relative to a pure economic value consideration, but the general concept and application is reasonable

Refund exposure = f (amount of excess reserve capacity)

- Unless otherwise indicated, recommend continuing with the dynamic refund factors as previously analysed and proposed by the IMO
  - Note that the dynamic refund factors will have a different impact each year depending on the overall amount of supply and demand and the specific amount that is available in a given interval

The other leg of the refund regime is to ensure that capacity performance is adequately incentivised

- Refund exposure should
  - Align with performance versus expectation
  - Underlying dispatch costs should not affect refund exposure – two units with similar reliability levels should face similar refund “risk” if they are equally unreliable during relevant periods

- Refund exposure should not
  - Distort investment incentives
  - Create arbitrary risks that do not align broadly with value

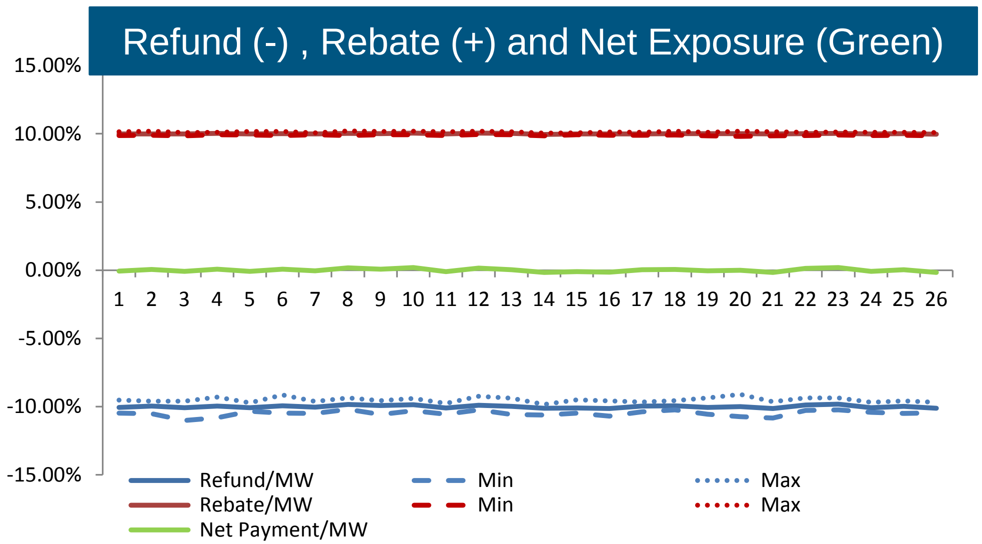
As proposed last month, the simplest way to align both legs of the refunds regime is to combine a refund regime with a rebate regime

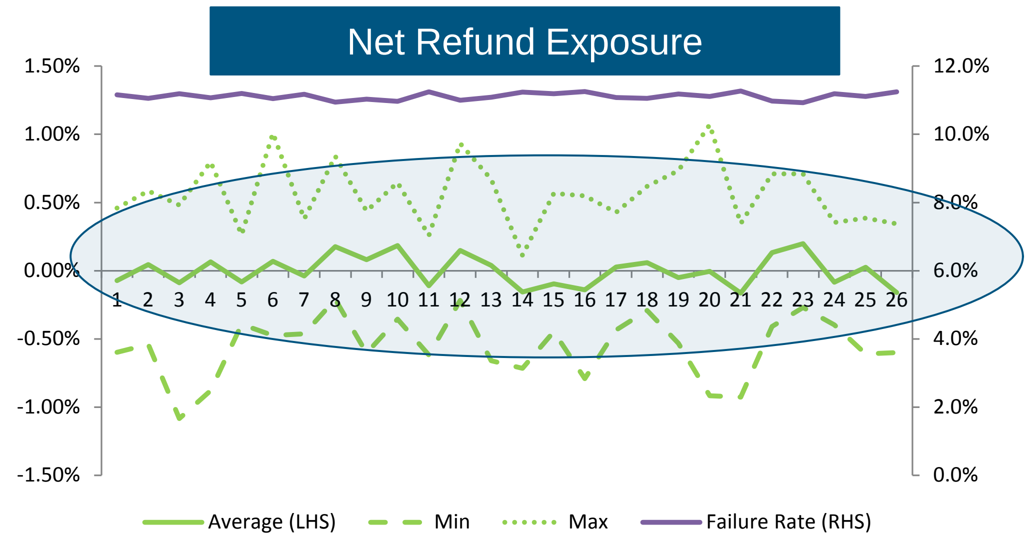
- Refund exposure increases to the extent that availability increases. Two facilities with equal reliability performance expectations (FOR), should face equivalent refund exposure
  - The problem is that dispatch can influence refunds through the sometimes messy relationship between dispatch and FOR
  - Two equally available units, one with low dispatch costs and one with high dispatch costs can have very different refund exposure if their FOR correlate with dispatch
  - This risk can be mitigated through a rebate mechanism
    Similarly, a rebate mechanism can
  - Incentivise reduction in planned outages (as planned outages can reduce opportunity for rebate)
  - Sharpen incentives for managing capacity during peak periods – the decision to move from FOR to discretionary maintenance can take into account both refund and rebate exposure
- Capacity that performs less reliably pays more refund and loses more rebates – strengthening the incentive
- Aligns with longer term improvement of reliability and efficiency by reducing risk of refunds correlated with dispatch and rewarding better-than-average reliability at the expense of worse-than-average reliability

Observations

- If capacity is less reliable, it pays relatively more
- If a year has more excess, capacity credits have lower value, so refunds are less (but so are rebates)
- If a year has less excess, capacity credits are more valuable, refunds are more penalising and rebates are more valuable
- DSM earns rebates for availability, pays refunds for non-performance
- Non performing (delayed) facilities lose refunds up to 100% of the value of capacity credits over the year if they do not operate at all
- Planned maintenance windows are accommodated by making a substantial portion of the load duration curve “refund free” (refund factor = zero)
- Maximum refund factor aligns with most valuable periods
- Rebate regime eliminates noise and impacts solely related to utilisation differences
- Rebate regime incentivises return from planned and unplanned outages

Identical units with uniform refund factor : no net payment exposure



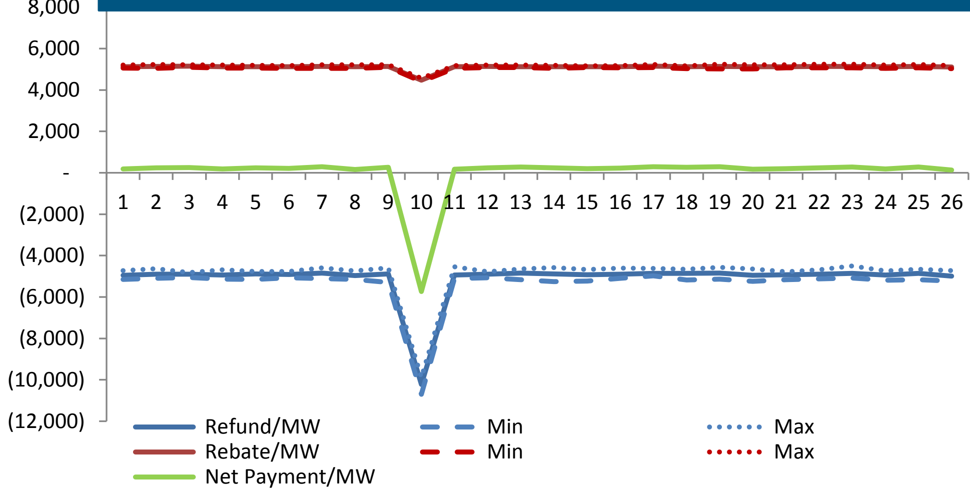


% of hours	Refund Factor
100%	1
72%	1
65%	1
47%	1
17%	1
14%	1
7%	1
1%	1
0%	1

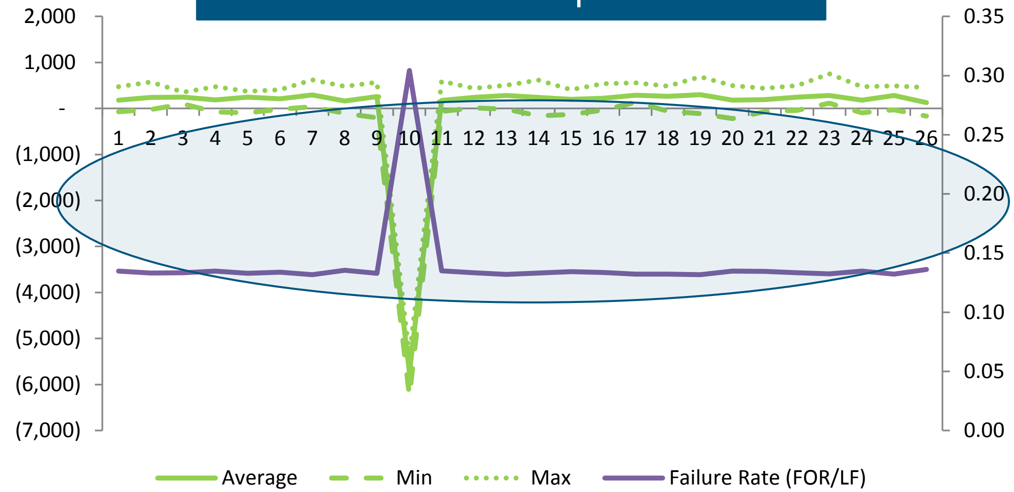
Plant No.	Net Capacity (MW)	FOR (%)	Availability	Load Factor (%)	Plant No.	Net Capacity (MW)	FOR (%)	Availability	Load Factor (%)	Plant No.	Net Capacity (MW)	FOR (%)	Availability	Load Factor (%)
1	200	10.0%	96.0%	80.0%	10	200	10.0%	96.0%	80.0%	19	200	10.0%	96.0%	80.0%
2	200	10.0%	96.0%	80.0%	11	200	10.0%	96.0%	80.0%	20	200	10.0%	96.0%	80.0%
3	200	10.0%	96.0%	80.0%	12	200	10.0%	96.0%	80.0%	21	200	10.0%	96.0%	80.0%
4	200	10.0%	96.0%	80.0%	13	200	10.0%	96.0%	80.0%	22	200	10.0%	96.0%	80.0%
5	200	10.0%	96.0%	80.0%	14	200	10.0%	96.0%	80.0%	23	200	10.0%	96.0%	80.0%
6	200	10.0%	96.0%	80.0%	15	200	10.0%	96.0%	80.0%	24	200	10.0%	96.0%	80.0%
7	200	10.0%	96.0%	80.0%	16	200	10.0%	96.0%	80.0%	25	200	10.0%	96.0%	80.0%
8	200	10.0%	96.0%	80.0%	17	200	10.0%	96.0%	80.0%	26	200	10.0%	96.0%	80.0%
9	200	10.0%	96.0%	80.0%	18	200	10.0%	96.0%	80.0%	27				

Higher FOR → Higher exposure

Refund (-) , Rebate (+) and Net Exposure (Green)



Net Refund Exposure

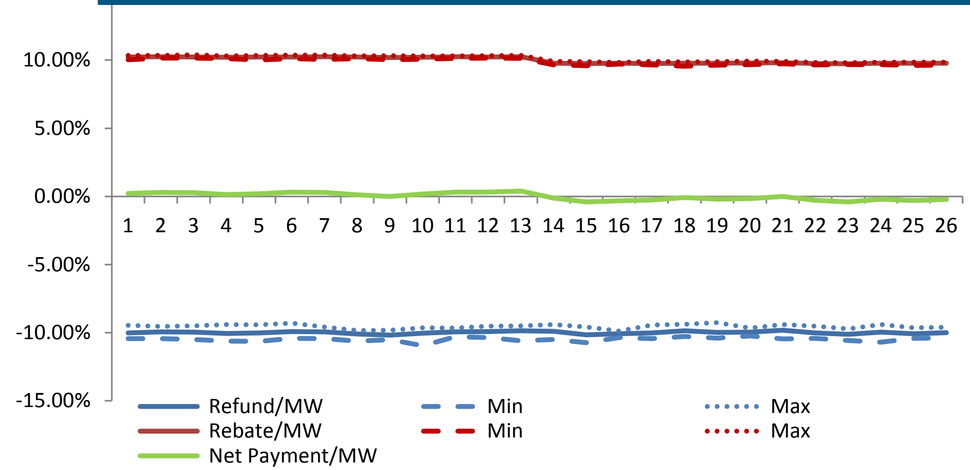


Plant No.	Net Capacity (MW)	FOR (%)	Load Factor (%)	Plant No.	Net Capacity (MW)	FOR (%)	Load Factor (%)	Plant No.	Net Capacity (MW)	FOR (%)	Load Factor (%)
1	200	10.0%	85.0%	10	200	20.0%	85.0%	19	200	10.0%	85.0%
2	200	10.0%	85.0%	11	200	10.0%	85.0%	20	200	10.0%	85.0%
3	200	10.0%	85.0%	12	200	10.0%	85.0%	21	200	10.0%	85.0%
4	200	10.0%	85.0%	13	200	10.0%	85.0%	22	200	10.0%	85.0%
5	200	10.0%	85.0%	14	200	10.0%	85.0%	23	200	10.0%	85.0%
6	200	10.0%	85.0%	15	200	10.0%	85.0%	24	200	10.0%	85.0%
7	200	10.0%	85.0%	16	200	10.0%	85.0%	25	200	10.0%	85.0%
8	200	10.0%	85.0%	17	200	10.0%	85.0%	26	200	10.0%	85.0%
9	200	10.0%	85.0%	18	200	10.0%	85.0%	27			

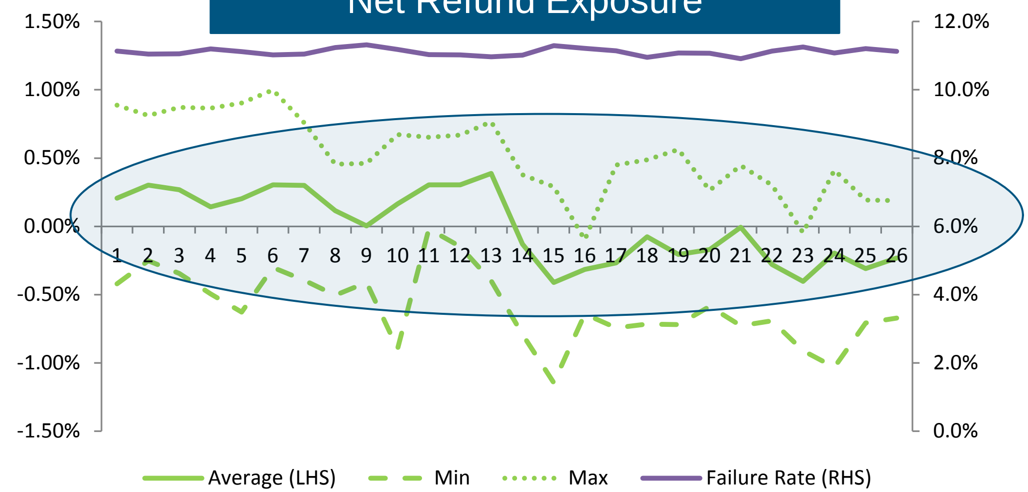
APPLY HRS	% of hours	Refund Factor
8760	100%	1
6320	72%	1
5700	65%	1
4134	47%	1
1446	17%	1
1210	14%	1
590	7%	1
87.6	1%	1
0	0%	1

Lower availability, lower rebates → Exposure

Refund (-) , Rebate (+) and Net Exposure (Green)



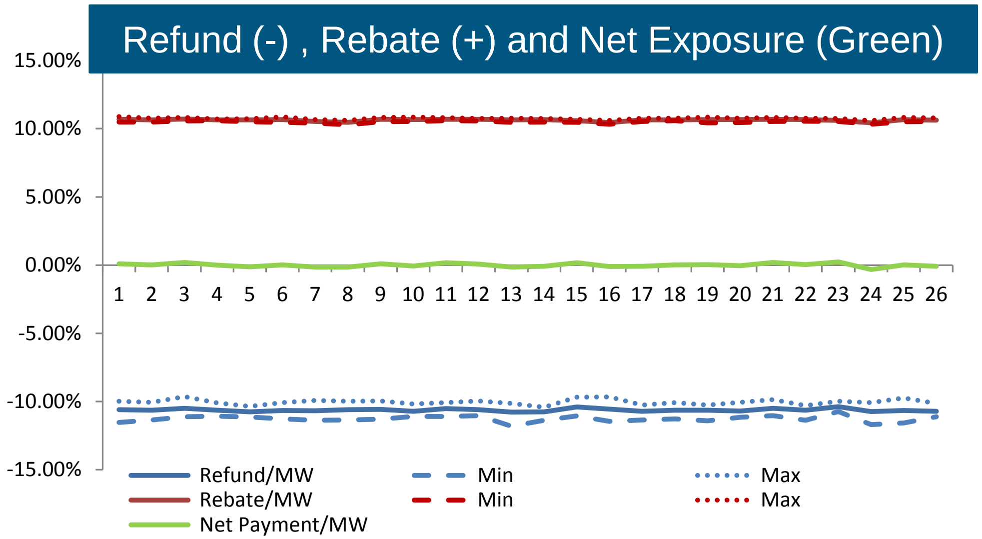
Net Refund Exposure

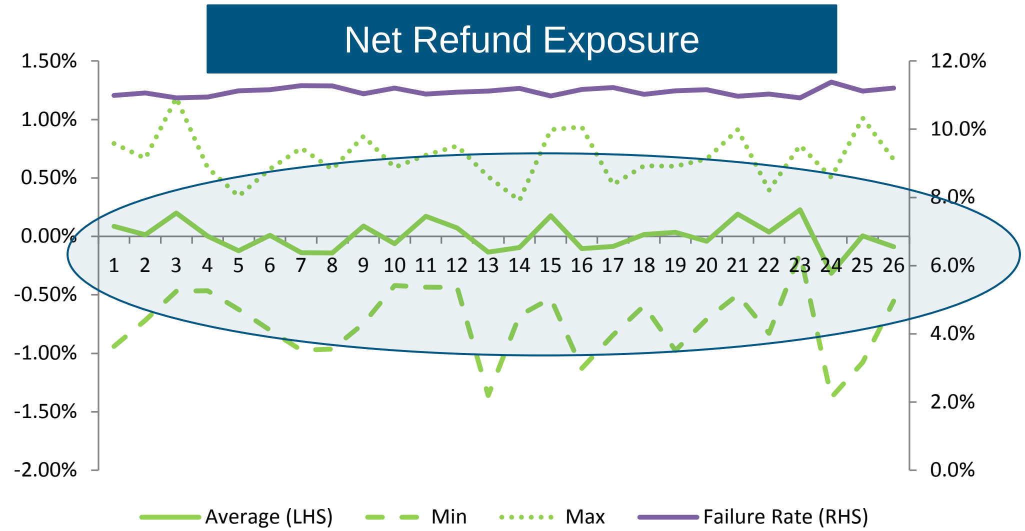


% of hours	Refund Factor
100%	1
72%	1
65%	1
47%	1
17%	1
14%	1
7%	1
1%	1
0%	1

Plant No.	Net Capacity (MW)	FOR (%)	Availability	Load Factor (%)	Plant No.	Net Capacity (MW)	FOR (%)	Availability	Load Factor (%)	Plant No.	Net Capacity (MW)	FOR (%)	Availability	Load Factor (%)
1	200	10.0%	96.0%	80.0%	10	200	10.0%	96.0%	80.0%	19	200	10.0%	92.0%	80.0%
2	200	10.0%	96.0%	80.0%	11	200	10.0%	96.0%	80.0%	20	200	10.0%	92.0%	80.0%
3	200	10.0%	96.0%	80.0%	12	200	10.0%	96.0%	80.0%	21	200	10.0%	92.0%	80.0%
4	200	10.0%	96.0%	80.0%	13	200	10.0%	96.0%	80.0%	22	200	10.0%	92.0%	80.0%
5	200	10.0%	96.0%	80.0%	14	200	10.0%	92.0%	80.0%	23	200	10.0%	92.0%	80.0%
6	200	10.0%	96.0%	80.0%	15	200	10.0%	92.0%	80.0%	24	200	10.0%	92.0%	80.0%
7	200	10.0%	96.0%	80.0%	16	200	10.0%	92.0%	80.0%	25	200	10.0%	92.0%	80.0%
8	200	10.0%	96.0%	80.0%	17	200	10.0%	92.0%	80.0%	26	200	10.0%	92.0%	80.0%
9	200	10.0%	96.0%	80.0%	18	200	10.0%	92.0%	80.0%	27				

Dynamic refund factor has no "average overall" impact if units are all identical: The real value is incentivising focus on high value periods



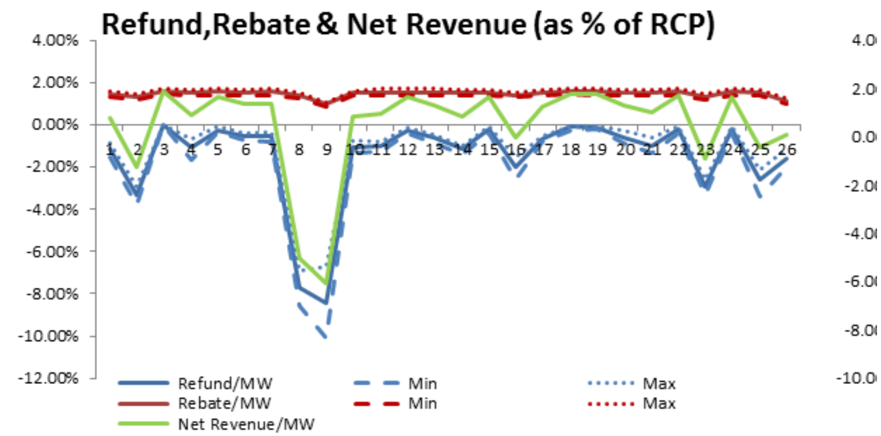


% of hours	Refund Factor
100%	1
72%	2
65%	3
47%	4
17%	5
14%	6
7%	7
1%	8
0%	9

Plant No.	Net Capacity (MW)	FOR (%)	Availability	Load Factor (%)	Plant No.	Net Capacity (MW)	FOR (%)	Availability	Load Factor (%)	Plant No.	Net Capacity (MW)	FOR (%)	Availability	Load Factor (%)
1	200	10.0%	96.0%	80.0%	10	200	10.0%	96.0%	80.0%	19	200	10.0%	96.0%	80.0%
2	200	10.0%	96.0%	80.0%	11	200	10.0%	96.0%	80.0%	20	200	10.0%	96.0%	80.0%
3	200	10.0%	96.0%	80.0%	12	200	10.0%	96.0%	80.0%	21	200	10.0%	96.0%	80.0%
4	200	10.0%	96.0%	80.0%	13	200	10.0%	96.0%	80.0%	22	200	10.0%	96.0%	80.0%
5	200	10.0%	96.0%	80.0%	14	200	10.0%	96.0%	80.0%	23	200	10.0%	96.0%	80.0%
6	200	10.0%	96.0%	80.0%	15	200	10.0%	96.0%	80.0%	24	200	10.0%	96.0%	80.0%
7	200	10.0%	96.0%	80.0%	16	200	10.0%	96.0%	80.0%	25	200	10.0%	96.0%	80.0%
8	200	10.0%	96.0%	80.0%	17	200	10.0%	96.0%	80.0%	26	200	10.0%	96.0%	80.0%
9	200	10.0%	96.0%	80.0%	18	200	10.0%	96.0%	80.0%	27				

Simulated refunds and rebates

% of hours	Refund Factor	APPLY HRS	HRs in interval
100%		8760	2440
72%		6320	620
65%		5700	1566
47%	1	4134	2688
17%	2	1446	236
14%	3	1210	620
7%	5	590	502.4
1%	6	87.6	87.6
0%	NA	0	0



Input	
Output	

	Switch	
Eligible Capacity for Rebate	0	0=ava; 1=dispatch
Distribute Unallocated refund	1	0 = not dis; 1 = dis
FOR correlated to LF	0	0 = not corr; 1 = corr

Run

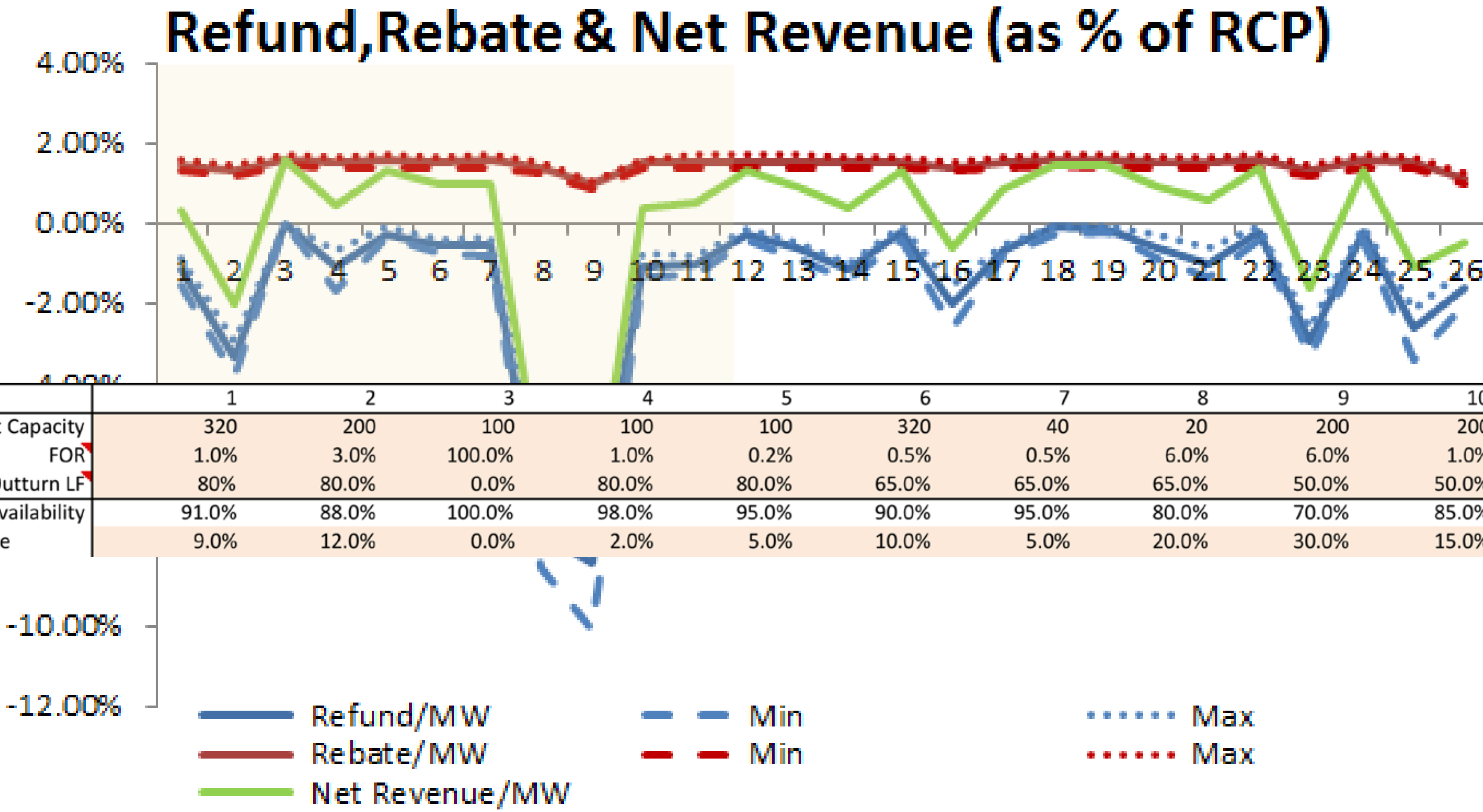
RCP (AUS/MW/yr)	50000
Peak (% of time)	58%
Peak (No. of hours)	5110
Unit Refund (AUS$/M	6.21

Baseload | Input capacity with reducing load factor

Plant No.	1	2	3	4	5	6	7	8	9	10	11
Net Capacity	320	200	100	100	100	320	40	20	200	200	20
FOR	1.0%	3.0%	0.0%	1.0%	0.2%	0.5%	0.5%	6.0%	6.0%	1.0%	1.0%
Outturn LF	80%	80.0%	0.0%	80.0%	80.0%	65.0%	65.0%	65.0%	50.0%	50.0%	50.0%
Availability	91.0%	88.0%	100.0%	98.0%	95.0%	90.0%	95.0%	80.0%	70.0%	85.0%	95.0%
Planned Outage	9.0%	12.0%	0.0%	2.0%	5.0%	10.0%	5.0%	20.0%	30.0%	15.0%	5.0%
Planned Outage Start	91.0%	79.0%	79.0%	77.0%	72.0%	62.0%	95.0%	75.0%	70.0%	85.0%	80.0%
Planned Outage End	100.0%	91.0%	79.0%	79.0%	77.0%	72.0%	100.0%	95.0%	100.0%	100.0%	85.0%

nark :
R + LF + Planned Outage <= 100%
tage start time >58.3% - only in off-peak
outturn LF to 0 if don't consider LF

Scenarios: a range of different configurations of utilisation, FOR and planned outages



Plant No.	1	2	3	4	5	6	7	8	9	10	11
Net Capacity	320	200	100	100	100	320	40	20	200	200	20
FOR	1.0%	3.0%	100.0%	1.0%	0.2%	0.5%	0.5%	6.0%	6.0%	1.0%	1.0%
Outturn LF	80%	80.0%	0.0%	80.0%	80.0%	65.0%	65.0%	65.0%	50.0%	50.0%	50.0%
Availability	91.0%	88.0%	100.0%	98.0%	95.0%	90.0%	95.0%	80.0%	70.0%	85.0%	95.0%
Planned Outage	9.0%	12.0%	0.0%	2.0%	5.0%	10.0%	5.0%	20.0%	30.0%	15.0%	5.0%

Proposal

- Preserve the dynamic refund factor scheme concept, but note that
  - Currently refund relates to “factor * trading interval refund allocation”, but summation over the year may not recover full refund in the event of non performance
  - It would be better if a capacity that did not perform at all over a year received no residual capacity credit value.
- Pay rebates based on availability
  - If a resource is neither on planned or forced outage, it will receive a rebate. Naturally the rebate will be larger if market conditions justify the “6” refund factor
- Recycle 100% of refunds – no net value change
  - Pure efficiency incentive
- As no net value change, and assuming no security risks, may not need any further adjustment, though it would be possible to incorporate a waning adjustment to the “RCP formula perhaps for a transition if necessary for fairness

End

% of hours	Refund Factor	APPLY HRS	HRs in interval
100%		8760	2440
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65%		5700	1566
47%	0	4134	2688
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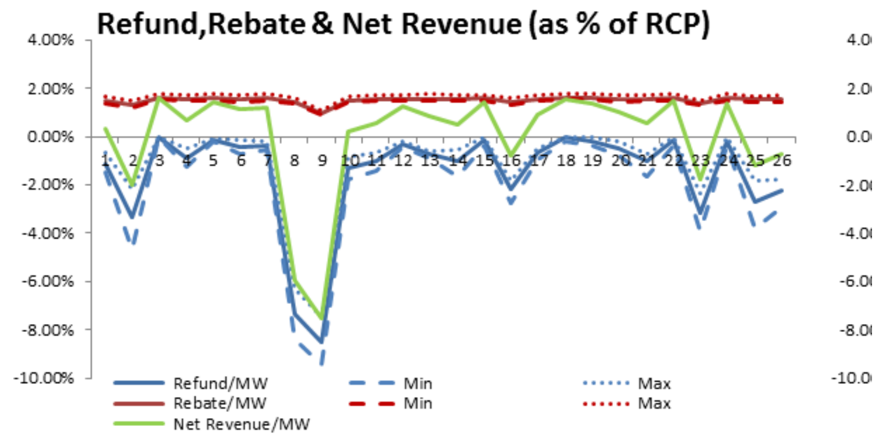
1%	4	87.6	87.6
0%	NA	0	0



Input

Output

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Outturn LF	80%	80.0%	0.0%	80.0%	80.0%	65.0%	65.0%	65.0%	50.0%	50.0%	50.0%
Availability	91.0%	88.0%	100.0%	98.0%	95.0%	90.0%	95.0%	80.0%	70.0%	85.0%	95.0%
Planned Outage	9.0%	12.0%	0.0%	2.0%	5.0%	10.0%	5.0%	20.0%	30.0%	15.0%	5.0%
Planned Outage Start	91.0%	79.0%	79.0%	77.0%	72.0%	62.0%	95.0%	75.0%	70.0%	85.0%	80.0%
Planned Outage End	100.0%	91.0%	79.0%	79.0%	77.0%	72.0%	100.0%	95.0%	100.0%	100.0%	85.0%
	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE

nark :

R + LF + Planned Outage <= 100%

tage start time >58.3% - only in off-peak

outturn LF to 0 if don't consider LF

A view of all the pieces

RISK OF SHORTAGE

The MRCP sets the basis for the *unconstrained capacity resource benchmark cost*

In theory an upper bound, but actual upper bound costs depends on factors that are uncertain and so is estimated as an expected value

Markets generally have to allow for some head-room above the expected value to ensure alignment between spot and contracting incentives

RETAILERS

Retailers generally are exposed to some risk of higher costs due to the fact that short-term options tend to be more costly than long-term options. Failure to take prudent steps to assure sufficient long-term options can expose retailers to risk

As there are options that are more expensive in the short-term than the “target” benchmark, most markets expose retailers to risk of higher cost

CONTRACTING

Contracting is neither good nor bad; it is about managing risk

Identify the risk and determine if contracting is a solution to it

Contracting helps parties manage uncertainty

But to work as a risk management instrument, both sides must face some uncertainty for which the contract is a suitable instrument to manage.

A view of all the pieces (capacity)

RISK OF SURPLUS

Supply and demand conditions determine the value of "spot" capacity

If there is excess capacity, the value of uncontracted capacity credits should reflect market conditions

Or, at minimum, signal clearly that new investment should not be required unless it can compete with the SRMC of existing capacity

GENERATORS

When there is excess then, the value of capacity is supposed to fall.

Uncontracted generators become exposed to falling "spot" capacity prices

New investors re-think their investment decisions – delay or cancel

In principle maximum exposure is nearly "zero" when the excess is so large – at least when calculated in economic terms

ENERGY MARKET

The RCM needs to ensure that the mix of capacity that is incentivised by the market contribute to lowering the cost of electricity over time through both the capacity and energy components.

TESTING

Capacity needs to be tested if it is not sufficiently tested in the energy market

HARMONISATION

A correctly defined capacity resource has the same value whether provided by suppliers or demand reduction

Material differences in resource capability to contribute to meeting peak demand should not exist

But “capability to meet peak demand” is a very generic issue – we are not concerned with fuel types or techonologies – only effectiveness

NET REFUNDS

A nonperforming capacity resource poses a concern

Value for money?
Correct incentives?

Therefore the refunds regime works with harmonisation to sharpen availability incentives and protect the value-for-money proposition for those who pay for capacity

BACKSTOP

Backstops are pro-competitive

Backstops can also be cost-increasing or risk-increasing

All depends on how the backstop is designed

But the existence of a backstop between generators and retailers reduces reliance on counterparty creditworthiness and buyer or seller market power – by defining an alternative pathway.