EMM Comments on ISO-NE's RCA Proposal for Non-Firm Gas Generating Capacity

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Introduction

- ISO-NE has recognized the need to accredit capacity resources based on marginal reliability impact ("marginal accreditation")
  - ✓ Marginal accreditation leads to efficient incentives
  - ✓ Important for transition from a conventional resource mix with summer risk to a non-conventional resource mix with winter risk
- ISO's proposal uses marginal reliability impact for most resources, but not for non-firm gas-fired generators.
  - ✓ The Derating Approach reflects the marginal value of the regional gas supply profile—*not* the marginal value of gas-fired capacity.
  - ✓ These are different because adding one non-firm gas-fired generator does not increase the regional supply of natural gas.
- ISO's January 4th memo compared the Derating Approach to:
  - ✓ Market Constraint Approach – ideal, but not feasible in the near-term
  - ✓ MRI=0 Approach – Not viable to pay suppliers $0 for a CSO

Introduction

- It is critical for the RCA design to embody marginal pricing principles. Capacity payment rates:
  - ✓ Should be consistent with the equilibrium where marginal value converges to the marginal cost of supply
  - ✓ Must be non-zero to clear the market for non-firm gas-fired capacity
- Overview:
  - ✓ Value of non-firm gas-fired generating capacity
  - ✓ Problems with the Derating Approach
  - ✓ EMM's proposed alternative
  - ✓ Illustration of the EMM's proposed alternative
  - ✓ Conclusion

Reliability Value of Non-Firm Gas-Fired Capacity

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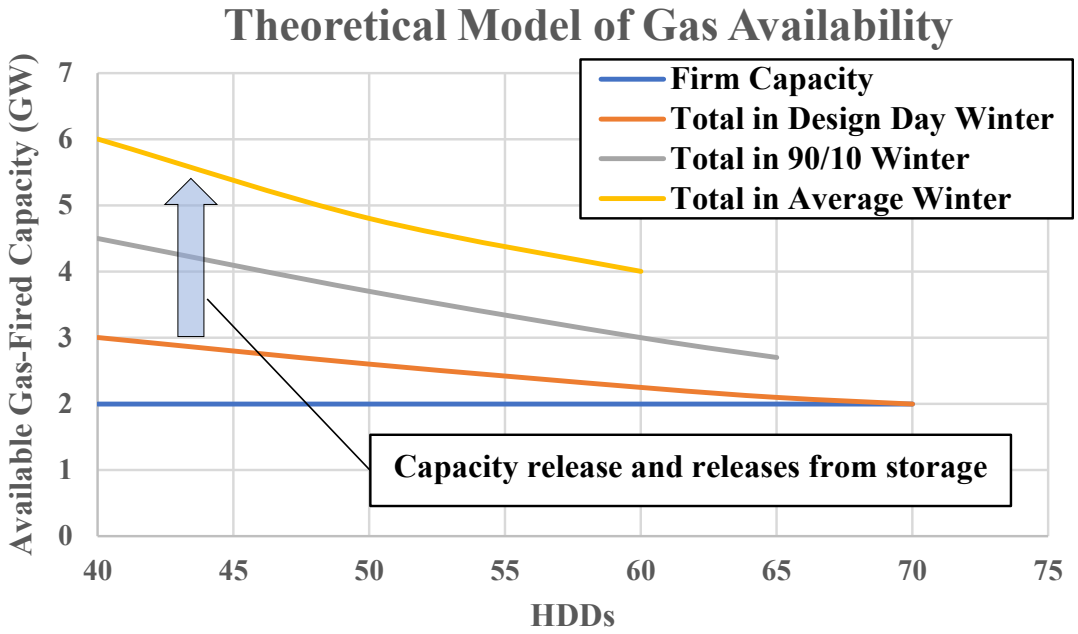
Reliability Value of Non-Firm Gas Capacity: Overview

- Marginal accreditation of any resource is based on:
  - ✓ The effect on reliability of adding or subtracting *one* unit; and
  - ✓ NOT the effect of a class of resources (average accreditation) and NOT including any fuel supply changes unrelated to the single unit.
- The marginal value of non-firm gas-fired capacity depends on:
  - ✓ The marginal reliability impact of additional generating capacity when the supply of gas to the region is limited
  - ✓ The marginal cost of supply to generators accepting a CSO
- An efficient market for non-firm gas generation would clear where:
  - ✓ The marginal reliability impact of capacity ("rMRI") times the capacity clearing price ("Price") equals the going forward cost of supply of the marginal non-firm gas-fired resource ("GFC"):

$$rMRI \times Price = GFC$$

Reliability Value of Non-Firm Gas Capacity: Average vs. Design Day Conditions



- LDCs plan for "Design Day" conditions
- ISO-NE plans for 1-in-10 conditions
- In an average winter, large quantities of additional gas become available to generators without firm rights

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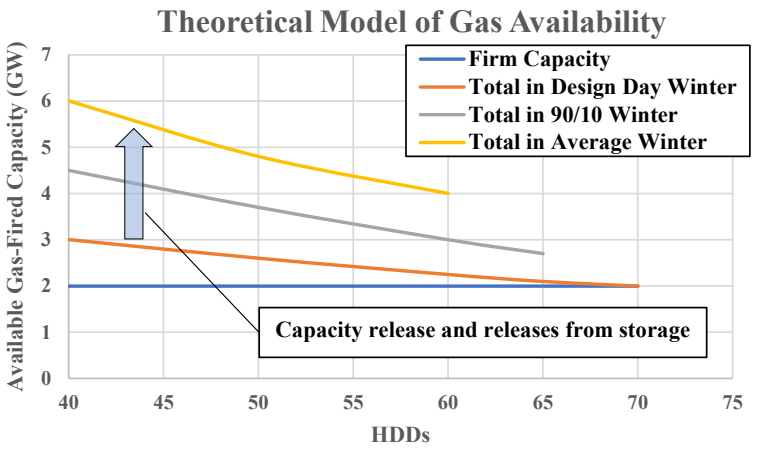
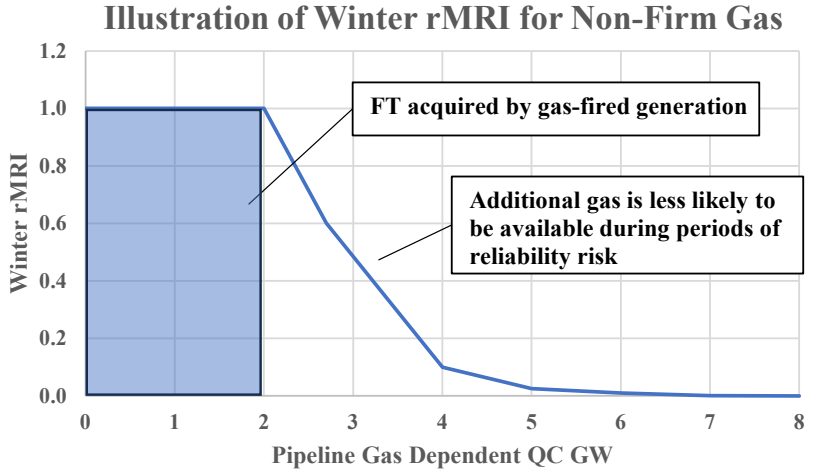
Reliability Value of Non-Firm Gas Capacity: Estimating rMRI of Gas-Fired Units





- On the left: More gas becomes available under moderate conditions
  - ✓ Non-firm gas will not be available under Design Day conditions
- On the right: Reliability risk is primarily associated with extreme weather when relatively little gas is available on a non-firm basis
  - ✓ The rMRI of non-firm gas capacity falls quickly

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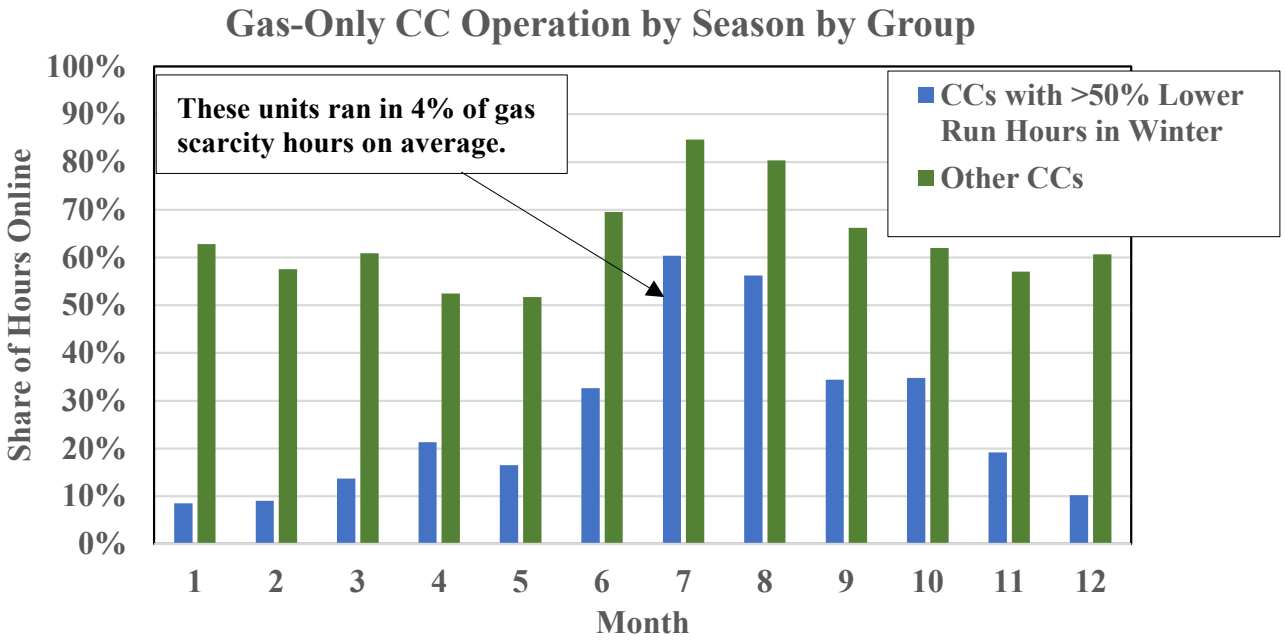
Reliability Value of Non-Firm Gas Capacity: Cost of Accepting a CSO

- The cost of supply will be a key factor that determines the market clearing payment rate for non-firm gas units in the winter.
- Non-firm gas-fired units would not accept a CSO during the winter and shoulder seasons unless they expect to recoup:
  - ✓ Avoidable costs related to plant staffing
  - ✓ Potential cost savings and/or net revenue benefits from conducting maintenance on a more flexible schedule
  - ✓ Expected value of PFP obligation
- Units that have low capacity factors during the winter may realize some cost savings from reduced availability in the winter

Reliability Value of Non-Firm Gas Capacity: Frequency of Operation of Gas-Only Units



- Blue category (which includes 30% of gas-only CCs) runs very little in the winter, especially during gas scarcity (defined as gas days when price >$9/MMbtu and average oil generation was >200MW).
- Green category includes several CCs with low run hours year-round.
- Some CCs avoid significant costs from seasonal mothballing.

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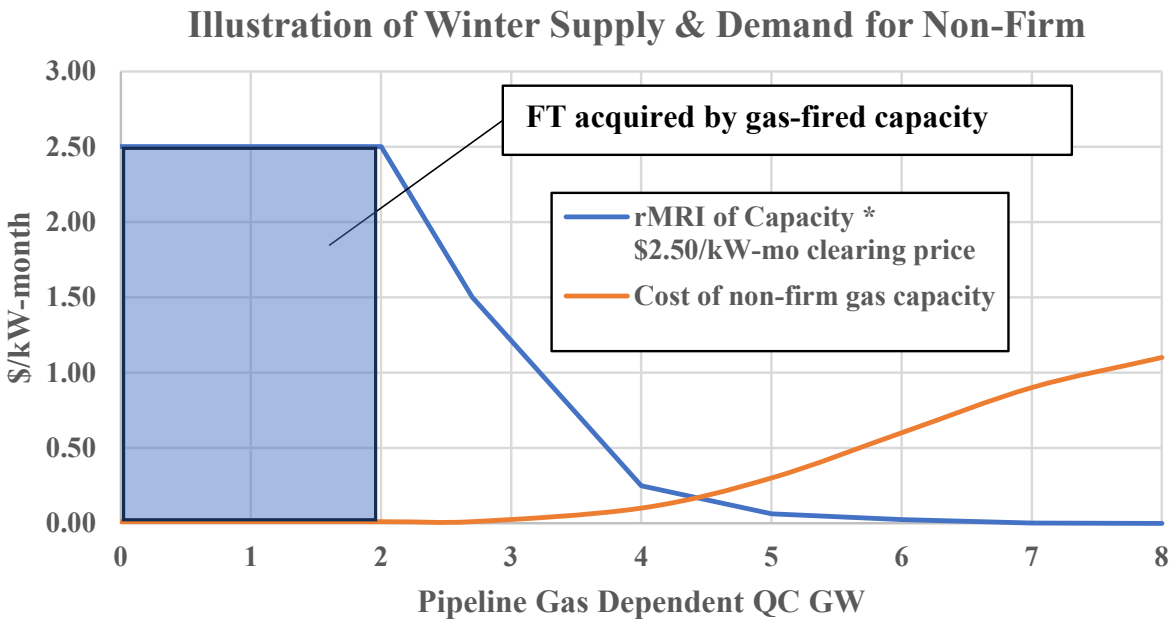
Reliability Value of Non-Firm Gas Capacity: Market Clearing Payment Rate for Non-Firm



- This assumes a clearing price of $2.50/kW-mo, the rMRI function and FT from slide 7, and illustrative supply costs.
  - ✓ In this illustration, an rMRI near 0.07 would clear the market.
- The most fuel-efficient units have lowest net cost of accepting a CSO. Units with low net revenues may prefer not to have a CSO.

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Reliability Value of Non-Firm Gas Capacity: Conclusions

- A market clearing mechanism would be needed to determine where the supply and demand for non-firm gas capacity intersect.
  - ✓ However, the rMRI should clearly not be zero.
- In the long-term, the ISO proposes the Market Constraint Approach, which would adjust price to clear non-firm gas capacity.
  - ✓ The EMM supports a market constraint approach, although we recommend the ISO consider adjusting rMRI rather than price
- In the short-term, the difficulty is that the rMRI of non-firm gas capacity cannot be adjusted after the qualification process.
  - ✓ Given the large size of the gas-dependent generation fleet, it is critical to develop a short-term solution that provides:
    - Adequate incentives for non-firm gas-fired capacity to sell sufficient amounts to utilize available non-firm gas supply
    - Reasonably efficient incentives for generators to firm-up when able to do so.

Problems with the Derating Approach

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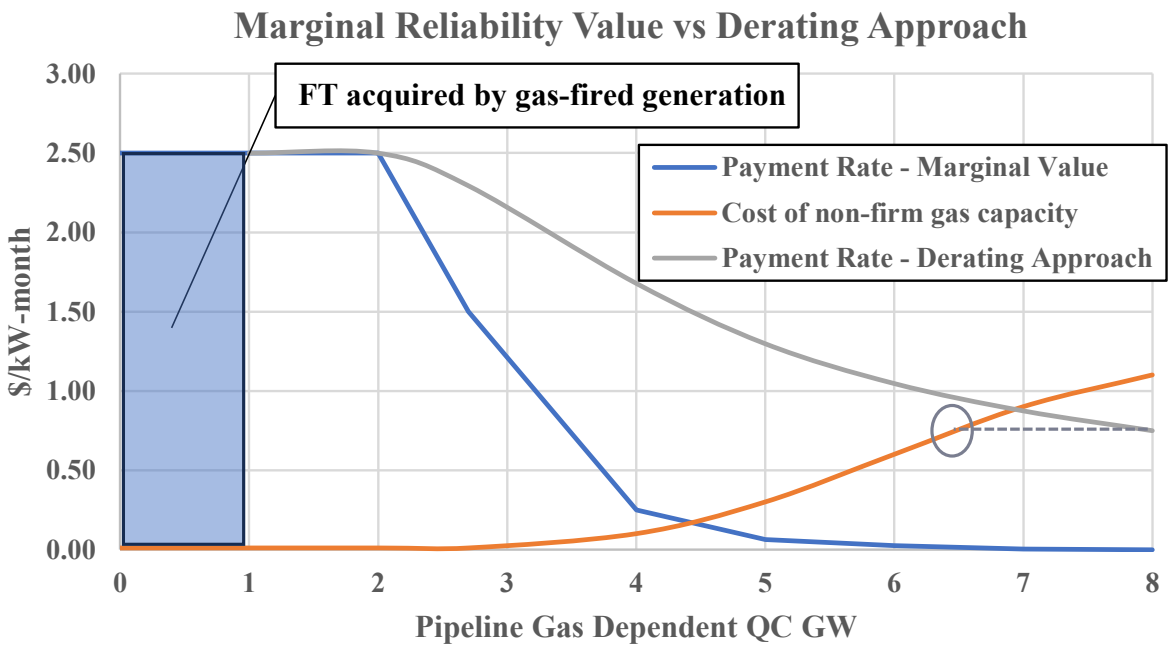
Problems with the Derating Approach

- The ISO proposes the Derating Approach, which would allocate to each seller a proportional share of regional non-firm gas supply
- The Jan. 4th Memo (page 11) acknowledges this would accredit based on the marginal value of regional gas supply, not gas-fired capacity
  - ✓ Adding (or removing) gas-fired capacity will redistribute the available gas without increasing (or decreasing) reliability
  - ✓ Hence, it will not produce a marginal accreditation value for non-firm gas resources and will likely over-accredit these resources
- Over-accrediting non-firm capacity leads to additional problems:
  1. It will under-compensate generators that make firm-fuel investments, which will likely result in less capacity with firm fuel
  2. If some non-firm capacity is qualified but does not get a CSO, a proportionate amount of the non-firm gas supply to the region will be removed from the auction. (see next slide)

Problems with the Derating Approach



- Illustration shows $2.50/kW-mo clearing price assuming no units delist.
  - ✓ Derating Approach uses an rMRI of 0.30 based on 8 GW of qualified.
  - ✓ Payment rate under Derating Approach is less than supply cost shown for 1.5 GW of QC with 450 MW of QMRIC. (see gray circle above)
  - ✓ Could result in unsold non-firm gas-fired capacity, which would inflate the auction clearing price.

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Description of the EMM's Proposed Approach

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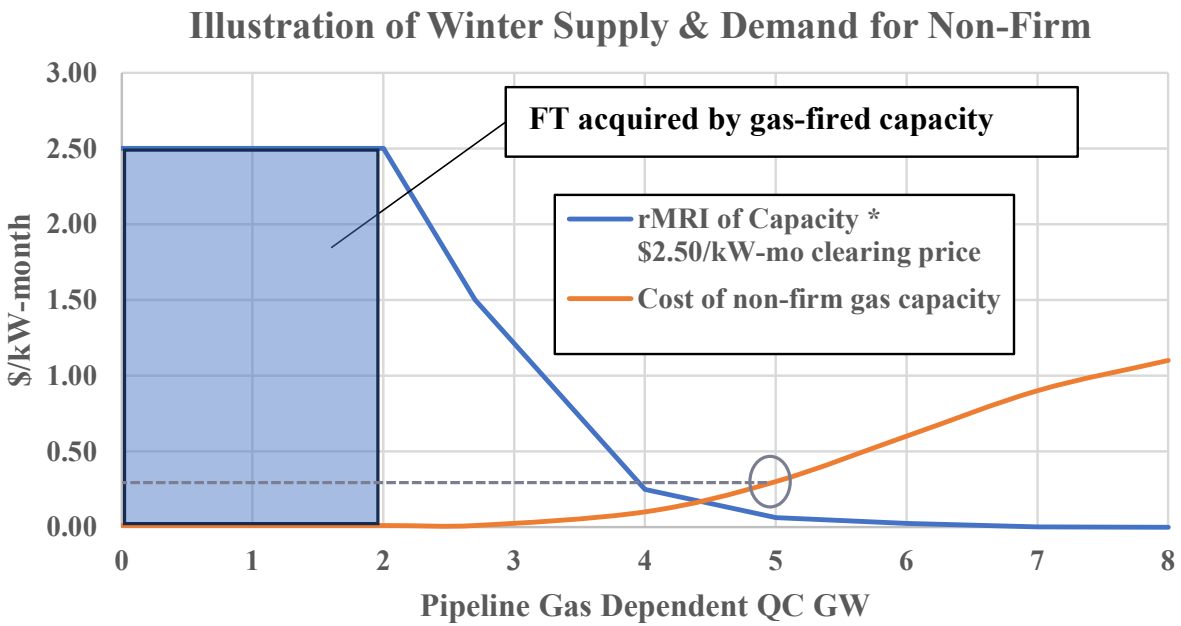
EMM Proposal: GFC-Based MRI Estimate

- Efficient Market Principle:
  - ✓ The payment rate to non-firm gas-fired capacity should be at the intersection of marginal cost and marginal value
- Practical Limitation:
  - ✓ The rMRI must be set before the qualification process rather than in the market clearing process
- Proposed Approach:
  - ✓ Estimate the marginal reliability impact (rMRI) of non-firm gas-fired units in the same manner as other resource types.
  - ✓ Estimate the lowest rMRI that would be sufficiently high to ensure available non-firm gas is fully utilized in periods of reliability risk.
    - – Use this as a floor for the rMRI of non-firm gas-fired capacity.

EMM Proposal: GFC-Based MRI Estimate



- The gray horizontal line illustrates that a rMRI floor of 0.10 would result in a payment rate of $0.25/kW-month.
- The rMRI floor should be set at a level that ensures that virtually all available non-firm gas is fully utilized.

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EMM Proposal: GFC-Based MRI Estimate

- A feature of marginal accreditation is that the sum of the QMRICs of a group does not necessarily equal their combined reliability impact.
  - ✓ The capacity requirement used in the auction is adjusted to account for this.
- For example: if non-firm gas supply has total reliability value equal to 3 GW and non-firm gas-fired QC was 8 GW:
  - ✓ Derating Approach would set their rMRI at 37.5%
- However, if the GFC-Based MRI Estimate was 10% and non-firm gas-fired QC was 8 GW:
  - ✓ Total QMRIC is 800 MW while total reliability impact is equivalent to 3 GW of perfect capacity
  - ✓ Accordingly, net capacity requirement would be reduced by 2.2 GW.
    - This would result in a lower PFP obligation for non-firm gas-fired units and a higher Balancing Ratio during PFP events.

Evaluation of the EMM Proposal vs Other Approaches

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Evaluation of EMM Proposal v Other Approaches

- ISO's Jan 4th memo presented an example comparing four scenarios:
  - ✓ Example 0: Current capacity market rules
  - ✓ Example 1: Market Constraint Approach – long-term solution
  - ✓ Example 2: MRI=0 Approach
  - ✓ Example 3: Derating Approach
- Based on the examples, the memo finds that:
  - ✓ Market Constraint Approach achieves the highest savings, but it cannot be implemented for FCA19.
  - ✓ Derating Approach achieves more savings than MRI=0 Approach.
- This presentation builds on the examples listed above:
  - ✓ Example 4: EMM Approach – GFC Based MRI Estimate

Evaluation of EMM Proposal v Other Approaches: ISO's Example 3 for the Derating Approach

Table 3: Summary of Market Outcomes with the Derating Approach (Example 3)

			Gas A	Gas B	Non-Gas A	Non-Gas B
Total Cost	[1]		$2,000	$4,000	$2,500	$12,000
QC	[2]		2,000 MW	2,000 MW	500 MW	2,000 MW
QMRIC	[3]		1,000 MW	1,000 MW	500 MW	2,000 MW
Offer	[4]	=[1]/[3]	$2/MW	$4/MW	$5/MW	$6/MW
CSO Award	[5]		1,000 MW	1,000 MW	250 MW	0 MW
Total Social Cost	[6]	=SUM([4]*[5])		$7,250		
Clearing Price	[7]			$5/MW		
Resource Payments	[8]	=[7]*[5]	$5,000	$5,000	$1,250	$0

Proportionate allocation of gas supply results in an rMRI = 0.5 for Gas A & Gas B.

QMRIC = QC * rMRI

Derating Approach results in a lower overall social cost than the MRI=0 Approach.

- The table above is copied from page 12 of the ISO's memo.
  - ✓ The MRI=0 Approach performs poorly because neither gas unit sells capacity when the payment rate is $0.
  - ✓ The examples do not consider that gas units can firm-up their fuel supply.

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Evaluation of EMM Proposal v Other Approaches: Example 4 for the EMM Approach

Example 4: Summary of Market Outcomes with the EMM Approach

			Gas A	Gas B	Non-Gas A	Non-Gas B
Total Cost	[1]		$2,000	$4,000	$2,500	$12,000
QC	[2]		2,000 MW	2,000 MW	500 MW	2,000 MW
QMRIC	[3]		700 MW	700 MW	500 MW	2,000 MW
Offer	[4]	=[1]/[3]	$2.86/MW	$5.71/MW	$5/MW	$6/MW
CSO Award	[5]		700 MW	450 MW	500 MW	0 MW
Total Social Cost	[6]	=SUM([4]*[5])	$7,071			
Clearing Price	[7]		$5.71/MW			
Resource Payments	[8]	=[7]*[5]	$4,000	$2,571	$2,857	$0

Estimate rMRI = 0.35 for Gas A & Gas B, which yields QMRIC = 700 MW for each unit.

Total reliability impact is 2000 MW while total QMRIC is 1400 MW, so requirement is adjusted down by 600 MW.

Compared to the Derating Approach, the EMM Approach results in a higher clearing price, but overall resource payments are lower because of the reduced requirement.

The EMM Approach results in a lower social cost than the Derating Approach because it reduces the amount of capacity purchased from gas units that provide no reliability value.

- rMRI floor is set where the estimated:

$$rMRI * Clearing\ Price = Marginal\ Cost$$

- If these examples considered the incentives to firm-up fuel supplies, the EMM Approach would result in higher levels of firm fuel investment and correspondingly lower Total Social Cost.

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Conclusion

- Market Constraint Approach: Cannot be implemented in short-term
- MRI=0 Approach: Non-viable because suppliers will not accept a capacity payment of $0
- Derating Approach: Will not produce a marginal accreditation of capacity, which leads to:
  - ✓ Over-payment to non-firm gas-firm capacity; and
  - ✓ Poor incentives to contract for firm fuel, which may affect reliability or lead to less efficient resource procurement (e.g., the IEP)
- EMM Approach: Applies principle of marginal cost pricing to non-firm gas-fired capacity in a reasonable manner given short-term practical constraints
  - ✓ Results in a more efficient solution using the ISO's example
  - ✓ More consistent with the treatment of other technologies