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Connecting the Dots Between Fuel Security & Resource Adequacy

Tom Kaslow

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The path to Chapter 3

January 2004 Cold Snap

- Improve day ahead market timing, ISO tools, & ISO communication with pipes

Winter Reliability Programs 2013 through 2017

- Provide out-of-market compensation to fill oil tanks, encourage dual fuel and DR
- LNG contracting added in winter 2014-15

ISO-NE November 5, 2012 Memo, Complaint Docket No. EL13-66 and related FERC Order:

- Capacity obligation to get fuel to support day ahead energy sale although high gas prices can price gas-only units out of day ahead market economics
  - Ability of residual pipe line-pack plus LNG vaporization to support (or not) simultaneous gas-only unit operation can be masked by dispatch stack
- Obligation to get fuel to support real-time dispatch is less clear

Connecting resource adequacy to fuel security

Assuring winter reliability requires a combination of:

- Resource adequacy to assure there is sufficient capability backed by fuel storage to meet forecasted winter peak loads (“how many buckets *could be* filled”)
- Fuel security to assure sufficient fuel arrangements are made to meet electric demand (“how many buckets need to be filled”)

The Forward Capacity Market (FCM) qualification process generally relies on physical audits to demonstrate the ability of each resource to provide incremental resource adequacy support:

- This works for resources whose physical audit can require all units using the same fuel storage capability to demonstrate its ability to support their simultaneously output
- **Gas-only fired resources cannot (as a practical matter) be simultaneously audited at peak winter day demand resulting in *no* verification that adequate fuel storage and delivery exists to support that level of winter qualified capacity**

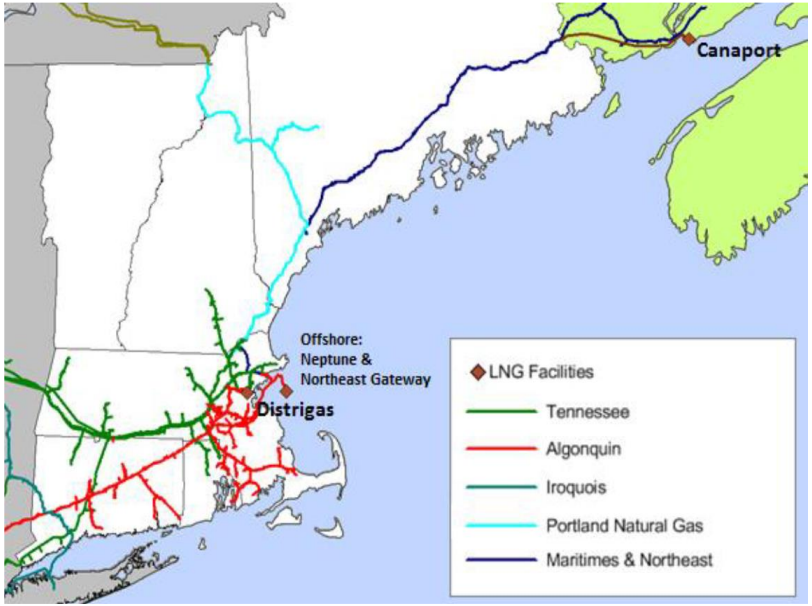
Winter gas-only capacity relies on residual gas storage remaining after firm retail demand met

As part of the FCM winter capacity qualification process, propose to determine the highest level of aggregate winter gas-only capacity that could be qualified to sell capacity to the level that could be simultaneously fueled in the winter peak demand hour(s).

The level of hourly gas that could be taken off gas storage to support simultaneous gas-only generator operation at the winter peak is limited by:

- Pipe line-pack
- LNG storage vaporization capability
- Firm retail natural gas demand

If the net residual off-take capability cannot support the full extent of gas-only capacity qualifications requested, then the winter capacity qualifications must be limited to the level that *could* be supported at the winter peak.



(Figure 2.1 of the ICF International Final Report dated November 20, 2014: Assessment of New England's Natural Gas Pipeline Capacity to Satisfy Short and Near-Term Electric Generation Needs: Phase II)

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Example Case: Gas-only MWs exceed the capability to fuel

Assuming 15,000MW of gas-fired generation seeking winter capacity qualification, 6,000MW can be supported by residual gas storage capability and 6,000MW have dual fuel capability:

- 6,000MW achieve their winter qualified capacity rating based on their oil storage capability.
- This still leaves 9,000MW of gas-only generators chasing 6,000MW of gas storage capability. In this example, only 2/3rds of each MW of that BTU conversion capability could receive a winter qualified capacity rating.
- Consequently, a 600MW generator relying on “naturally occurring” gas storage could only achieve a 400MW qualified winter capacity rating.

If 1,000MW of the above gas-only resources have sufficient firm contract rights to pipeline storage (i.e., transportation) or contracted priority to LNG injection capability, then, those resources could use their firm rights to achieve a full qualified winter capacity rating. In that case, the above evaluation would then leave 8,000MWs chasing 5,000MWs of gas storage capability.

Contracting pipeline in support of FCA qualification

Gas-only resources seeking to assure full winter qualified capacity rating could contract for priority access to pipeline capability.

- **Firm right to nominate gas for transportation over all, or a portion of, the pipeline path from the generator' supply source to the gas-only generator in the winter months of December, January and February of the Commitment Period.**
- **Does not require any gas supply commitment at that time. Filling the pipe will be signaled by the day(s) ahead energy and reserve markets under ISO-NE Energy Security proposal**

The quantity of contracted firm rights and the span of the path will determine the extent of pipe line-pack supporting the resource's gas-only winter qualified capacity rating. That portion of pipe line-pack capability will be removed for purposes of evaluating qualification of non-contracted gas-only resources.

Contracting LNG in support of FCA qualification

Gas-only resources seeking to assure full winter qualified capacity rating could contract for priority access to LNG vaporization capability.

- **Contracted priority right to vaporize gas from LNG storage facility and inject it into the pipeline in the winter months of December, January and February of the Commitment Period.**
- **At this stage, no commitment to fill local LNG tank with liquid is required. Filling the LNG tank with liquid will be signaled by the day(s) ahead energy and reserve markets under ISO-NE Energy Security proposal.**

Gas-only generating capability that is backed by priority right to inject (vaporize) gas from LNG tank into pipeline will be qualified for Forward Capacity Auction (FCA) participation without proration. That portion of vaporization capability will be removed for purposes of evaluating qualification of non-contracted gas-only resources.

Applying gas storage off-take constraint - alternatives:

(A) Treat new and existing gas-only generators the same

- Gas-only resources with contracted firm access to pipeline transportation or LNG storage vaporization capability can qualify without risk of proration
- Rest of gas-only resources qualify to the extent the residual gas storage could support their simultaneous operation.
- Calculate proration level based on requests for existing gas-only winter capacity qualification (e.g., 80%)
- Apply same proration to requests for new gas-only winter capacity qualification (e.g., 80%)
- Can result in FCA clear of slightly more winter gas-only capacity than can be fueled, but proration ultimately corrected in subsequent FCA when new resource becomes existing.

(B) Grandfather existing

(C) Reflect gas storage limit as constraint in the FCA

Applying gas storage off-take constraint - alternatives:

(A) Treat new and existing the same

(B) Grandfather existing gas-only generators

- Gas-only resources with contracted firm access to pipeline transportation or LNG storage vaporization capability can qualify without risk of proration
- Rest of (uncontracted) gas storage allocated among existing gas-only resources
- Grandfathered amount would still need to be reduced if new resources contracted for gas storage

(C) Reflect gas storage limit as constraint in the FCA

Applying gas storage off-take constraint - alternatives:

(A) Treat new and existing the same

(B) Grandfather existing

(C) Reflect gas storage limit as constraint in the FCA

- Qualify gas-only capacity without considering shared fueling capability
- Proration of qualified capacity still required based on start of round winter gas-only qualified capacity
  - Proration at auction start likely to be higher than in Option A or B (for existing resources)
  - Proration decreases as gas-only units drop out of auction (new capacity prices out or existing de-lists)
- Software and implementation could become very complicated
- Other resources that share a common (but different) fuel source could seek similar changes

Applying qualified winter capacity limit - alternatives:

(A) Apply existing rules (FCA qualified capacity based on the lower of winter or summer qualified capacity)

- Could reduce quantity of capacity qualified to participate in the FCA
- Encourages gas storage contracting in advance of FCA qualification

(B) Permit FCA qualified capacity to the summer qualified capacity level, if higher

- Could ultimately require a minimum winter qualified capacity constraint in the FCA
- Might also require a separate winter capacity price

(C) Reflect gas storage limit as constraint in the FCA (see prior slide)

- Software and implementation could become very complicated
- Could require further changes to treatment of resources that share common fuel source for other fuel types

Benefits of assuring sufficient gas storage for each MW

Avoids sending inaccurate market signals where winter capacity is actually not surplus (or possibly even inadequate)

Sends efficient price signals to install dual fuel capability or contract for pipeline transportation or priority access to LNG storage and vaporization capability

Avoids capacity payments for winter gas-only generating capability to levels that could not be simultaneously fueled

Improves comparability with other sources that either demonstrate own fuel storage or are treated as Intermittent Power Resources

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