NEW ENGLAND GAS-ELECTRIC FOCUS GROUP
FINAL REPORT

March 28, 2014

I. Introduction

New England's increasing dependence on natural gas as a generation fuel, and the implications that such dependence has for the region's energy landscape moving forward, has been identified by ISO New England ("ISO-NE"), the New England states and a number of stakeholders as a key issue for the region. As more electric generation has become natural gas-fired, certain fundamental challenges have emerged. More than 50% of New England's electricity needs are now generated with natural gas, compared to only 5% in 1990 and 15% in 2000, with even more growth in the use of natural gas-fired generation anticipated going forward. However, at the same time, there is limited pipeline capacity to deliver relatively low cost domestic supplies to New England because the region is at the "end of the pipeline," and those interstate pipelines transporting this gas from the Marcellus Shale region to New England are often running at or near capacity. The combination of these two forces combined with inadequate performance incentives have raised concerns about the reliability of New England's power system, especially during those periods when the pipelines transporting gas to New England from the south and west are most constrained.

In response to these evolving issues, and consistent with the regional gas-electric coordination discussions initiated by the Federal Energy Regulatory Commission ("FERC"), New England stakeholders expressed an interest, in the first instance, in exploring regionally-based solutions to address the challenges associated with New England's increased dependency on natural gas. Led by Tri-Chairs[1] representing the gas and electric industries and the states, the New England Gas-Electric Focus Group (the "Focus Group") was established to provide an open regional forum where members from the gas and electric industries, state regulators, ISO-NE representatives, and other interested stakeholders could together share information, further discuss and identify regional challenges and explore potential solutions.

Based on the observations of the Tri-Chairs during initial Focus Group discussions in the fall of 2012, where members presented their views with respect to the gas-electric coordination issues facing the region, a list of common themes was developed (the "Tri-Chair List of Common Themes"). This list contained thirty-four common themes reflecting facts and opinions of the Focus Group participants, which helped to frame the group's subsequent discussions on potential solutions.

Included in the Tri-Chair List of Common Themes were fifteen (15) fact-based themes that addressed: 1) infrastructure realities in New England; 2) the increasing demand for gas; 3)

[1] Tri-Chairs of New England Gas-Electric Focus Group:

Heather Hunt, Executive Director for the New England States Committee on Electricity ("NESCOE"); *Dan Dolan*, President of the New England Power Generators Association ("NEPGA"); and *John Rudiak*, Senior Director Energy Supply for Connecticut Natural Gas Corporation and Southern Connecticut Gas Company.

gas pipeline development proposals and associated timeframes; 4) pipeline operational issues due to heavy demand for gas; and 5) the differences between the gas and electric industries related to cost recovery and supply acquisition.

In addition, nineteen (19) other common themes and opinions addressed a range of stakeholder concerns related to the costs and risks associated with the range of potential solutions, including what entity(ies) might bear certain risks, or alternatively, might benefit, under a particular solution and/or set of solutions. Dated January 22, 2013, the "Tri-Chair List of Common Themes" is included with this final report as Attachment A.

The Focus Group provided a useful forum through which the natural gas industry, electric industry, consumers and the New England states explored in detail the region's gas-electric challenges and the potential solutions. Several solutions were implemented during the course of the Focus Group's meetings. Several other potential solutions that require further analysis have been identified and are described below. The Focus Group did not arrive at any particular long-term solution, as there is still yet not complete consensus around which all stakeholders and the New England states can coalesce.

New England States' Consensus View

As noted in the *New England Governors' Commitment to Regional Cooperation on Energy Infrastructure Issues* statement, dated December 2013, the New England states have arrived at consensus point of view that New England needs to advance new energy infrastructure: "The Governors therefore commit to continue to work together, in coordination with ISO-New England and through the New England States Committee on Electricity (NESCOE), to advance a regional energy infrastructure initiative that diversifies our energy supply portfolio while ensuring that the benefits and costs of transmission and pipeline investments are shared appropriately among the New England States." The Governors' Statement is attached as Attachment B.

In January 2014, the New England Governors, through NESCOE, requested ISO-NE's support and assistance with tariff filings related to electric and natural gas infrastructure in New England. In connection with electric infrastructure, NESCOE indicated that the New England states have agreed that one or more requests for proposals will be issued to advance the development of transmission infrastructure that would enable delivery of at least 1200 MW and as much as 3600 MW of clean energy into the New England electric system from no and/or low carbon emissions resources. The states further agreed that the costs of transmission infrastructure would be recovered through the ISO-NE tariff or through merchant project(s) in a manner that ensures that the benefits and costs of transmission investments are shared appropriately among the New England States. With respect to natural gas infrastructure, the New England states requested ISO-NE's assistance toward approval by FERC of a tariff for the recovery of the cost of firm natural gas pipeline capacity, in a manner that is effective to achieve the construction of new, or the expansion of existing, pipelines in the amount of firm pipeline capacity into New England of 1000 MMcf/day above 2013 levels or 600 MMcf/day beyond what has already been announced for the Algonquin Incremental Market Expansion ("AIM") and Tennessee's Connecticut Expansion ("CT") projects. Further, the New England states preliminarily agreed that recovery of the net cost of any such procurement of firm pipeline capacity be collected

through the Regional Network Services rate shared appropriately among the New England states. NESCOE's letter to ISO-NE is attached as Attachment C.

Accordingly, the New England states are currently working together on potential mechanisms to facilitate infrastructure development that would help diversify the region's fuel resource mix, enhance reliability and help advance carbon reduction goals. The New England states will advance such potential mechanisms to the natural gas pipelines, ISO-NE, the New England Power Pool ("NEPOOL") and/or stakeholders for discussion and action as appropriate.

II. Focus Group

A) Purpose and Scope

1. **Bridge communication gaps between electric industry, gas industry, and States**. The Focus Group provided a vehicle for ensuring full and balanced communications on the: (i) intricacies of the different industries and perspectives; (ii) evolving challenges resulting from increased dependence on natural gas for electric generation in New England; and (iii) potential solutions to those challenges.

2. **Identify and evaluate challenges based on informed input from all interested stakeholders.** The Focus Group discussed, and to the extent possible, segregated the articulation of potential solutions that may be accomplished in the short-term (within two years), the intermediate-term (two to five years) and the long-term (more than five years) to the challenges identified.

3. **Analyze, discuss and exchange viewpoints and facts regarding challenges and their solutions.**[2]

Prepare a Report.[3] Beyond providing an open regional forum for discussion, the Focus Group was tasked with preparing a report ("Report") that would identify, generally: 1) agreed-upon challenges that emerge in regional discussions; 2) regional solutions on course to be implemented that require no additional discussion; 3) potential solutions about which there is full information available upon which to base judgments and about which there is consensus; 4) potential solutions that some stakeholders and/or states believe may have merit, but about which further analysis is required to inform a final judgment; and 5) potential

[2] In the context of subsection (1) and (2) described above under "Purpose and Scope," the Focus Group discussions included reference to, and explanation of, potential solutions that were being discussed and considered by NEPOOL. However, because under New England's Regional Transmission Organization ("RTO") arrangements, NEPOOL, pursuant to the Participants Agreement, provides the sole Participant Processes for advisory voting on ISO-NE matters, the Focus Group did not debate or duplicate discussion of any proposals that otherwise occurred in the NEPOOL stakeholder process.

[3] Note that the Focus Group did not have any staff or consultants. As such, the group's capacity to conduct independent analysis of potential solutions was limited.

solutions about which there is full information available on which to base a judgment, and about which there is no consensus.

B) Membership

The composition of the Focus Group consisted of industry representatives from interstate natural gas pipelines, electric generators, end-use consumers, ISO-NE, municipal electric providers, Local Distribution Companies ("LDCs"), Liquefied Natural Gas ("LNG") facilities, and environmental advocates, state regulators, and other interested stakeholders. The distribution list of Focus Group meeting attendees is included as Attachment D.

C) Means

1. The Focus Group met on a monthly basis eight times beginning in October 2012 and concluding in May 2013. Since May 2013, the Focus Group has held meetings on an as-needed basis, including, most recently, on October 18, 2013;

2. The Focus Group held an Operational Webinar in February 2013 to facilitate the gas and electric industry's understanding of each other's day-to-day operational challenges; and

3. The Focus Group considered specific objectives through three subcommittees[4] of the Focus Group, which conducted work by teleconferences, some of which continued discussions following the cessation of the Focus Group's regularly scheduled monthly meetings.

III. Focus Group Subcommittees

Three focus group subcommittees were set up and were comprised of members of the focus group or their designees. Subcommittee participation was open to anyone that wished to participate. The three subcommittees are described below.

A) Gas Markets Subcommittee

1. **Purpose and Scope**: The subcommittee was established based upon the view that the electric industry market need for natural gas was different than the traditional gas model. The electric industry gas supply is largely reliant on the city-gate secondary market and depends upon firm capacity holders and pipelines for the procurement of services and supplies to facilitate ramp up and ramp down during intra-day and non-business hours. The subcommittee explored potential short-term enhancements in terms of communication, markets and systems that could provide benefit

[4] Described in further detail in Section III of this report, the three subcommittees are: (i) *Gas Markets Subcommittee*; (ii) *LNG Import Subcommittee*; and (iii) *Nominations & Scheduling Subcommittee*.

to electric markets in terms of supply transactional access. The following topics were evaluated:

- Investigation of secondary market gas enhancements and liquidity.
- Consideration of enhanced ways to communicate gas for sale by LDCs and marketers to generators and other end-users.
- Exploration of opportunities for intra-day buying and selling, off-hours, weekend (3 day), and holiday transactions and consideration of related issues (such as whether there is enough liquidity during non-standard hours, or whether liquidity will be enhanced by such measures).
- Examination of the role of the Intercontinental Exchange ("ICE") system.
- Analysis of how buying and selling relates to pipeline nominations and scheduling.
- Consideration of how technology and communication systems can be better employed to communicate opportunities to buy, sell and schedule.

2. **Composition**: The subcommittee was comprised of gas marketers, LDCs, pipelines, generators, NESCOE, counsel from Day Pitney, ISO-NE, representatives from national organizations and other stakeholders that volunteered to participate.

3. **Outcomes/Recommendations**:

Overview: The exchange of detailed information concerning the workings of each industry in terms of markets and physical operations and the identification of issues, some of which are described in this section of the Report, was the main accomplishment of the subcommittee. While the subcommittee concluded that a regional information platform could provide enhanced access to information concerning physical pipeline operation and gas capacity/supply availability, the subcommittee did not have the funding or resources to develop such a platform at this time. While such a tool would provide better information, the consensus of the subcommittee was that it would not address the underlying gas capacity limitations in the region that affect liquidity and the physical ability to respond to electric generator needs.

Need: The subcommittee acknowledged and agreed that gas generators clearly need gas market flexibility to address intra-day dispatch changes

from the perspective of a buyer and a seller. Currently, such intra-day needs are pursued through private commercial transactions. Many generators acquire gas during the morning for the next day; however, they may need to purchase or sell gas on an intra-day basis depending on the circumstances.

Existing Tools: Transactions occur on the ICE system, or through private commercial arrangements between counterparties arranged via phone communication, instant messenger or other means. Transactions may occur at fixed prices based upon market conditions or utilize published market indices such as those contained in *Gas Daily*.

Issue - Limitations of ICE system: The ICE electronic system forms the basis of the gas market, in conjunction with private commercial transactions. Significant transactional and liquidity limitations of the ICE system were identified most predominantly due to capacity constraints, and the lack of available capacity limiting sellers and the lack of buyers and sellers during intra-day and non-business hours. The ICE system is not used during off-hours, weekends and holidays. Transactions that occur on Friday are for the three day period of Saturday-Monday. Intra-day, the ICE system frequently suffers from lack of buyers and sellers.

Another concern expressed by holders of firm capacity in New England was the "buyer's choice of point" concept employed by the ICE system. For example, an Algonquin city gate purchase enables the buyer to select any delivery point (even those requiring "out of path" flows through constraints), and correspondingly obligates the seller to deliver to that point or face penalties. This deters seller participation in ICE sales transactions, and instead incentivizes such sellers to engage in the secondary market only through private commercial transactions. In that regard, ICE prices reflect only a limited amount of transactions. The subcommittee unsuccessfully attempted to contact and work with ICE on these issues.

Issue - Supply Store "Not Open" Off Hours: The subcommittee concluded that most energy marketing companies that are involved in buying and selling are not staffed for off-hours operations. The reason why these entities are not staffed "24/7/365" is because it is not cost effective to do so; there are not enough off-hours transactions and margins available that occur to justify keeping the "store open" in such a fashion.

The subcommittee also acknowledged that there is a lack of liquidity during intra-day, off-hours and weekend time periods, due to capacity constraints on the pipelines and the absence of both buyers and sellers. While the amount of intra-day, off-hours and weekend liquidity varies considerably, it is always subject to capacity constraints.

While thought was given to the possibility of the "24/7/365" operation of the supply store, no one expressed interest in funding such operations to ensure the availability of off-hours supplies.

Issue - Secondary Points: The New England city gate secondary markets depend upon scarce firm transportation. Availability of gas to secondary markets is subordinate to the use by the holders of transportation capacity (mostly LDCs), or downstream suppliers such as LNG importers, and is of limited availability during high demand conditions. Secondary market sales almost always use secondary delivery points which have a lower priority of service relative to the primary points in the underlying contracts. Secondary in-path deliveries are typically reliable, the secondary out-of-path deliveries are highly prone to interruptions and inability to schedule. The subcommittee concluded that availability of the secondary points was declining in the region due to both lower LNG imports and the growth in higher gas use by firm gas customers. Consequently, the subcommittee determined that only increased use of existing infrastructure (e.g., LNG) or added natural gas infrastructure would contribute to a higher level of availability and flexibility of secondary market capacity in the region.

Potential Enhancement - Information Platform: The subcommittee examined alternative ways to help address the gas market limitations faced by generators both in the short term and beyond. The underlying capacity issue was beyond the scope of the subcommittee. Thought was given to the development of a New England market information platform that would contain market and capacity information, and perhaps serve as a platform for the purchase and sale of gas in the secondary market. The developmental, legal, compliance, cost and feasibility issues were evaluated and the effort was deemed to be important, and of interest. However, ultimately, the effort was deemed to be without funding, and otherwise unsupported by the resources available to the subcommittee.

The markets and pipeline information subcommittee also worked on a potential interim communications tool as a means to communicate short term gas supply or capacity more efficiently, but the tool was not implemented. Market participants were not convinced such a tool would provide value and better communication at the time.

The subcommittee agreed that it should monitor other efforts to institute such measures, perhaps by the FERC, ICE or a third party.

B) LNG Imports Subcommittee

1. **Purpose and Scope**: The subcommittee explored the potential leveraging of additional LNG imports as a supply source for the electric industry. The subcommittee recognized that LNG imports have been, and were likely to continue to be, a marginal winter source of gas supply in the secondary market for the region and the electric industry. This is due to the fact that LNG imports often, depending on the delivery point, perform a back-feeding role entering the region due to pipeline firm west to east capacity limitations. The following topics were evaluated:

    - In light of LNG's historic role, examining whether existing LNG import facilities in the region could be further utilized to provide gas supply during periods of high demand, subject to mutually agreeable commercial arrangements that would enable these facilities to attract LNG imports that could eventually be transported downstream.

    - Ensuring that this opportunity was fully communicated, understood, analyzed by the ISO-NE in its winter 2014 short term solution evaluation, and for purposes of mid and longer term options.

    - Assistance in understanding transportation bottlenecks and coordinating transportation evaluation as necessary with interstate pipelines to move the gas to generators.

    - Ensuring understanding of new and existing service options that may be available through the flexible storage capabilities of the LNG facilities (hourly, intraday, and off-hours services).

2. **Composition:** The subcommittee was comprised of gas LDCs and LNG importers, an electric generator and a state official, NESCOE and counsel from Day Pitney. All members of the focus group were invited to participate, but no other entities volunteered.

3. **Outcomes/Recommendations**: The subcommittee examined the historical level of LNG imports into the region and deemed such imports to be important sources of supply into the secondary market. LNG imports into the region often provided back-feeding supplies (counter to forward haul constraints), and thus could be available quickly as pipeline construction to move such supplies was often not required (depending upon actual receipt and delivery point combinations). The subcommittee urged that LNG imports be considered as part of ISO-NE interim procurement for the winter of 2013/2014, and the LNG importers put forth proposals to provide service to the region through meetings with the ISO-NE, generators and as part of the NEPOOL process. LNG imports were

considered, but not selected, for the ISO-NE interim procurement. The resulting and future level of LNG imports into the region is unknown, and will depend upon future commercial arrangements entered into on a timely basis to ensure the LNG importers can pre-arrange contractually for ship cargoes on the world market.

The subcommittee concluded that LNG imports would continue to be a key winter marginal supply source for the electric industry for the foreseeable future due to west to east firm pipeline capacity limitations. The subcommittee also determined that communication and efforts to pursue commercial arrangements should continue be considered a priority.

C) Nominations & Scheduling Subcommittee

1. **Purpose and Scope:** The purpose of the subcommittee was to determine whether enhancements and standardization of hourly natural gas nomination rights was necessary. The premise of the effort was that the electric industry frequently requires intra-day changes in terms of gas flows to plants, both upwards and downwards, and some generator owners are also interested in moving gas between regional pipelines intra-day (i.e. between Tennessee and Algonquin at Mendon, MA) as circumstances warrant.

2. **Composition:** The subcommittee was comprised of gas marketers, LDCs, pipelines, generators, NESCOE, counsel from Day Pitney, ISO-NE, representatives from national organizations and other stakeholders that volunteered to participate.

3. **Outcomes/Recommendations:** The subcommittee performed an examination of the need for, and availability of, pipeline nominating and scheduling flexibility in the New England region. The subcommittee concluded that gas generators need a high level of flexibility to allow them to respond to dispatch orders from the ISO-NE throughout the electric day. Gas generators need to be able to procure, sell, nominate, and redirect gas in response to dispatch instructions. To the degree that pipelines can provide this flexibility on an informal basis, additional formal nomination cycles may not be needed. The subcommittee agreed with the following observations:

    - The ability to do hourly nominations does not enhance the physical capacity of the system.

    - During high demand periods, hourly nomination attempts through constraint points are often futile as primary firm service is being used.

- The ability to schedule hourly nominations is always subject to confirmation of flow from upstream and downstream entities.

- Market liquidity is frequently an issue regarding intraday and hourly demand and supply.

The subcommittee also determined that ratable versus non-ratable takes of gas, and the timing of scheduled volumes and usage and notice time frames for starting of gas plants, especially quick start peaking plants, is a major issue. The existing gas system is not designed to accommodate those types of demands.

Overall, the subcommittee determined that the current non-physical scheduling flexibility, formal and informal, offered by the various regional interstate pipelines is sufficient to meet the majority of the market participants' needs. Moreover, the actual ability to schedule is often physical in nature, a function of infrastructure and associated firm services, and that no additional formal North American Energy Standards Board ("NAESB") nomination/confirmation/scheduling cycles are needed at this time.

IV. NESCOE's Black & Veatch *Gas-Electric Study*

A) The purpose of the NESCOE *Gas-Electric Study* was to analyze the current and future natural gas fuel supply and infrastructure in New England and to assist policymakers' understanding of the future implications for natural gas-fired power generation in New England, power system reliability and consumer costs over the long-term. The Gas-Electric Focus Group was the forum through which NESCOE shared information with interested stakeholders in connection with Black & Veatch *Gas-Electric Study*.

B) Black & Veatch Presentation of Phase I Report

In Phase I, Black & Veatch assessed the adequacy of natural gas infrastructure in New England based on the studies and information available to date. Black & Veatch concluded that New England's natural gas infrastructure will become increasingly stressed as regional demand for natural gas grows, leading to infrastructure inadequacy at key locations. Black & Veatch also identified information gaps and missing elements in prior studies and papers.

C) NESCOE Presentation of Phase II Report

Black & Veatch found that historical load and price analyses show that the region experienced supply stress, expressed as spot market basis spikes, when load levels approached 75% or more of existing firm contract capacity serving the market. This indicates that the current New England natural gas market balance is very tight, with small shocks to the system causing significant market impacts. Therefore, the 75% utilization factor of firm contracted capacity was identified as the "constraint capacity" threshold facing the region. The capacity constraint threshold and historical and forecasted load duration curves were used to analyze the extent and duration of pipeline congestion serving the region. Black & Veatch found that in the absence of incremental natural gas infrastructure (or increased use of existing LNG infrastructure), regional load growth from the electric sector will increase the likelihood of constraints. For the 14 New England sub-regions that Black & Veatch analyzed, 11 will exceed the constraint capacity level by more than 30 days in the year 2023 without Spectra's Algonquin Incremental Market Expansion ("AIM"). Even with AIM, nine sub-regions will have load levels that exceed the constraint capacity threshold for more than 30 days in 2023.

Black & Veatch indicated it believes that the following are the most appropriate primary solutions to alleviate the infrastructure constraints: incremental natural gas pipeline capacity, incremental LNG imports, and electric transmission that enables imports from outside the region. Other alternatives considered—additional LNG peak-shaving capacity, dual-fueled generation and demand-side resources—can help to relieve capacity constraints in a meaningful way, at least at a sub-regional level or as part of a blended solution.

NESCOE concluded that in Phase III, Black & Veatch would further analyze the combinations of potential solutions to address New England's natural gas infrastructure inadequacy issues associated with electric reliability. Based on preliminary observations and findings, Black & Veatch recommends three scenarios and several sensitivities to explore the potential severity of infrastructure constraints as well as the benefits brought about by incremental infrastructure: *a Base Case, a High Demand Scenario, and a Low Demand Scenario.*

D) NESCOE Phase III Report and Recommendations

In Phase III, NESCOE examined the adequacy of New England's natural gas infrastructure to meet the growing needs of the electric generation sector and analyzed the relative costs and benefits of various solutions that could alleviate natural gas pipeline congestion. Its consultant, Black & Veatch, performed an economic analysis of the natural gas and electricity market interactions using computer simulation modeling and cost-of-service cost estimation techniques. In the Phase III final report, *Natural Gas Infrastructure and Electric Generation: Proposed Solutions for New England*, Black & Veatch estimated the costs and benefits associated with various gas and electric supply and demand-side solutions under three future scenarios: a Base Case (most likely outcome based on current outlooks), a High Demand Scenario (increased gas use through market and policy drivers), and a Low Demand Scenario (flat or declining gas use across all sectors).

The Phase III report highlighted Black & Veatch's key observations and analytical results:

- In the absence of infrastructure and demand reduction / energy efficiency / non-natural gas-powered distributed generation solutions, New England will experience capacity constraints that will result in high natural gas and electric prices; as noted below, in a Low Demand Scenario, no long-term infrastructure solutions are necessary.

- Gas-supply requirements driven by episodes of extremely cold weather can be very costly and create significant reliability risks – they aggravate infrastructure deficiencies.

- Short-term solutions (2014-2016) provide net benefits to New England customers.

- In the absence of greater demand reduction / energy efficiency / non-natural gas-powered distributed generation solutions, a Cross-Regional Natural Gas Pipeline solution presents higher net benefits to New England consumers than do alternative long-term solutions (2017-2029).

- For more or all prospective solutions, the majority of the benefits apply to New England electric customers.

Black & Veatch concluded and recommended:

- Short-term and long-term solutions are needed to relieve the natural gas market constraints in New England under the Base Case and High Demand Scenario.

- No long-term infrastructure solutions are necessary under the Low Demand Scenario.

In its notice of issuance, NESCOE made several observations on the results of the Gas-Electric study, including:

- A new natural gas pipeline currently in process toward commercial operation provides significant economic benefits to New England's electricity customers under all future scenarios studied – the Base Case, the Low Demand Case, and the High Demand Case. The commercial operation of this new planned pipeline reduces gas prices – and therefore electricity prices – in the short term.

- An *additional* hypothetical pipeline, beyond that in process toward commercial operation, provides the most substantial economic net benefits to electricity consumers of all solutions studies under the Base Case and the High Demand Case.

- Using existing LNG import terminals and dual-fuel (e.g., gas and oil) capable electric generation infrastructure is a cost-effective means to address natural gas dependency in the short term, or at least until a new longer-term infrastructure, such as a natural gas pipeline or electric transmission line to increase the level of hydroelectric imports, become operational. Dual-fuel units would, however, need to comply with increasingly stringent emissions standards in order to be permitted. This is likely to influence the extent and duration of at least some dual-fuel units' ability to reduce natural gas dependency.

- The actual cost to consumers for incremental hydroelectric imported power is currently unknown. The study assumes cost of service based pricing, which may be much lower than its real costs to electricity consumers if the cost of hydroelectric imports are ultimately closer to market prices than to the cost-of-service. The actual costs of incremental hydroelectric imports are unknown absent a competitive process to identify a

fixed bid price, a negotiated price in relation to a specific project, or an actual project advancing to operation.

- Reducing consumers' demand for electricity and natural gas to the extent assumed in the Low Demand Case eliminates the need for consumers to invest in infrastructure (beyond the pipeline currently in process toward commercialization). Successfully implementing natural gas and electricity energy efficiency programs, renewable thermal heating applications, and distributed electric generation that cause the demand for natural gas and the net electric load to decline in the long-term could eliminate any need for additional infrastructure. The associated cost of achieving a Low Demand Scenario is not known. Further analysis would be required to determine whether policies that would result in a Low Demand Scenario are cost-competitive with infrastructure investments.

NESCOE presented the Phase III Gas-Electric Study results to the Focus Group on October 18, 2013. Stakeholders from both the gas and electric industries provided written comments on the study. Two natural gas pipelines, a hydroelectricity importer, and a regional natural gas industry trade association provided written comments on aspects of the study, including input assumptions and the cost and benefit analysis.[5] While generally supporting the report's conclusions, the Northeast Gas Association (NGA) identified, in their view, a number of issues with the study including, among others, an overly optimistic AIM expansion assumption, understated LDC demand and understated pipeline infrastructure cost assumptions. HQ Energy Services indicated support for consideration of imported hydro-power and suggested the report likely understated the benefits of new electric transmission to enable such imports.

The Phase III final report completed NESCOE's study of the interactions between the New England natural gas and electricity markets.

V. Solution Discussion

A) Electric market-related solutions that ISO-NE appears to have either implemented (or is on course to implement).

Those solutions in effect include:

1. Improved communication on maintenance/outage scheduling and pressure restrictions between gas pipeline and ISO-NE.

2. Requirement that generators submit information to ISO-NE on their fuel status.

[5] Stakeholder comments and NESCOE's reply are available at: http://www.nescoe.com/Gas-Elec_Info_Exchange.html.

3. Utilization of the Cold Weather Conditions authority to move the Day Ahead Market.

4. Moving Day-Ahead Market and the Reserve Adequacy Assessment ("RAA") forward.

5. Payment to certain dual fuel capable units to hold/burn oil and maintain oil-burning capabilities in the ISO-NE's 2013/2014 Winter Program.

Those solutions that are planned or in-progress include:

1. Disclosure of generation output to pipelines.

2. Allowing generators to reoffer hourly during the intraday period.

3. Revisions to Day Ahead Market to allow for variable offer curves.

4. Allowing generators to submit bids based on two fuels if the generator is dual-fuel capable.

5. Changing mitigation methodology so that generators can reflect price risk in their offers.

6. Implementation of rule changes that encourage better unit availability during scarcity conditions.

B) Gas system and/or gas market-related solutions that the gas industry appears to have either implemented (or is on course to implement) include:

1. Communication on maintenance/outage scheduling and pressure restrictions between gas pipelines and the ISO-NE.

2. Pipeline nomination flexibility that reflects enhancements including hourly rights.

3. Public posting of information regarding pipeline capacity status and restrictions.

4. Availability of LNG imports during the winter of 2013/2014 subject to commercial restrictions.

5. Continued cooperation between the gas industry and generators concerning explanation of restriction points and potential input sources to avoid bottlenecks.

6. Continued use of line pack by pipelines to provide transportation services to the region.

7. Active and viable pipeline expansion proposals that have been proposed by Algonquin, Tennessee and PNGTS that will add capacity to the region.

8. Availability of "negotiated rate" arrangements that offer substantial flexibility to pipelines and their customers.

C) Potential solutions that may have appeal to some stakeholders and/or states, but require further analysis before implications can be fully understood, and judgments can be formed.

In addition to the measures discussed within the individual subcommittees, the gas industry has suggested a number of mid- and long-term measures that were proposed in the Focus Group process that may have some appeal, but require further analysis. These include:

1. Gas sector could develop new services that incorporate more flexibility for generators, subject to additional infrastructure and appropriate cost and design.

2. Interstate pipelines have expressed a willingness to expand their pipeline systems to serve the electric industry, but require long term commitments to support the capital investment consistent with gas industry practice.

3. Gas pipeline rate designs could be examined to determine if there are ways to shift some costs from fixed to variable collection for firm transportation as part of new infrastructure expansion.

4. Certain LDCs are willing to subscribe for new pipeline firm transportation services under long term contracts, operate and manage such capacity, employing capital and utilizing their experience and resources to assist the electric industry in building and managing firm and flexible services to generators, subject to an appropriate funding mechanism (such as an ISO-imposed surcharge).

5. LNG importers have offered and are willing to continue to offer supply services from the east end of New England subject to commercial arrangements and other factors. To transport such supply, pipelines have and can continue to review capacity requests for flow feasibility from such sources for various terms.

6. Certain LDCs may be willing to work with the electric industry towards building and operating new LNG storage terminals in the region to serve generators, subject to the appropriate funding of such resources.

7. As part of new infrastructure construction, pipelines may offer more service enhancements subject to agreement and FERC approval for non-standard services.

8. LDCs may consider additional summer monthly releases of storage and downstream pipeline capacity at market rates and at quantities to be determined, subject to serving system demand and maintenance of appropriate inventory levels.

9. Technological advances, such as a potential on-site "compressed natural gas" concept to assist in providing balancing and hourly service.

10. Potential increases in natural gas efficiency.

11. The markets subcommittee worked on the development of a regional information platform to promote transaction and information flow but such efforts have been suspended due to funding and feasibility issues.

D) Potential solutions about which market participants and the states broadly believe there is adequate information available and about which there is no consensus.

One current proposal intended to improve resource performance and availability over the long-term is ISO-NE's Forward Capacity Market Performance Incentive mechanism ("FCM PI"). FMC PI is ISO-NE's preferred means to improve resource performance. ISO-NE has produced substantial analysis associated with FCM PI. FCM PI has minimal voting support within NEPOOL. There is adequate information concerning what the proposal is, but the impact of the proposal is subject to opinion, is unclear and is controversial. It is also unclear whether and to what extent the proposal would cause natural gas-fired power generators to modify their natural gas procurement practices.

Gas/Electric Themes From December 19, 2012 Meeting
New England Gas-Electric Focus Group
Tri-Chair Observations for Discussion

(Updated January 22, 2013 - Includes comments received by multiple Gas-Electric Focus Group members in response to the December 19 draft of Common Themes)

Themes Supported by Facts:

1. Interstate pipelines in southern New England operate at very high capacity factors during periods of peak demand (primarily in winter). As gas supply has become abundant in the Marcellus region, New England pipelines have experienced increased capacity factors in non-peak summer months too, primarily due to the increase in gas demand by power generation markets. Pipelines have little, if any, forward haul (west to east) firm year-round capacity available. They have some back haul (east end) capacity available, most of which can only be utilized if gas from eastern sources (Maritimes Canada, Portland Natural Gas Transmission, and LNG imports) is available.

2. There is no gas production or underground storage in New England.

3. There are four LNG import terminals that can provide supplies into New England, with the ability of such supplies to be delivered to markets subject to downstream pipeline capacity. In recent years gas deliveries to LNG terminals in the region have declined substantially as low US gas prices have made the US market relatively unattractive compared to other potential markets. As a result, the bulk of gas supplies for New England are coming through the west-to-east pipeline infrastructure.

4. Historical data indicates east end (LNG and Eastern Canadian) supplies into interstate pipelines have been a meaningful source of gas supply in the winter for power generators. A widening differential between LNG and U.S. natural gas prices has adversely impacted the economics of east end supplies.

5. Gas fired power generation demand in New England has increased rapidly over the last few years, and natural gas is now the dominant regional generation fuel.

6. LDC demand in New England is growing because natural gas is now substantially less expensive than oil, which has encouraged conversions.

7. Several interstate pipelines serving New England have active proposals to expand their systems, but pipelines have not increased their west-to-east capacity to accommodate growing gas supply on New England's western doorstep.

8. There is a 3-5 year lead-time to place new gas pipeline capacity into effect.

9. Non-firm pipeline capacity, including secondary out-of-path capacity, seeking to transport from west to east is increasingly interrupted during winter days, and also in the summer. Many gas-fired generators are served using non-firm pipeline capacity.

10. New England has experienced operational problems with electric dispatch and higher costs that are attributable to gas supply restrictions and electricity market design, but to date has not had a major electric reliability event.

11. Gas pipelines have initiated more operational restrictions on non-firm customers to protect deliveries to firm customers; due largely to increasing demand from power generators and LDCs coupled with unexpanded capacity.

12. The gas and electric industries deploy very different models for purposes of planning, operations and cost recovery. LDCs operate portfolios of FERC cost-based firm transport and gas storage, coupled with on-system peak shaving with LNG to manage fluctuating customer demand, under a regulated model. Supply is acquired at market prices at supply sources, not at the city gate. By contrast, the electric industry regularly relies on daily procurements at city gate market prices that include the cost of pipeline capacity in variable charges. [Maintaining electric reliability focuses upon quick starting of marginally dispatched units without "prior acquired" gas delivery].

13. The gas and electric markets are not aligned in terms of acquisition of gas supply/pipeline nominations and dispatch of electric generators.

14. Gas and Electric reliability is very important to both LDCs and electric suppliers and all customers.

15. Gas LDCs in New England own LNG storage facilities which they use for peak shaving. The LNG peak shaving facilities in New England hold about 10 days of supply at maximum output and therefore are husbanded by LDCs to ensure access under cold winter weather conditions. The facilities are designed to serve firm gas customers on peak days. The vast majority of the LDC LNG facilities do not have the ability to liquefy gas off of the pipeline and thus are dependent on trucked in supply. Those LNG facilities that can liquefy supply can only do so at a very low re-fill rate.

Other Themes and Opinions:

1. There is a significant fixed cost and term commitment required to contract for firm gas capacity, but such incrementally constructed capacity may allow access to lower commodity costs. The net cost impact varies and depends upon market conditions, availability of interruptible capacity, LNG imports, and other factors.

2. It is unclear what the net benefits associated with the fixed costs of acquiring firm gas pipeline capacity will be for the region's energy infrastructure as a whole.

3. Recent market conditions (for this winter season) indicate the price differential between New England city gate prices and supply source prices has widened to historical highs. Some believe that contracting for new incremental pipeline capacity would be a net cost reduction to both electric and gas consumers; others believe the opposite is true.

4. Both the electric and gas industries in New England have recently experienced some situations of low and volatile gas pressure issues.

5. There is significant existing communication and coordination between the gas and electric industries in New England. It is unclear if further improvements in communications can resolve capacity deficits.

6. Some parties believe that the problems associated with gas-electric coordination can be resolved through electric market modifications, while others believe that a resolution will require solutions beyond those possible within the existing structure of the gas and electric markets.

7. The ISO has indicated that natural gas dependence is a high priority strategic risk. The ISO has put forth various proposals, both short and long-term oriented, to address gas dependence and coordination issues, and is conducting ongoing analysis.

8. ISO-proposed changes are subject to stakeholder debate and committee reviews, and usually also require FERC approval.

9. Earlier commitment notification to generators and hourly offers and reoffers may help in the near term to mitigate issues arising from the lack of alignment between the gas and electric markets.

10. Gas-fired electric generators without firm supply are sometimes unable to get the gas they need to respond to ISO instructions. Sometimes the unavailability of a gas-fired electric generator cannot be determined until the unit is unable to obtain gas in response to an ISO direction to come on-line or, in other cases, when such generator goes off-line unexpectedly. ISO is working to understand which gas-fired electric generators are affected by these circumstances so that ISO can properly commit and dispatch generation. However, ISO does not always have complete information and may therefore over-commit resources to mitigate this risk to reliability. Some gas generators are also being asked to increase their availability in real-time putting further financial and physical strain on the generators and the gas markets.

11. Some entities believe that gas pipeline expansion is necessary to solve this electric reliability problem.

12. Others believe that the existing gas and electric infrastructure is sufficient to meet consumer demand reliably. These include other generation technologies, dual-fuel units and better maximization of other gas delivery options.

13. Many Focus Group participants are concerned about the cost of gas pipeline expansion and who will commit to and ultimately bear the costs, and some are concerned about whether various approaches might interfere with the functioning of the electric market.

14. Some have expressed concerns about the environmental implications associated with the potential for increased reliance on dual fuel units.

15. Some entities believe that the region should maximize utilization of existing gas infrastructure, including LNG/LDC storage, and pursue leak reduction and energy efficiency, before building any new infrastructure. Others believe that existing infrastructure is already being used to the maximum extent feasible.

16. Some have concerns that the products offered by pipelines do not match the needs of their customers, notably the gas-fired generators.

17. Some believe that there are opportunities to integrate demand response to a greater extent into the gas system.

18. Pipeline expansion will probably result in lower gas commodity prices in New England. Some believe those lower gas prices would lead to lower electricity prices, while others believe the cost of new pipeline infrastructure could push electricity prices higher. Depending on the type of mechanism used to "collect" the cost of any new gas infrastructure, some also believe that imposing the costs of new gas infrastructure on generators could create a "multiplier effect," meaning consumers would pay orders of magnitude more than the actual cost of the new infrastructure. For example if such costs were "collected" through the electric industry Forward Capacity Market with a gas unit as the marginal clearing resource, it is possible this increment of cost would be paid to all capacity resources not just gas generation, requiring electric customers to carry a multiple of incremental cost. Others believe that socializing the cost of pipeline expansion could undermine electric market signals.

19. Natural gas end-use customers of LDCs could also benefit from new pipeline infrastructure.

NEW ENGLAND GOVERNORS' COMMITMENT TO REGIONAL COOPERATION ON ENERGY INFRASTRUCTURE ISSUES

Securing the future of the New England economy and environment requires strategic investments in our region's energy resources and infrastructure. These investments will provide affordable, clean, and reliable energy to power our homes and businesses; make our region more competitive by reducing energy costs; attract more investment to the region; and protect our quality of life and environment.

As the region's electric and natural gas systems have become increasingly interdependent, ensuring that we are efficiently using existing resources and securing additional clean energy supplies will be critical to New England's economic future. To ensure a reliable, affordable and diverse energy system, we need investments in additional energy efficiency, renewable generation, natural gas pipelines, and electric transmission. These investments will also serve to balance intermittent generation, reduce peak demand, and displace some of the least efficient and most polluting fossil fuel generation, enabling the states to meet clean energy and greenhouse gas reduction goals while improving the economic competitiveness of our region.

New England ratepayers can benefit if the states collaborate to advance our common goals. The Governors therefore commit to continue to work together, in coordination with ISO-New England and through the New England States Committee on Electricity (NESCOE), to advance a regional energy infrastructure initiative that diversifies our energy supply portfolio while ensuring that the benefits and costs of transmission and pipeline investments are shared appropriately among the New England States. At the same time, we must respect individual state perspectives, particularly those of host states, as well as the natural resources, environment, and economy of the States, and ensure that the citizens and other stakeholders of our region, including NEPOOL, are involved in the process. The Governors are committed to achieving consensus as we move forward, consistent with laws and policies across the region.

The New England States believe that investments in local renewable generation, combined heat and power, and renewable and competitively-priced heating for buildings will support local markets and result in additional cost savings, new jobs and economic opportunities, and environmental gains. The New England States further believe that these investments must be advanced in a coordinated approach in order to maximize ratepayer savings and system integrity. We will continue to advocate at ISO-New England, NEPOOL, and elsewhere for greater integration and utilization of renewable generation; development of new natural gas pipeline infrastructure; maximizing the use of existing transmission infrastructure; investment, where appropriate, in new transmission infrastructure; and continuation of the inclusion of energy efficiency – and the addition of distributed generation – in load forecasting and transmission planning.

continued…

New England Governors' Commitment to Regional Cooperation on Energy Infrastructure Issues

We have directed our appropriate staff to work together with NESCOE to ensure that we are taking all necessary steps to meet our common needs and goals. Our commitment to work together on energy infrastructure issues will be informed by recent regional energy infrastructure studies conducted by the States, ISO-New England, and other regional organizations. We believe that by working together we can expand economic development, promote job growth, improve the competitiveness of our industries, enhance system reliability, and protect and increase the quality of life of our citizens. Expanding our existing efforts will ensure that we are on a course toward a transformed energy, environment, and economic future for our region that offers a model for the nation.

Signed,

Dannel P. Malloy
Governor of Connecticut

Paul R. LePage
Governor of Maine

Deval L. Patrick
Governor of Massachusetts

Margaret Wood Hassan
Governor of New Hampshire

Lincoln D. Chafee
Governor of Rhode Island

Peter Shumlin
Governor of Vermont

New England States
Committee on Electricity

January 21, 2014

Via electronic mail

Mr. Gordon van Welie, President and CEO
ISO New England, Inc.
One Sullivan Road
Holyoke, MA 01040

Re: Request for ISO-NE technical support and assistance with tariff filings related to electric and natural gas infrastructure in New England

Dear Mr. van Welie:

The New England Governors recently expressed their collective perspective about energy infrastructure diversification in a statement entitled the *New England Governors' Commitment to Regional Cooperation on Energy Infrastructure Issues*, dated December 2013. The New England States Committee on Electricity (NESCOE) is pleased to begin furthering the Governors' common interests in cooperation with ISO-NE and stakeholders, such as the New England Power Pool (NEPOOL). To that end, NESCOE requests that ISO-NE take all necessary and appropriate action to accomplish the following:

1. **New Electric Transmission Infrastructure.** In furtherance of the New England States' (the States) energy and environmental policy requirements and other statutory objectives, the New England States, through NESCOE, have agreed that one or more requests for proposals will be issued to advance the development of transmission infrastructure that would enable delivery of at least 1200 MW and as much as 3600 MW of clean energy into the New England electric system from no and/or low carbon emissions resources. NESCOE is in the process of developing the specific method to facilitate infrastructure development, including but not limited to the products to be procured. As is generally the case with state solicitations, whether and to what extent States decide to move forward with one or more proposals will depend on their judgments as to proposed pricing and other consumer implications.

   Specific infrastructure projects inevitably present some variation in benefits and costs when evaluated on a state-by-state basis; however, the States expect that the diverse energy infrastructure contemplated by the Governors will provide broad-based consumer benefits across New England's integrated energy marketplace. Through this effort, then, the States

will seek a portfolio of projects that produce region-wide benefits and that support an appropriate allocation of costs based on these benefits. The States agree that the costs of transmission infrastructure would be recovered through the ISO-NE tariff or through merchant project(s) in a manner that ensures that the benefits and costs of transmission investments are shared appropriately among the New England States.

To assist in these efforts, NESCOE is requesting that ISO-NE provide to the States (i) technical electrical system planning and related support; and (ii) support in the development and filing of any tariff changes needed to advance the States' objectives, including, as necessary, working together with States and transmission owners with responsibility for cost allocation filings with the Federal Energy Regulatory Commission (FERC).

2. **Increased Natural Gas Capacity.** The approval by FERC of a tariff for the recovery of the cost of firm natural gas pipeline capacity, in a manner that is effective to achieve the construction of new, or expansion of existing, pipelines. Specifically, the additional capacity shall be capable of delivering natural gas from one or more of the "hubs" at the Ramapo, Wright or similar facility at prices reflecting no or minimal "basis differential" relative to Henry Hub, in amounts sufficient in aggregate to achieve, when taken together with firm commitments by other market participants, an increase in the amount of firm pipeline capacity into New England of 1000 mmcf/day above 2013 levels or, 600mmcf/day beyond what has already been announced for the AIM and CT expansion projects. The New England States preliminarily agree, through NESCOE, that recovery of the net cost of any such procurement of firm pipeline capacity be collected through the Regional Network Services rate shared appropriately among the New England States. States are in the process of discussing appropriate cost allocation. NESCOE requests that all possible efforts be made to secure approval of the tariff as expeditiously as possible and with the objective of allowing commitments to be made that would permit the new pipeline capacity to be available no later than the winter of 2017/18. NESCOE does not have a single preferred mechanism for securing pipeline capacity under the requested tariff, but the New England States agree that they will work with ISO-NE and NEPOOL participants to develop and support, and take whatever steps are necessary and appropriate to facilitate, a structure that will ensure that the capacity obtained with the support of the postulated ISO-NE tariff will be made available in a manner that primarily benefits electricity customers in the ISO-NE market.

NESCOE appreciates ISO-NE's technical assistance and related support and looks forward to continuing discussions with ISO-NE and NEPOOL about means to execute the New England States' shared objectives as expeditiously as possible.

Sincerely,

/s/ Ann G. Berwick
Ann G. Berwick
President, NESCOE
Chair, Massachusetts Department of Public Utilities

/s/ Katie S. Dykes
Katie S. Dykes
Deputy Commissioner for Energy
Connecticut Department of Energy and Environmental Protection

/s/ Thomas L. Welch
Thomas L. Welch
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ATTACHMENT D

Updated 3/28/14

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