Shaping Price Caps for In-city Installed Capacity

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Which Set of Caps to Choose?

The tariff requires that the monthly price caps for ICAP sold by mitigated in-city generation must permit the DGOs to earn the $105/kW-yr. in revenue they are permitted under the divestiture agreements.

- **But many different combinations of price caps sum to $105/kW-yr.**
- **For a hypothetical "average" DGO, whose winter DMNCs are 107% of its summer DMNCs (the average for in-city facilities):**
  - ***A cap of $8.45/kW-month in each month sums to $105/kW-yr.***
  - ***A cap of $17.49/kW-month in each summer month and $0.01/kW-mo. in each winter month sums to $105/kW-yr.***
  - ***A cap of $0.01/kW-month in each summer month and $16.35/kW-mo. in each winter month sums to $105/kW-yr.***
  - ***There are infinitely many candidates.***

Which set should we choose?

A Criterion to Guide the Selection

We need an additional criterion to help us select from among these candidates.

- **I propose that the criterion be that the cap applicable to each month should be proportional to expected in-city ICAP prices in that month.**
- **So if prices are expected to be twice as high in one month as in another month, the cap would be twice as high in the first month as in the second month.**

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Calculating the Ratio of Expected ICAP Prices

We can calculate the ratio of the expected in-city ICAP price in winter months to the expected ICAP price in summer months, given the in-city ICAP demand curve and assumptions regarding:

- **The amount of ICAP that will be sold during the summer, and**
- **The amount of ICAP that will be sold during the winter.**

Assume that exactly 100% of the minimum in-city ICAP requirement will be met during the summer.

- **The ICAP demand curve has been drawn with the intention of ensuring that this occurs.**

Also assume that all of these resources continue to supply ICAP during the winter.

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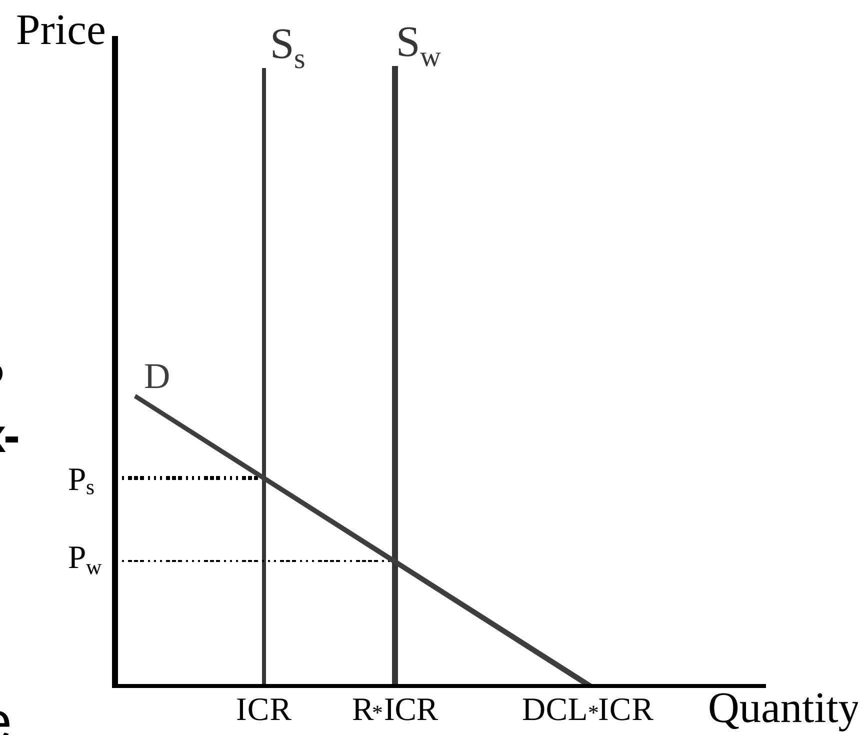
Price Ratio in Example

Given those assumptions:

- **If R is the ratio of the sum of winter DMNCs for in-city resources to the summer DMNCs of those resources,**
- **And DCL is the ratio of the point at which the in-city ICAP demand curve intercepts the x-axis to the in-city ICAP requirement,**



The ratio of the winter in-city ICAP price to the summer in-city ICAP price would be (DCL – R) / (DCL – 1).

Formula Based on this Approach

The memo that I distributed earlier derived this relationship, along with the price cap formula that results from use of this criterion, together with the requirement that the caps must permit each DGO to earn $105/kW-yr.

- **As it turned out, it exactly matched the formula that Steve Wemple used to develop examples that he had circulated in May.**

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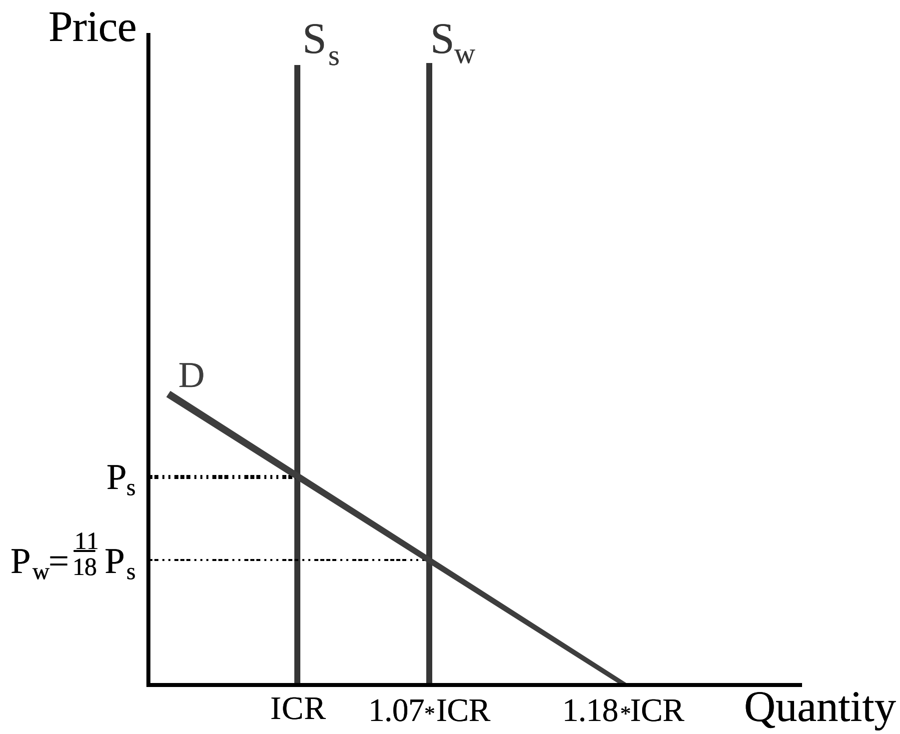
Price Ratio in Example

Given current summer and winter DMNCs and the current in-city ICAP demand curve:

- **If 100% of the in-city requirement is met during the summer, then 107% of the in-city ICAP requirement will be met during the winter.**
- **The ratio of the winter in-city ICAP price to the summer in-city ICAP price would then be 11/18, as the graph illustrates.**



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Caps Vary for Different DGOs

So the price cap for winter months would therefore be set at 11/18ths of the price cap for summer months.

Price caps would still vary for different DGOs.

- **Some have lower ratios of winter DMNC to summer DMNC. As a result, they need higher caps to compensate for the reduced amount of ICAP they can sell during the winter.**
- **Others, with higher ratios of winter DMNC to summer DMNC, reach their $105/kW-yr. revenue allocation at lower caps.**

But the winter and summer price caps for each DGO would obey this proportionality constraint.

Caps for this Example

The price caps that Steve calculated that would result for DGOs with various ratios of winter DMNC to summer DMNC are shown below.

- **For a DGO with a winter DMNC-to-summer DMNC ratio of 107% (the average):**
  - ***The winter cap would be $6.47/kW-mo.***
  - ***The summer cap would be $10.58/kW-mo.***
- **For a DGO with a winter DMNC-to-summer DMNC ratio of 104%:**
  - ***The winter cap would be $6.54/kW-mo.***
  - ***The summer cap would be $10.70/kW-mo.***
- **For a DGO with a winter DMNC-to-summer DMNC ratio of 115%:**
  - ***The winter cap would be $6.28/kW-mo.***
  - ***The summer cap would be $10.28/kW-mo.***

Reasons to Adopt this Criterion

There are several reasons why we should calculate the caps so that the ratio of winter cap to summer cap equals the expected ratio of winter price to summer price.

- **It ensures that mitigated and unmitigated in-city generators have the same relative incentives to be provide ICAP in each season.**
- **It minimizes the likelihood that monthly caps will be set in a way that precludes the DGOs from earning the full $105/kW-yr. they are permitted.**
- **It eliminates the need to recalculate caps whenever the slope of the demand curve changes.**

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Maintains Consistent Seasonal Incentives

It ensures that mitigated and unmitigated in-city generators have the same relative incentives to be provide ICAP in each season.

- **The market-clearing price of ICAP in the winter and the market-clearing price of ICAP in the summer send signals to unmitigated generators indicating the relative value of providing ICAP in the winter and in the summer.**
- **Setting price caps for DGOs that are not consistent with that ratio would send a different signal to mitigated generators regarding the relative value of summer and winter capacity.**
- **We should use a mechanism that sends consistent signals to all generators—mitigated and unmitigated—regarding the relative value of providing capacity during the summer and the winter.**

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Minimizes Chance that Some Caps Are Too High

It minimizes the likelihood that monthly caps will be set in a way that precludes the DGOs from earning the full $105/kW-yr. they are permitted.

- **In each month, the DGO will only be able to collect the lesser of the market-clearing price or the price cap for that month.**
- **If a month's cap exceeds the market-clearing price for a month, the difference is revenue that the DGO will not be able to recover in other months.**
- **This proposal minimizes the likelihood that some monthly caps have been set at levels that exceed the market-clearing price for in-city ICAP, by making each month's cap proportional to that month's anticipated price.**

Detailed illustrations appear in Appendix A.

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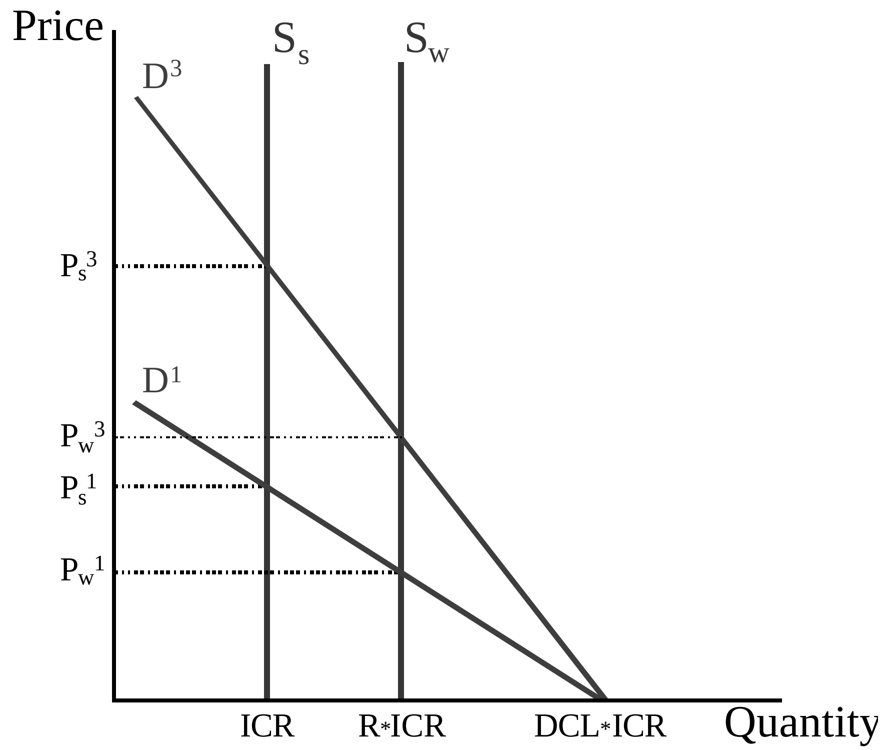
No Change When Demand Curve Slope Changes

It eliminates the need to recalculate caps whenever the slope of the demand curve changes.

- **The D^3 curve to the right has twice the slope of D^1.**
- **As a result, the anticipated winter price in Year 3 is twice the anticipated winter price in Year 1.**
- **But the anticipated summer price in Year 3 is also twice the anticipated summer price in Year 1.**
- **The ratio of expected winter to summer prices remains the same, so there is no need to revise the caps.**



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Effects of Changing Assumptions

The formula I derived is based on two assumptions:

- **The amount of ICAP supplied will exactly meet the in-city requirement.**
- **The providers of ICAP during the summer will also provide ICAP during the winter (i.e., the supply of ICAP is fixed).**

Changes to these assumptions would affect the formula.

- **However, as Appendix B shows, the effects of these changes to assumptions are small.**

Appendix A: Interaction Between Monthly Caps and DGOs' Ability to Recover the Full $105/kW-Year

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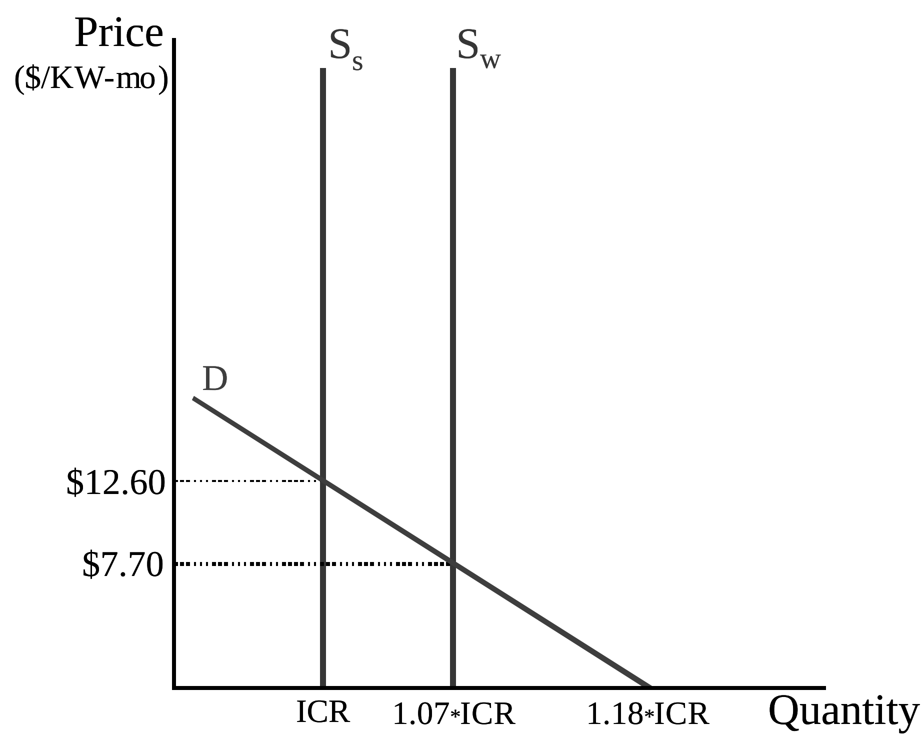
Expected Prices in Year 2

To illustrate this, use the following example:

- **Continue to assume that 100% of in-city ICAP requirements will be met during the summer, and 107% of in-city ICAP requirements will be met during the winter.**
- **Then, during the 2004-05 capability year:**
  - ***The summer market-clearing price for in-city ICAP would be $12.60/kW-mo.***
  - ***The winter market-clearing price for in-city ICAP would be $7.70/kW-mo.***

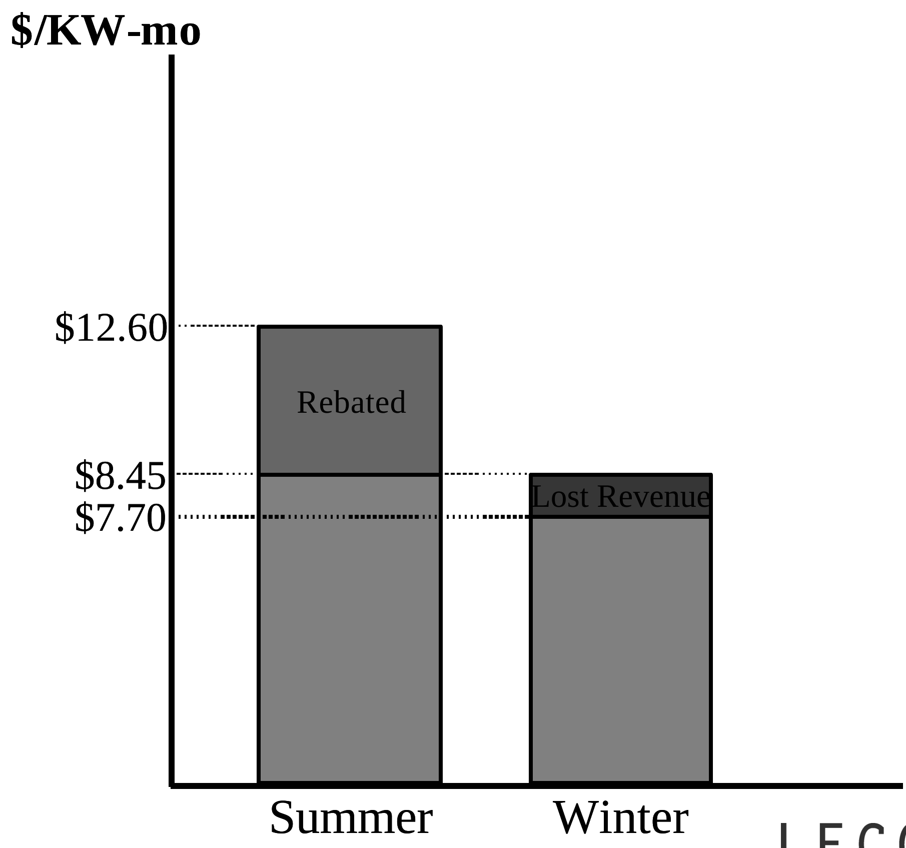


DGO Revenue with Even Caps

Given these Year 2 prices, the "average" DGO would not be able to earn $105/kW-yr. under any of the caps proposed at the beginning of this presentation, because one of the caps exceeds the monthly market-clearing price.

If the cap were set $8.45/kW-mo. in each month:

- **The winter cap exceeds the winter market-clearing price.**
- **So the DGO would only be able to receive the market-clearing price of $7.70/kW-mo. in the winter.**
- **As a result, it would only realize $100.14/kW-yr.**



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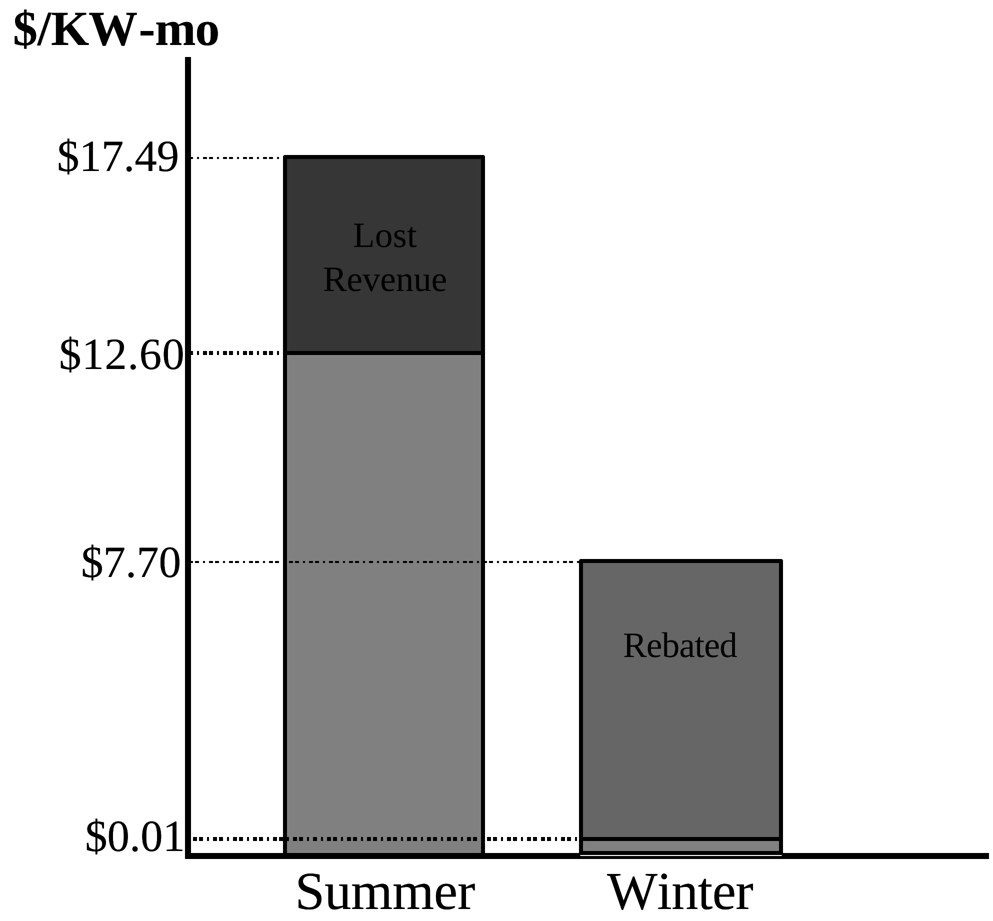
DGO Revenue with High Summer Cap

If the cap were set at $17.49/kW-mo. in each summer month and $0.01/kW-mo. in each winter month:

- **The summer cap exceeds the summer market-clearing price.**
- **So the DGO would only be able to receive the market-clearing price of $12.60/kW-mo. in the summer.**
- **As a result, it would only realize $75.63/kW-yr.**



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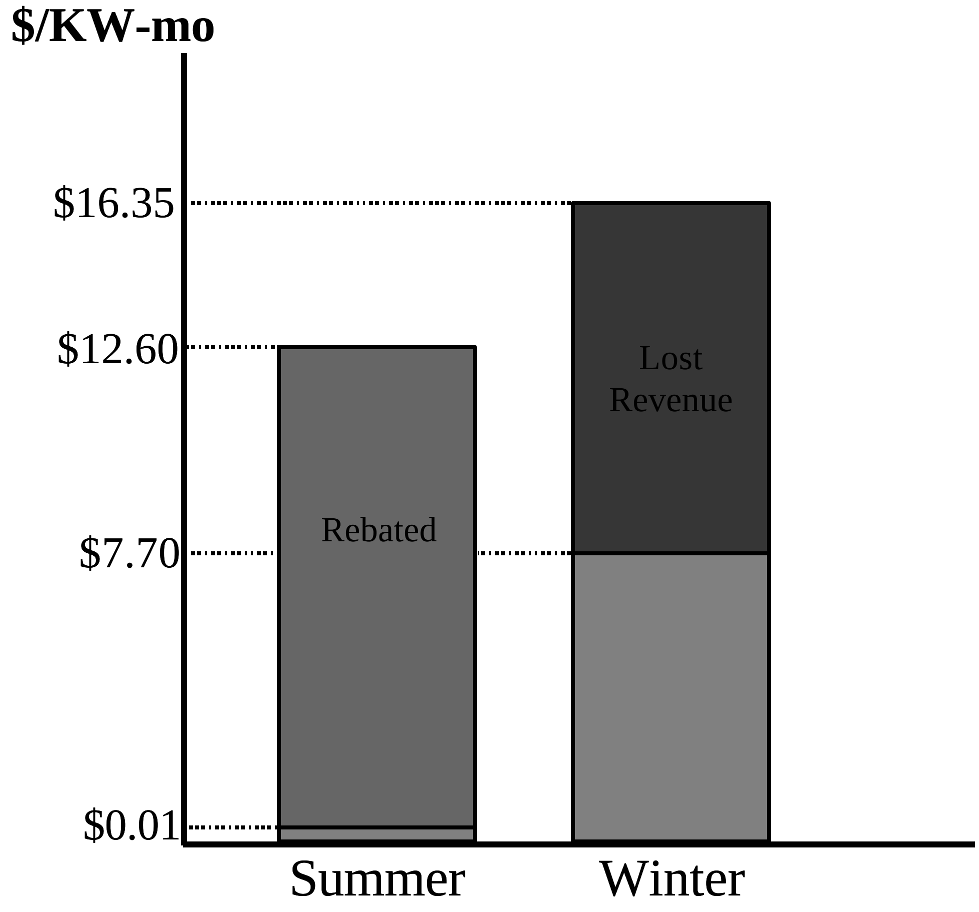
DGO Revenue with High Winter Cap

If the cap were set at $0.01/kW-mo. in each summer month and $16.35/kW-mo. in each winter month:

- **The winter cap exceeds the winter market-clearing price.**
- **So the DGO would only be able to receive the market-clearing price of $7.70/kW-mo. in the winter.**
- **As a result, it would only realize $49.47/kW-yr.**



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Trade-off Between Seasonal Caps

These examples show how reducing the cap for one season will reduces the likelihood that the cap will exceed the market-clearing price for that season.

- **But it also leads to the need to increase the cap for the other season.**
- **And so it increases the likelihood that the cap in the other season will exceed the market-clearing price for that season.**

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Equating the Cap-to-Price Ratio for Each Season

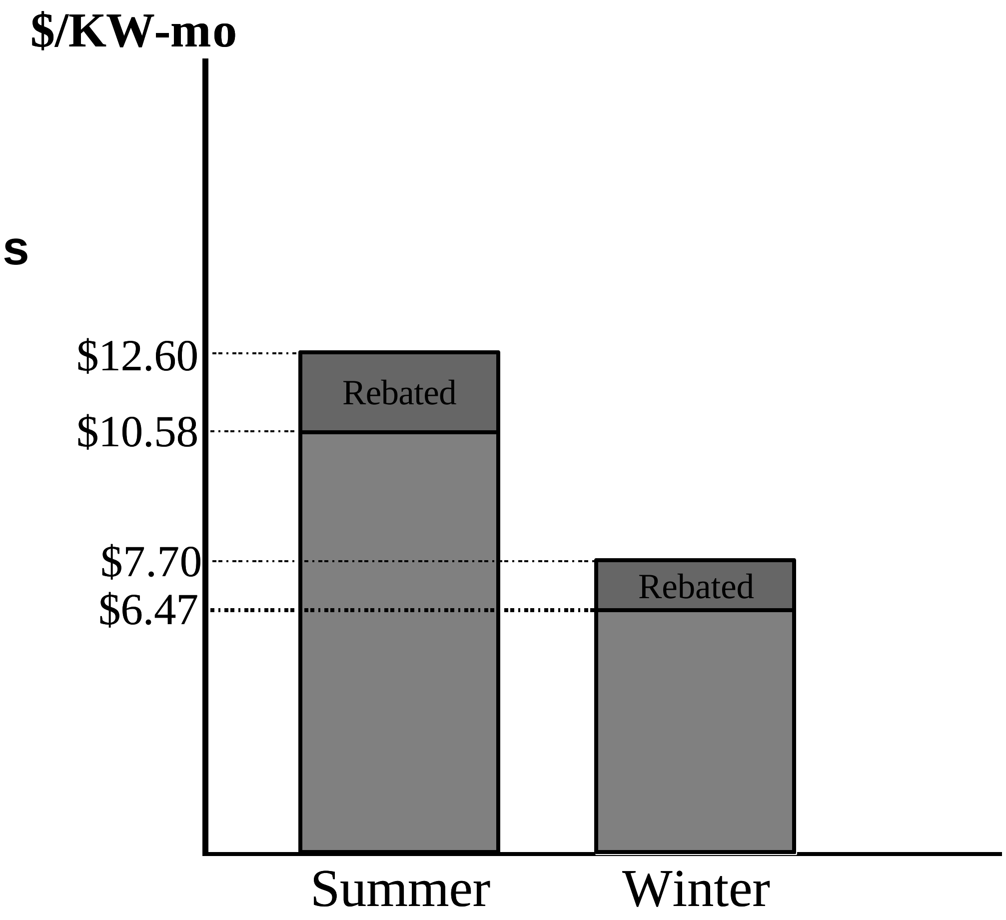
How do we determine the optimal trade-off?

- **It equates the ratio of each season's cap to that season's anticipated market-clearing price.**
- **So, for example, if one proposed set of caps were 98% of the anticipated winter price and 70% of the anticipated summer price, it would make sense to decrease the winter cap and increase the summer cap.**
  - ***This guards against the possibility than expectations were inaccurate and the winter cap actually turned out to be greater than the actual winter price.***

DGO Revenue with Caps Proportional to Price

The proposed formula would do this.

- **The summer cap in this example, $10.58/kW-mo., is 84% of the anticipated summer price of $12.60.**
- **The winter cap in this example, $6.47/kW-mo., is 84% of the anticipated winter price of $7.70.**



Appendix B: Changing the Assumptions Underlying the Formula

Percentage of In-city Requirement Met

If we derive the formula under the assumption that something other than 100% of the in-city ICAP requirement will be provided during the summer:

- **The ratio of expected winter prices to expected summer prices will change.**
- **Since the ratio of the winter cap to the summer cap is based on the price ratio, the caps would also change.**

The table below shows the caps that would result for the "average" DGO, using a modified version of the formula.

Assumed % of ICR Met in Summer	Summer Cap ($/kW-mo.)	Winter Cap ($/kW-mo.)
94%	9.85	7.15
96%	10.04	6.97
98%	10.28	6.75
100%	10.58	6.47
102%	10.99	6.09
104%	11.56	5.55
106%	12.43	4.74

Percentage of In-city Requirement Met

As the table illustrates, the cap would not be substantially affected by changes in this assumption.

- **However, given that the demand curve has been drawn with the intent of ensuring that the in-city requirement can be met, it would be inconsistent to determine the caps using a different assumption.**
- **One could adjust the caps for each year, based on expectations for that year, but:**
  - ***Following this approach would require the ISO to estimate how much of the in-city requirement will be met*** before ***the auction is held.***
  - ***It would also require the ISO to adjust the cap whenever that assumption changes.***
- **The better and simpler approach is to assume that 100% of the in-city requirement will be met.**

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Shift in Supply Between Summer and Winter

The other assumption that could be challenged is the assumption that the same resources that provide ICAP in summer will do so in winter.

- **If some resources provide ICAP in the summer but not in the winter, the ratio of the winter price to the summer price would increase.**
- **This in turn would affect the winter and summer caps.**

But it seems unlikely that this effect would be significant.

- **In both summer and winter, in-city ICAP prices are likely to be somewhat higher than prices in-city resources could realize by selling their capacity elsewhere.**
- **So the assumption that they will sell their ICAP to meet NYC requirements in both the summer and winter is fairly realistic.**

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