



North American Energy Standards Board

# Gas-Electric Harmonization Committee Report

September 2012



**Wholesale Electric**



**Retail Electric**



**Wholesale Gas**



**Retail Gas**



## **NORTH AMERICAN ENERGY STANDARDS BOARD**

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### **NAESB Gas-Electric Harmonization Committee**

Ms. Valerie Crockett, *Co-chair*  
Dr. Sue Tierney, *Co-chair*

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The drafters of the report, the members of the NAESB Gas-Electric Harmonization Committee, comprise a broad cross section of natural gas and electric markets – state and federal regulators, pipelines, generators, producers, distribution, marketing, transmission, end users, independent system operators and technology experts.

The committee was fortunate to have several of the key architects of the National Petroleum Council (NPC) report as members. NAESB has reached out to other groups that are also addressing harmonization issues, such as the North American Electric Reliability Corporation, to ensure that the activities are coordinated. All NAESB meetings, including those of this committee, are open to any interested party.

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## **BACKGROUND:**

In September 2011, the National Petroleum Council (NPC)<sup>1</sup> issued the “Prudent Development – Realizing the Potential of North America’s Abundant Natural Gas and Oil Resources” study.<sup>2</sup> The NPC study was in response to letters dated September 16, 2009 and April 30, 2010 from the U. S. Department of Energy Secretary Steven Chu. The NPC conducted a comprehensive study to reassess the character and potential of the North American natural gas and oil resources and the contribution that natural gas can make to a transition to lower carbon energy footprint. The report cited five core strategies for government and industry, including the functioning of energy markets and specifically recommended actions that could be taken by NERC, NAESB, FERC, NARUC and Independent System Operators to continue efforts to harmonize the interaction between the natural gas and electric markets.

**The NPC recommended actions were brought to the attention of NAESB’s Board of Directors at both the September and December 2011 quarterly meetings. The NPC recommendations included:**

- **Developing policies, regulations, and standardized business practices that improve the coordinated operations of the two industries and reduce barriers that hamper the operation of a well-functioning market**
- **Increasing the transparency of wholesale electric power and natural gas markets**
- **Addressing the issue of what natural gas services generators should hold, including firm transport and storage, and what services pipeline and storage operators should provide to meet the requirements of electricity generators as well as compensation for such services for pipeline and storage operators and generators**

**In January 2012, the NAESB Board announced the formation of a Board-level Gas-Electric Harmonization (GEH) Committee. As with all NAESB meetings and consistent with the NPC request that the named groups work together with the "robust participation from market participants", all GEH Committee meetings have been posted on the NAESB website and been open to any interested party, with attendance in person or by telephone/webcast. Also, all materials and documents have been made available for public review. The work of the GEH Committee has been informed by this broad transparency, which has allowed interested parties to weigh in in multiple ways with Committee members.**

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<sup>1</sup> The National Petroleum Council endorsed the report in September 2011. The list for the members of the National Petroleum Council can be found at the following link: <http://www.npc.org/members/bycom.html>.

<sup>2</sup> The executive summary of the report can be accessed from the following link: <http://www.npc.org/NARD-ExecSummVol.pdf>.

## COMMITTEE EFFORTS & RECOMMENDATIONS:

The GEH Committee (“Committee”) team has held seventeen meetings and conference calls from January to August 2012<sup>3</sup> in an effort to identify the issues that affect the coordinated operations of the two industries. The Committee is comprised of members from both the electric and gas industries and government organizations. The Committee’s goal is to identify the policy, commercial, and standardized business practices issues that may require action by one or more entities (and not necessarily by NAESB). These potential actions include revised or new policies, commercial solutions, or standardized business practices to improve better-coordinated operations and reduce barriers that hamper the operation of a well-functioning power market and a well-performing gas market.

The Committee’s work involved soliciting insights and observations from members and others with respect to those topics. Because so much rich information came forward through this process, the Committee recorded and compiled these observations into written documents. These compilations are included later in this report and in its appendices. Specifically, the subsequent sections of this report entitled “Standards Development Considerations,” “Policy Considerations,” and “Commercial Practice Considerations” are the compilations that capture the insights made by individual participants in the Committee’s process.

Importantly, we’ve included them in this report for transparency purposes, but not because they reflect a consensus view of the Committee. The individual observations that resulted from those discussions, however, are just that: observations by the respective Committee members, and not to be considered as positions endorsed by the Committee as a whole.

Nonetheless, compiling and categorizing the observations served as the foundation for discussions and for determining what, if any, recommendations this Committee would make to the Board regarding the Committee’s work related to the following questions:

1. Under what circumstances should NAESB consider new standards development or modifications of existing standards (see discussion below under “Standards Development Considerations”);
2. What policy decisions should precede any action by NAESB (see discussion below under “Policy Considerations”), and
3. Whether NAESB should refrain from standards development because commercial services may be the most appropriate course of action, (see discussion below under “Commercial Practice Considerations”).

As the Committee worked to condense and categorize the observations, it noted a number of realities: First, the Committee recognized that federal and state policy issues are outside NAESB’s purview, and thus the Committee’s work attempted to distinguish between issues that are policy-related and things that are not (e.g., issues that are amenable to resolution by commercial parties; issues that could benefit from standardized business practices).

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<sup>3</sup> The GEH Committee meetings and materials can be accessed from the NAESB web site at the following hyperlink: [http://www.naesb.org/board\\_gas\\_electric\\_harmonization.asp](http://www.naesb.org/board_gas_electric_harmonization.asp).



Second, there are many instances, however, in which policy issues, commercial issues and standards development overlap. For example, many policy and commercial actions taken by regulators and market participants, respectively, could affect the standards NAESB may seek to develop in the area of GEH. These interactive effects complicate sequencing and content of any actions that NAESB might seek to take in the future.

Finally, the Committee observed that some commercial solutions by their nature evolve to meet market needs of specific market participants or regions and are unlikely to be extended to other regions or to all pipelines. Although these specific commercial solutions may address some of the underlying GEH issues, they may not lend themselves to uniform market applicability and the adoption of national standards.

With these parameters in mind, the Committee identified three areas where existing standards could be revisited to determine whether modifications could improve GEH with respect to those discrete issues, and if so, what those modifications might address.

1. **Market timelines and coordination of scheduling:** Unsynchronized market clearing times, gas and electric delivery days, the difference between nomination timelines and trading timelines, and gas supply timelines for natural gas and electricity sometimes create challenges that may possibly require changes to market timelines. At a minimum, standards supporting schedule coordination and additional communications between the two markets may be needed.
2. **Flexibility in Scheduling:** Greater flexibility in scheduling gas transportation services balanced against existing contracted services and operational integrity of the markets may lead to standards development or revisions of existing standards and may need to be considered by the NAESB organization.
3. **Provision of Information:** Standard development could be considered to further promote the availability of information to specific entities in order to assist in addressing GEH issues related to
  - a. the status of generation and pipeline capacity,
  - b. access to critical infrastructure information needed by electric service providers in curtailment conditions, including information on gas-fired generators, and
  - c. decision-enabling tools related to contingency response and day-of-service operations.

The means by which communication would take place for situational awareness reporting, recognizing confidentiality constraints are key components for consideration.

## **COMMITTEE CAUTIONS:**

Although this Committee has identified discrete areas where standards could be considered, the Committee recognizes that the ability of NAESB to reach consensus on certain standards may not be possible absent further policy guidance by regulators or other appropriate public bodies.

Accordingly, prior to adding these items to the 2013 Annual Plans as active items, the Committee recommends the Board evaluate the likelihood of success prior to committing the time and resources of NAESB staff and other stakeholders to these issues.

The Committee notes, further, that even when new policy or clarifications of existing policy are provided to address GEH issues, such clarifications or new policy, when received, may or may not lead to outcomes amenable to near-term standards development or adoption (or at all).

## **STANDARDS DEVELOPMENT CONSIDERATIONS:**

### **CONTEXT WITHIN WHICH THE COMMITTEE CONSIDERED POTENTIAL STANDARDS DEVELOPMENT:**

- Individual observations stand by themselves and are not considered positions endorsed by the Committee as no votes are to be taken. They were provided from the documents listed as sources for the Committee and from the discussions held in the Committee meetings.
- The Committee did not expect that all GEH issues could be resolved with standards.
  - Should additional capacity be needed, standards will not determine whether to build that capacity. Standards do not address the creation of capacity. Standards cannot solve infrastructure requirements when policy and or commercial decisions must be made first.
  - If regional arrangements did not lend themselves to the broader uniformity provided when creating standards with regional differentiation, standards would not be appropriate.
  - When policy clarifications are needed or new policy would be helpful in addressing GEH issues, the clarifications or new policy may or may not lead to standards development.
- Observations identified as either primarily or secondarily related to standards development were done so because the Committee found no fundamental reasons why the industry should not consider developing standards to assist the market in addressing GEH issues.
- Where the Committee has found fundamental reasons why standards should not be developed, they will be so stated.
- Standards developed to harmonize the two markets could impact not only power generation but all natural gas end use customers, and the terms of existing contracts that govern the services provided to the end use customers should not be adversely impacted.
- If there is an expectation of impediments to reaching consensus on the development of a standard, such as a general reluctance to change or change that shifts costs from one segment to another, then policy direction would be required. The Committee recommends that the Board carefully consider any standards development efforts in conjunction with an expectation that consensus can be reached. Without such an expectation of consensus, it may be more appropriate to consider the development as provisional until such time as the Board does expect that consensus is achievable.
- As observations are listed for each of the consolidated recommendations, it can be seen that there is an overlap across policy issues, commercial issues and standards development recommendations. These overlaps are to be expected as the observations are multi-faceted, in which there may be standards development recommended for part of an observation at the same time that there are considerations for policy direction or regional commercial practices for other parts of an observation.

## **COMMITTEE RECOMMENDATIONS THAT COULD LEAD TO STANDARDS DEVELOPMENT:**

1. Greater flexibility in scheduling gas transportation services balanced against existing contracted services and operational integrity of the markets may lead to standards development or revisions of existing standards and may be considered by the NAESB organization.
  - This recommendation incorporates observations noted for: 1.1, 1.2, 1.3, 1.4, 1.6, 1.7, 1.8, 1.10, 1.11, and 2.15.
  - The recommendation is linked to similar NAESB standards that have been defined for intraday scheduling, scheduling and confirmations, and bumping rules. Those standards may require changes if standards development for this item is undertaken.
  - Fundamental reasons why standards development in this area should be undertaken:
    - This recommendation is linked to Recommendation 2 for market clearing times in day-ahead markets, in identifying ways to improve the gas-electric interface to ensure daily gas availability for all end user customers, including gas-fired power generation, in the most reliable, economically rational way to benefit the largest number of commercial participants. In this instance, it is recommended that the existing rules governing the scheduling and holding of pipeline capacity be revised to allow for more flexible intraday nominations without penalties to enable an appropriate allocation of available capacity to customers dependent upon gas takes to meet their daily delivery requirements. As noted earlier in this paragraph, standards development supporting flexibility in scheduling goes hand in hand with the need to revise the pipeline capacity and market clearing timelines to harmonize the gas-electric interface.
  
2. Unsynchronized market clearing times, gas and electric delivery days, the difference between nomination timelines and trading timelines, and gas supply timelines for natural gas and electricity sometimes create challenges that may possibly require changes to market timelines. At a minimum, standards supporting schedule coordination and additional communications between the two markets may be needed.
  - This recommendation incorporates observations noted for: 1.5, 1.6, and 2.15.
  - The recommendation is linked to similar NAESB standards that have been defined for natural gas timelines -- which could impact capacity release program timelines, and communications between pipeline operators and generator facility operators. Those standards may require changes if standards development for this item is undertaken.
  - Fundamental reasons why standards development in this area should be undertaken:
    - This recommendation is linked to Recommendation 1 above. The unsynchronized timelines between the nomination periods for pipeline capacity, on the one hand, and the market clearing times for power dispatch in organized markets, on the other, are well known. If both the gas and electricity sectors want to ensure power reliability in a scenario of significantly higher gas dependency for power generation, this matter must be addressed to seek solutions broadly acceptable to as many commercial participants as possible, and to inquire whether standards should be developed.

- Cautionary considerations to be taken into account if standards development is to be pursued:
    - Load profiles in both the natural gas and electricity markets present challenges to reaching more uniform market clearing times.
    - Convergence of natural gas and electricity delivery days may be achievable with policy guidance.
3. Standard development should be considered to further promote the availability of information to specific entities in order to assist in addressing GEH issues to include (1) the status of generation and pipeline capacity, (2) access to critical infrastructure information needed by electric service providers in curtailment conditions including information on gas-fired generators, and (3) support of decision enabling tools related to contingency response and day-of-service operations. The communications protocols and effective means, by which communication would take place for situational awareness reporting, recognizing confidentiality constraints, are key components for consideration. Nuclear Power Plant Communications (Report 16, Nuclear Plant Interface Coordination – Standard NUC-001-2, NERC, April 2010, <http://www.nerc.com/files/NUC-001-2.pdf>) and other similar reports may be reviewed as potential reference points for standards development. NAESB communications protocol standards and security standards should be reviewed periodically to ensure they are robust enough to support the sharing of information envisioned in this development.
- This recommendation incorporates observations noted for: 1.12, 3.3, 3.4, 3.5, 4.0, 4.1, 4.2, 4.4, 4.6, 4.7, and 4.8.
  - The recommendation is linked to similar NAESB standards that have been defined for NAESB for scheduling and for communications between pipeline operators and generation facility operators, which may require changes if standards development for this item is undertaken. The recommendation is also linked to similar NAESB standards that have been defined for NAESB security standards and communication protocol standards, which may require changes if standards development for this item is undertaken.
  - Fundamental reasons why standards development in this area should be undertaken:
    - This recommendation addresses the need for improved communications between the gas and electricity sectors to attain a higher degree of situational awareness to address instances of unforeseen capacity constraints or emergency conditions. It also is intended to ensure a higher quality of information for all commercial participants whether or not they participate in organized power markets. While this recommendation builds upon Recommendations 1 and 2, it is not dependent upon their adoption, and can be considered separately on its own merits for purposes of standards development.
    - This recommendation is intended to complement the need for openness and transparency, with the possibility of creating a formalized structure of communications between the electricity and gas sectors. At the same time, this need for formalized, open communications needs to be tempered with adherence to the legal requirements prohibiting anticompetitive conduct, and refraining from placing into the public domain information that could jeopardize the safety and security of the system.
  - Cautionary considerations to be taken into account if standards development is to be pursued:
    - The communications noted cover both real-time and operational planning schedules.
    - Three levels of communication exchange should be addressed – public consumption, market participant communications and operator-to-operator communications.

## **POLICY CONSIDERATIONS:**

### **CONTEXT WITHIN WHICH THE POLICY ISSUES WERE IDENTIFIED BY COMMITTEE MEMBERS:**

- Individual observations stand by themselves and are not considered positions endorsed by the Committee as no votes are to be taken. They were provided from the documents listed as sources for the Committee and from the discussions held in the Committee meetings.
- The Committee is not addressing whether a policy should be developed; however, policy decisions will likely affect NAESB standards and work products.
- Anything earmarked as a possible policy consideration is a recognition that it is an issue that is outside NAESB's purview but has generated considerable discussion and concern.
- The Committee recognizes that many of these operational issues transcend regions or extend beyond gas and electric service territories or the jurisdiction of PUC's, RTOs and ISOs.
- The Committee also recognizes that gas distributors and pipelines are not represented in RTOs or ISOs and that pipelines have other customers besides electric generators.
- One criteria for development of a policy would be a regulatory action or commercial arrangement affecting the balance of rights between two parties or someone is commercially disadvantaged.
- The observations that were identified as either primarily or secondarily related to policy development were done so presumably because there were no identified fundamental reasons given for why the industry should not consider standards development as helpful to the market in addressing GEH issues.
- As observations are listed for each of the consolidated issues, it can be seen that there is an overlap across policy issues, commercial issues and standards development recommendations. These overlaps are to be expected as the observations are multi-faceted, in which there may be standards development recommended for part of an observation at the same time that there are considerations for policy direction or regional commercial practices for other parts of an observation.

## **OBSERVATIONS RAISING POLICY ISSUES:**

1. Significant differences in both natural gas and electric markets day-of service and day-ahead scheduling procedures create the gaps in the clearing of gas and electricity markets and may require policy recommendations aimed at synchronizing the clearing times and the energy delivery day for both markets.
  - This recommendation incorporates observations noted for: 1.2, 1.5, 1.6, 1.7, 1.8, and 1.10.
  - If an impasse by the parties participating in standards development for the natural gas and electric markets day-of service and day-ahead scheduling occurs, it may be resolved when gaps between the two markets are addressed – which could require policy guidance.
  
2. Recognizing that market design issues are regional and may be most appropriately addressed by the ISOs and RTOs directly, the economics surrounding the use and cost recovery for firm and interruptible capacity, including who holds and pays for the gas pipeline capacity needed to back up renewables or to serve normal electric load requirements is a core issue for both the day-of and the day-ahead markets.
  - This recommendation incorporates observations noted for: 2.2, 2.3 and 2.5.
  - If alternate economic models for cost recovery are considered to address the use of natural gas in power generation including use of renewables, which may require use of firm natural gas capacity, policy guidance at the state and federal level will be needed. A cost-benefit analysis of the risk of curtailments and costs incurred by those curtailments compared to the costs for adequate capacity to avoid curtailments would be needed, possibly across systems and states to best understand the impacts.
  
3. State curtailment policies impact both natural gas and electric markets, and it should be recommended to policy makers that a review of those policies may be helpful to ensure that policies do not inadvertently lead to interruption of service, depending on the priorities outlined in the state curtailment policies. More structured communications and availability of information for decision making in stress conditions could also require an examination that would lead to possible policy changes and standards changes to support the movement of natural gas to electric generation.
  - This recommendation incorporates observations noted for: 3.1, 3.3, 3.4, 3.5, 3.6, and 3.7.
  - In addition to policy guidance, NAESB WGQ Standard No. 1.3.80 could be considered for revisions to add flexibility in addressing movement of natural gas to other delivery points. To consider changes to standards such as 1.3.80 could require policy guidance.
  - Policy guidance may be needed to allow for structured communications and information available for decision making in times of stress that could lead to implementing curtailment plans. This structured communication and information could take the form of: (1) the status of dispatchable generation and available pipeline capacity, (2) pipeline outages (only three possibilities: supply failure, equipment failure, or loss of electric compression due to generation outages) and (3) generation outages impacting pipelines and LDCs.

4. The increasing interdependency of the natural gas and electric markets will require more timely information to enhance market operability. Mechanisms (standards, rules, tools and products) should be in place to provide the confidentiality required to insure competitive markets and to prevent unintended anti-competitive behavior. Adequate security measures will be needed to ensure the protection and integrity of the information made available, including restricting receipt of some information.
- This recommendation incorporates observations noted under 4.0, 4.4, 4.5, and 4.7.
  - Policy guidance may be needed to compel a uniform delivery and accessibility to information so that decision making is not impeded.
  - Existing policies supporting protection of cyber-assets and addressing data privacy, as well a protection of the sound operation of competitive markets should be reviewed to ensure that the rules are robust enough to support enhanced and increased information sharing.
  - If an impasse by the parties participating in standards development for the natural gas and electric markets for the availability of more timely information to enhance market operability occurs, it may require policy guidance.



## **COMMERCIAL PRACTICE CONSIDERATIONS:**

### **CONTEXT WITHIN WHICH THE COMMERCIAL PRACTICE ISSUES WERE IDENTIFIED BY COMMITTEE MEMBERS:**

- Individual observations stand by themselves and are not considered positions endorsed by the Committee as no votes are to be taken. They were provided from the documents listed as sources for the Committee and from the discussions held in the Committee meetings.
- Commercial issues related to gas-electric market harmonization may eventually lead to standards development where there is broad enough attractiveness and a need for the predictability of standardization, but it is the opinion of the Committee that at this time standards development is not necessary in the areas addressed here.
- Regional and pipeline-specific arrangements may not lend themselves to the broader uniformity that is provided when creating standards with regional choices.
- Commercial issues that are specific to individual pipeline systems, ISOs and RTOs, or commercial arrangements through bilateral agreements with specific generation owners may be best addressed by the stakeholders of those situations, rather than extending the analysis of the issues to a much broader audience.
- A fundamental underpinning of commercial solutions is that they are inherently bilateral, wherein neither side of the transaction is compelled to agree. This balance of rights and discretion among generators, organized markets, the pipelines that serve them, and the other customers dependent upon those pipelines must be maintained for commercial solutions to work. Departures from that balance can and should only be considered or addressed in the policy arena, outside of NAESB's purview.
- As commercial practices are more broadly accepted, they may be the basis for standards development either to provide conformity across the country or to provide conformity with regional or operational differences identified by the interested stakeholders. However, again, such standardization cannot move forward if it involves an involuntary shifting of relative rights until there is a prior policy determination.
- As commercial practices are put in place to support harmonization of the two markets at a regional level, should existing standards inhibit the adoption of the practices, then standards should be reviewed to determine if changes are needed.
- As observations are listed for each of the consolidated issues, it can be seen that there is an overlap across policy issues, commercial issues and standards development recommendations. These overlaps are to be expected as the observations are multi-faceted, in which there may be standards development recommended for part of an observation at the same time that there are considerations for policy direction or regional commercial practices for other parts of an observation.

## **OBSERVATIONS RAISING COMMERCIAL PRACTICES ISSUES:**

1. Flexibility in the interactions of the natural gas and electric markets is used now to meet customer needs. These services reflect the specific operational or regional requirements of the pipelines and pipeline customers and would probably not be candidates for standards development. Additional services can be introduced and implemented through services offered by pipelines to their respective customers.
  - This recommendation incorporates observations noted for: 1.1, 1.11, 2.4, 2.10, 2.14, 2.15, 3.1, and 3.2.
  - Pipeline no-notice and park-and-loan services; plans for addressing contingency response and unanticipated variability in demand; incorporating the use of LNG and storage for flexibility; pipeline services that could be designed to offer quick movement of gas or capacity between shippers and generators downstream of constraints are examples of regionally based or commercial/bilateral agreements that provide flexibility in the markets, are currently implemented regionally to address regional needs, but are wholly or in part not suitable for standards development.
  - Framing issues for commercial practices that introduce flexibility but are not suitable for broader market applications are:
    - As services are offered, changes may be required to existing standards.
2. Use of the natural gas firm transportation service to support power generation may require specifically designed transportation services to meet market clearing and reliability requirements in the electric market.
  - This recommendation incorporates observations noted for: 1.2 and 2.1.
  - Commercial practices and services offered by pipelines to generators, addressing specific generator needs to utilize their firm capacity outside of the timely nomination cycle, could address market clearing issues. These practices are regionally defined and do not have an applicability to a more broader scale that would be envisioned for standards development.
3. Natural gas pipeline capacity growth that is needed to meet gas-fired power generation commitments is determined through commercial practices of the pipelines and generators with interaction to ensure that reliability requirements are met.
  - This recommendation incorporates observations noted for: 2.13 and 2.17.
  - The commercial practices and reliability requirements are designed to address stress that can be introduced when generation units are retired or taken offline. Standards development is generally not appropriate, other than possibly to provide information for decision making and structured communication, and to provide granularity in electricity capacity products sub-product characteristics.

4. Services can be and have been provided to avoid potential gas-fired power generation curtailments resulting from the complexities introduced when the timely nomination cycle is at odds with generation timing, when the economics of decision making may lead to the selection of interruptible service (which by definition may be interrupted) and when nominations cross multiple pipelines.
  - This recommendation incorporates observations noted for: 1.3, 1.4, 2.2, 2.3, 2.6, 2.8, 2.9, 2.16, and 2.18.
  - Under state curtailment plans, there is a risk that generators may have an obligation to generate without the ability to receive the necessary natural gas supply. This cycle may be addressed in individually tailored services. Similarly, the complexities presented in (a) nominations across multiple pipeline and control areas; (b) economic decisions considering the cost differential for services and the consequent potential impacts on reliability; and (c) the use of storage or LNG to support gas-fired power generation, may all be addressed in specifically tailored services or agreements supporting the regional or commercial practices of the pipelines and generators.
  - As a clarification, “curtailment” in natural gas transportation perspective occurs when it becomes necessary to cut firm transportation service, not interruptible service. When interruptible service is cut, it is considered interrupted – not curtailed.
  - Fundamental reasons why standards development in this area should not be undertaken:
    - It is not appropriate to develop standards that would mandate contracting for firm transportation.



## CATEGORIZATION OF GEH OBSERVATIONS INTO ISSUES RELATED TO STANDARDS DEVELOPMENT, POLICY OR COMMERCIAL PRACTICES

For the survey<sup>4</sup>, each of the observations<sup>5</sup> were considered by Committee members and identified related to possible standards development, related to policy issues or related to commercial practices issues. The Committee members could choose to place an observation in one or more of the three categories or they could identify the observation as more of a comment. The results of the survey were tabulated<sup>6</sup>, and for those observations having the highest or second highest number of votes in the category of issues related to possible standards development, they were used as the basis to form the recommendations for standards development. Similarly, for those observations having the highest or second highest number of votes in the category of issues related to policy or to commercial practices, those observations were used as the basis for the consolidations into the issues identified for policy or commercial practices considerations.

Following are the three tables that have been sorted so that you can more easily identify the observations listed as either a primary or secondary core issue for possible standards development, or policy considerations or commercial practices considerations. The tabulated voting is shown so you can review the observation and how the Committee members considered each observation. In some cases, the vote result is quite close showing a considerable crossover of issues. In other cases, the survey results indicate that the Committee as a group determined that the observation fit more specifically into one of the three issues.

The survey results in aggregate<sup>6</sup> show the listing of the observations in numeric order delineated by the topics of scheduling, capacity, curtailment or information sharing.

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<sup>4</sup> The GEH Observations by Issue survey can be found at: [http://www.naesb.org/pdf4/geh042612\\_survey.docx](http://www.naesb.org/pdf4/geh042612_survey.docx)

<sup>5</sup> Each of the observations are based on findings from one or more of the reports provided in Appendix D: List of Reference Reports. The findings from the reports were listed in working document "Matrix of Issues" (<http://www.naesb.org/pdf4/geh021512w1.docx>), from which the committee observations were identified.

<sup>6</sup> The aggregate GEH Observations by Issue survey results can be found at: [http://www.naesb.org/pdf4/geh042612\\_survey\\_results.docx](http://www.naesb.org/pdf4/geh042612_survey_results.docx)

CATEGORIZATION OF GEH OBSERVATIONS INTO ISSUES RELATED TO STANDARDS DEVELOPMENT, POLICY OR COMMERCIAL PRACTICES

Below please find the list of observations where if noted in green indicate that they are primary, and in yellow indicate that they are secondary for standards related issues that could lead to standards development. These observations have been consolidated, and reviewed in regard to:

- relationship to other existing standards,
- observations that lead to a determination that there are no fundamental reasons why standards development could not go forward, and
- if there is fundamental disagreements for standards development, they are to be highlighted for consideration.

STANDARDS - PRIMARY and SECONDARY CORE ISSUES & OBSERVATIONS			Policy	Commercial	Standards Primary	Standards Secondary	Comment
<p>1. Observations and Core Issues:                      Scheduling and other inconsistencies in the interactions of the two markets impact the effectiveness of providing gas and electric service.                      Core issue: Should NAESB examine: the gas and electric scheduling timelines to create more certainty and flexibility in scheduling, recognizing that providing flexibility in one area may take away flexibility in another?</p>							
1	1	For day-of operations, intraday nomination flexibility is key in contingency response, load following, and in backing up renewables.	10	14	22		5
1	2	As generation units sign up for firm transportation, the bumping rules in the tariff provisions may impede the benefit of holding firm gas transportation. Added flexibility and types of gas transportation services may be needed by gas-fired power generators to meet the clearing and reliability requirements of the electric market.	15	19		17	3
1	3	If a gas-fired generator submits a generation offer before scheduling gas and the generator is not informed as to whether its generation offer is accepted until after the deadline for a timely gas nomination, it runs the risk of being considered secondary firm, if the generator holds firm transportation, or interruptible. This exposes the generator to the risk of an obligation to generate without gas supply. On the other hand, if the gas-fired generator submits a timely nomination for transportation before knowing whether its generation offer has been accepted, it runs the risk of being caught long on gas supply that must be dealt with in the intraday market, exposing the generator to an economic loss or penalties.	12	13		12	12

CATEGORIZATION OF GEH OBSERVATIONS INTO ISSUES RELATED TO STANDARDS DEVELOPMENT, POLICY OR COMMERCIAL PRACTICES

STANDARDS - PRIMARY and SECONDARY CORE ISSUES & OBSERVATIONS			Policy	Commercial	Standards Primary	Standards Secondary	Comment
1	4	Scheduling flexibility can be introduced on a pipeline by pipeline basis to the pipeline's customers. Natural gas market grid synchronization plays a role, as in multi-pipeline nominations which may cross multiple control areas, the least flexible pipeline in the chain of nominations will govern the timing of submittal and confirmation of transaction(s).	9	12	21		11
1	5	If timelines were modified to reduce the gaps in the clearing of gas and electricity markets, a nine hour gap could be reduced to a one hour gap if the timelines were modified to an east and a west model. This would be a considerable change to the timelines supported by the pipelines – with a focus on synchronizing the clearing times and the economic day for both markets.	22	7	24		2
1	6	Significant differences in both natural gas and electric markets day-of service and day-ahead scheduling procedures could lead to separate considerations in drafting recommendations for the day-ahead and the intraday scheduling of energy. For example, the completion of the electric day-ahead market (which is iterative and can take approximately four hours) could be synchronized with the natural gas timely nomination cycle for scheduling energy over a majority of the hours in the peak operating period of the electric day. Added intraday flexibility in both the electric market offers and gas scheduling might improve scheduling coordination for those hours that are not common to the same gas and electric delivery days.	15	9	23		5
1	7	The timely natural gas nomination process, which is iterative, can take from three to four hours. The hourly or intraday gas nomination process is considerably shorter as is the adjustments and changes at the margin to the decisions made in support of the timely nomination process. In some cases, gas-fired generators could need to make changes in their usage more quickly than the current nomination processes or services allow.	5	8	21		10

CATEGORIZATION OF GEH OBSERVATIONS INTO ISSUES RELATED TO STANDARDS DEVELOPMENT, POLICY OR COMMERCIAL PRACTICES

STANDARDS - PRIMARY and SECONDARY CORE ISSUES & OBSERVATIONS			Policy	Commercial	Standards Primary	Standards Secondary	Comment
1	8	There are a number of options offered by some pipelines that introduce flexibility through the use of hourly firm non-ratable takes. Ratable takes are taken on a uniform hourly basis over the day. Non-ratable takes may be spread over a shorter period. There is a tension between the timely/intraday nomination schedule as outlined in NAESB WGQ Standard No. 1.3.1 and the hourly flexibility provided by non-ratable deliveries on some pipelines and/or by use of hourly nominations, which comes into play when bumping is to be applied to preserve firm transportation service priority. Following the schedule outlined in the NAESB standards, the interruptible transportation service may have already been used to deliver the volume by the time it is determined that bumping is to be enacted to provide firm service for hourly nominations. A recent opinion issued in FERC RP11-2569-002, et al, ( <a href="http://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20120315-3006">http://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20120315-3006</a> ), provides some background for this observation.	13	8	24		9
1	10	a) Incentives could be designed into the natural gas scheduling and confirmation process for a wholly electronic process that would require less time to complete than the existing process which includes communications that are not fully electronic. (This could incorporate the thoughts in observation 1-2).  b) If a fully electronic expedited process for natural gas nominations were implemented, it may be prudent to re-examine the bumping rules for the market participants who follow the fully electronic expedited process. The existing combination of manual and electronic process for natural gas nominations could exist as is.	18	9	24		5
1	11	Using natural gas-fired generation to back up renewables could require enhanced and additional flexibility in day-of nominations and/or no-notice service or similar services.	16	14		14	12
1	12	The transparency provided through posting of scheduling and capacity information by major non-interstate natural gas pipelines could be helpful, if the impact of the intrastates market on the interstate market is deemed significant.	17	5		14	11



CATEGORIZATION OF GEH OBSERVATIONS INTO ISSUES RELATED TO STANDARDS DEVELOPMENT, POLICY OR COMMERCIAL PRACTICES

STANDARDS - PRIMARY and SECONDARY CORE ISSUES & OBSERVATIONS			Policy	Commercial	Standards Primary	Standards Secondary	Comment
1	13	Deleted. Added to Observation 1-8.					
<p>2. Observations and Core Issues as of April 24, 2012:</p> <p>Capacity issues including the availability and determination to use firm and interruptible capacity to support load requirements is a core issue in the interdependencies of the two markets, for both the day-of and the day-ahead markets.</p> <p>Core Issue: Recognizing the interdependency of the gas and electric markets in both the day-of and day-ahead operations, should NAESB examine:</p> <ul style="list-style-type: none"> <li>• the relationship of pipeline service options and the electric capacity equivalent, (i.e. the character and quality of firmness of natural gas service and generator service selections is consistent with the service obligation/expectation of the generators and system operators/RTOs), and</li> <li>• the structure of communications to make for a better utilization of existing infrastructure and capacity.</li> </ul>							
2	15	NAESB WGQ Standard No. 1.3.80 may be extended to better facilitate the quick movement of gas and/or capacity between shippers and generators downstream of a pipeline constraint, and in doing so, provide more effective use of existing infrastructure, and more liquidity to the market in an ICE like market: 1.3.80 To the extent the Transportation Service Provider's (TSP) other scheduling requirements are met, a TSP should support the ability of a Service Requester to redirect scheduled quantities to other receipt points upstream of a constraint point or delivery points downstream of a constraint point at any of the TSP's subsequent nomination cycle(s) for the subject gas day, at least under the same contract, without a requirement that the quantities be rescheduled through the point of constraint.	8	11	31		0

CATEGORIZATION OF GEH OBSERVATIONS INTO ISSUES RELATED TO STANDARDS DEVELOPMENT, POLICY OR COMMERCIAL PRACTICES

STANDARDS - PRIMARY and SECONDARY CORE ISSUES & OBSERVATIONS			Policy	Commercial	Standards Primary	Standards Secondary	Comment
<p>3. Curtailment policies and practices are components of the interdependency of the two markets that impacts harmonization. Curtailment is interruption of service that has been scheduled.                      Core Issue: Should NAESB examine its existing or new standards (NAESB WGQ Standard No. 1.3.80 as an example) to support the movement of natural gas to support electric generation, and conversely, electricity needed by natural gas pipelines, to better respond in situations of potential curtailment and involuntary interruption of service, (improving capacity release program is an example)?</p>							
3	3	<p>Knowing the status on dispatchable generation and pipeline capacity can be important in decisions to modify planned outages scheduled for gas-fired facilities, transmission, and pipelines. The information is also crucial in addressing unplanned outages. However, it is not clear how this impacts gas-electric market harmonization. Entities responsible for balancing electricity supply and demand need improved overall situational awareness of the potential impacts of pipeline operations. This includes ensuring sufficient notice of scheduled outages on natural gas pipelines; balancing authority knowledge regarding those entities that can be impacted by pipeline outages; and understanding between the balancing authority and the generator regarding the impact of a pipeline outage to generator operations.</p> <p>Similarly, pipeline and storage operators as well as LDC with gas generation behind their city-gate need improved overall situational awareness of the potential impacts on their operations from planned or unplanned generation or transmission outages, expected changes in electricity demand, and expected changes in renewable generation and the potential impact on gas generation requirements. This includes ensuring sufficient notice of likely impacts on gas generation served by the pipeline, storage or LDC.</p> <p>Nonetheless, public disclosure of information of this type could have unintended anti-competitive inter-fuel impacts.</p>	19	5	26		4

CATEGORIZATION OF GEH OBSERVATIONS INTO ISSUES RELATED TO STANDARDS DEVELOPMENT, POLICY OR COMMERCIAL PRACTICES

STANDARDS - PRIMARY and SECONDARY CORE ISSUES & OBSERVATIONS			Policy	Commercial	Standards Primary	Standards Secondary	Comment
3	4	When determining actions to be taken by electric service providers in curtailment conditions, the information on critical infrastructure is needed. That information includes electric compressor locations for those interstate and intrastate pipelines' that use electric compressors, electric compressor locations for those LDCs that use electric compressors, gas processors' locations that use grid or utility provided electricity to maintain operations, storage operators locations that use grid or utility provided electricity to maintain operations, other locations that require electricity to maintain flow measurement and flow management/control would be helpful.	20	9	21		5
3	5	In imminent stress conditions leading to possible curtailments of firm service or interruption of balance of power deliveries, identification of the gas-fired generators to run, when they are going to run, and the contractual rights for needed capacity is information that is helpful to the decision making entities in both markets.	14	11	22		8
<p>4. Additional and more formal structure for communications of the parties in the gas and electric markets is needed, particularly for unanticipated demand situations.                      Core Issue: Should NAESB examine a more comprehensive approach to communications between the two markets and among participants in each of the markets as the communications impact the interdependency of the markets?</p>							
4	0	As information is made available to support market transparency and decision making that enhances market interoperability, care should be taken that the needed confidentiality is preserved so that anti-competitive aspects are not introduced. The purpose of the information, who provides the information, who accesses the information, and how the information is presented, should be analyzed to ensure that the needed confidentiality is preserved.	22	5	23		7
4	1	Communication and associated procedures may support the development of decision enabling tools with respect to day-of service, that may support efforts for contingency response.	4	5	24		9

CATEGORIZATION OF GEH OBSERVATIONS INTO ISSUES RELATED TO STANDARDS DEVELOPMENT, POLICY OR COMMERCIAL PRACTICES

STANDARDS - PRIMARY and SECONDARY CORE ISSUES & OBSERVATIONS			Policy	Commercial	Standards Primary	Standards Secondary	Comment
4	2	Nuclear Power Plant Communications (Report 16, Nuclear Plant Interface Coordination – Standard NUC-001-2, NERC, April 2010, <a href="http://www.nerc.com/files/NUC-001-2.pdf">http://www.nerc.com/files/NUC-001-2.pdf</a> ) could be used as a template for a more formal structure for communications.	8	1		13	19
4	4	An information clearinghouse may be considered as a mechanism for accessing posted information and providing information to be posted, as not all electric utilities are represented by ISOs and RTOs, who as regional entities can provide a similar function to their stakeholders.	14	10	19		7
4	5	Under FERC Order No. 698, mechanisms are in place to provide information between the pipelines and gas operations group of the generators. Additional information needed is managed on an informal basis. It may be that a more formal structure would be advisable on the state of the electric system and the availability of gas from the pipelines. On peak days, notifications are sent when there are issues. It may be reasonable to provide additional structure on the communications. (Referenced also in item no. 3-8)	13	4	28		3
4	6	With an increased focus on safety and integrity management issues in both natural gas and electric markets, as infrastructure ages there may be an increase in the number of planned outages due to maintenance, which emphasizes the importance of communication process in notifications to affected parties to ensure that appropriate planning occurs.	5	6	19		15
4	7	More formalized structure for communication should extend past pipeline and plant operators to any segment of the two markets that is impacted by or makes decisions that affects the interdependency of the two markets. This broader accessibility is tempered by the protection of and limited access to commercially or operationally sensitive data.	19	6	27		3
4	8	Communications protocols may reflect the technology that was common when the protocols were adopted such that both now need updating in order to support provision of greater flexibility.	3	4	29		8

CATEGORIZATION OF GEH OBSERVATIONS INTO ISSUES RELATED TO STANDARDS DEVELOPMENT, POLICY OR COMMERCIAL PRACTICES

Below please find the list of observations where if noted in green indicate that they are primary, and in yellow indicate that they are secondary for policy related issues. These observations have been consolidated, and reviewed in regard to:

- relationship to other existing standards,
- observations that lead to a determination that there are fundamental reasons why policy decisions are needed to address gas-electric harmonization issues, and
- fundamental disagreements by market participants that, to be addressed, would require policy decisions or guidance.

POLICY - PRIMARY and SECONDARY CORE ISSUES & OBSERVATIONS			Primary Policy	Secondary Policy	Commercial	Standards	Comment
1. Observations and Core Issues as of April 24, 2012: Scheduling and other inconsistencies in the interactions of the two markets impact the effectiveness of providing gas and electric service. Core issue: Should NAESB examine: • The gas and electric scheduling timelines to create more certainty and flexibility in scheduling, recognizing that providing flexibility in one area may take away flexibility in another?							
1	3	If a gas-fired generator submits a generation offer before scheduling gas and the generator is not informed as to whether its generation offer is accepted until after the deadline for a timely gas nomination, it runs the risk of being considered secondary firm, if the generator holds firm transportation, or interruptible. This exposes the generator to the risk of an obligation to generate without gas supply. On the other hand, if the gas-fired generator submits a timely nomination for transportation before knowing whether its generation offer has been accepted, it runs the risk of being caught long on gas supply that must be dealt with in the intraday market, exposing the generator to an economic loss or penalties.		12	13	12	12
1	5	If timelines were modified to reduce the gaps in the clearing of gas and electricity markets, a nine hour gap could be reduced to a one hour gap if the timelines were modified to an east and a west model. This would be a considerable change to the timelines supported by the pipelines – with a focus on synchronizing the clearing times and the economic day for both markets.		22	7	24	2

CATEGORIZATION OF GEH OBSERVATIONS INTO ISSUES RELATED TO STANDARDS DEVELOPMENT, POLICY OR COMMERCIAL PRACTICES

POLICY - PRIMARY and SECONDARY CORE ISSUES & OBSERVATIONS			Primary Policy	Secondary Policy	Commercial	Standards	Comment
1	6	Significant differences in both natural gas and electric markets day-of service and day-ahead scheduling procedures could lead to separate considerations in drafting recommendations for the day-ahead and the intraday scheduling of energy. For example, the completion of the electric day-ahead market (which is iterative and can take approximately four hours) could be synchronized with the natural gas timely nomination cycle for scheduling energy over a majority of the hours in the peak operating period of the electric day. Added intraday flexibility in both the electric market offers and gas scheduling might improve scheduling coordination for those hours that are not common to the same gas and electric delivery days.		15	9	23	5
1	8	There are a number of options offered by some pipelines that introduce flexibility through the use of hourly firm non-ratable takes. Ratable takes are taken on a uniform hourly basis over the day. Non-ratable takes may be spread over a shorter period. There is a tension between the timely/intraday nomination schedule as outlined in NAESB WGQ Standard No. 1.3.1 and the hourly flexibility provided by non-ratable deliveries on some pipelines and/or by use of hourly nominations, which comes into play when bumping is to be applied to preserve firm transportation service priority. Following the schedule outlined in the NAESB standards, the interruptible transportation service may have already been used to deliver the volume by the time it is determined that bumping is to be enacted to provide firm service for hourly nominations. A recent opinion issued in FERC RP11-2569-002, et al, ( <a href="http://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20120315-3006">http://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20120315-3006</a> ), provides some background for this observation.		13	8	24	9
1	9	As more efficiencies and flexibility can be introduced into the scheduling for both markets, an outcome may be an increased market reliance on natural gas-fired generation over other fuels used for electricity generation.		8	5	2	23

CATEGORIZATION OF GEH OBSERVATIONS INTO ISSUES RELATED TO STANDARDS DEVELOPMENT, POLICY OR COMMERCIAL PRACTICES

POLICY - PRIMARY and SECONDARY CORE ISSUES & OBSERVATIONS			Primary Policy	Secondary Policy	Commercial	Standards	Comment
1	10	a) Incentives could be designed into the natural gas scheduling and confirmation process for a wholly electronic process that would require less time to complete than the existing process which includes communications that are not fully electronic. (This could incorporate the thoughts in observation 1-2). b) If a fully electronic expedited process for natural gas nominations were implemented, it may be prudent to re-examine the bumping rules for the market participants who follow the fully electronic expedited process. The existing combination of manual and electronic process for natural gas nominations could exist as is.		18	9	24	5
1	11	Using natural gas-fired generation to back up renewables could require enhanced and additional flexibility in day-of nominations and/or no-notice service or similar services.	16		14	14	12
1	12	The transparency provided through posting of scheduling and capacity information by major non-interstate natural gas pipelines could be helpful, if the impact of the intrastates market on the interstate market is deemed significant.	17		5	14	11
<p>2. Observations and Core Issues as of April 24, 2012:</p> <p>Capacity issues including the availability and determination to use firm and interruptible capacity to support load requirements is a core issue in the interdependencies of the two markets, for both the day-of and the day-ahead markets.</p> <p>Core Issue: Recognizing the interdependency of the gas and electric markets in both the day-of and day-ahead operations, should NAESB examine:</p> <ul style="list-style-type: none"> <li>the relationship of pipeline service options and the electric capacity equivalent, (i.e. the character and quality of firmness of natural gas service and generator service selections is consistent with the service obligation/expectation of the generators and system operators/RTOs), and</li> <li>the structure of communications to make for a better utilization of existing infrastructure and capacity.</li> </ul>							
2	2	A better understanding of the electric installed capacity and production requirements would take into account: (1) conditions under which generators determine to use firm fuel and capacity, (2) the capacity needed to support must serve loads, and (3) the barriers or economic forces that impede generators from contracting for services to meet must serve loads.		12	12	8	18

CATEGORIZATION OF GEH OBSERVATIONS INTO ISSUES RELATED TO STANDARDS DEVELOPMENT, POLICY OR COMMERCIAL PRACTICES

POLICY - PRIMARY and SECONDARY CORE ISSUES & OBSERVATIONS			Primary Policy	Secondary Policy	Commercial	Standards	Comment
2	3	In RTO/ISO markets, with consideration for how plants are dispatched, the cost differentials between firm service and interruptible service should be examined, which may highlight the need for customer education and the definition of reasonable costs to support reliable service.	25		21	3	8
2	5	In RTO/ISO markets, ISOs and RTOs are not fuel biased in reviewing the generators' ability to provide electricity. The generators' fuel neutral requirements to meet load on a peak day would be helpful in avoiding or reducing curtailments. Some states may have policies in place that identify a preferred loading order to generation.	26		6	5	12
2	6	Market design issues are regional and may be most appropriately addressed by the ISOs and RTOs directly – an example of which could be the coordination issues for long term forward capacity electric markets. Gas service fixed cost recovery should be considered, including who holds and pays for the gas pipeline capacity needed to back up renewables and to serve normal load requirements. Product definition requirements and the form of firm service appropriate to the operational obligations may need to align with those regional requirements, although there may be common elements that would facilitate defining the service characteristics and scheduling rights needed to serve the electric sector.	25		23	15	3
2	12	It is a given in the energy markets that adequate lead time is needed to secure any required replacement capacity and address any associated stress when the decision is made to: (1) retire a generating unit; or (2) decommit (e.g., take offline) a generating unit.		12	9	3	17
2	13	Adequate lead times to secure the replacement capacity and energy is needed in order to reliably address any stress that is introduced when generation units are retired or taken offline.	14		13	7	14



CATEGORIZATION OF GEH OBSERVATIONS INTO ISSUES RELATED TO STANDARDS DEVELOPMENT, POLICY OR COMMERCIAL PRACTICES

POLICY - PRIMARY and SECONDARY CORE ISSUES & OBSERVATIONS			Primary Policy	Secondary Policy	Commercial	Standards	Comment
2	14	Intermittent wind and solar generation have an impact on pipeline capacity when gas-fired generation is used as a backstop to balance the system. ERCOT provides the data related to such generation in 15 minute increments to support planning. Weather conditions upwind of wind generation can be monitored to better plan for the requirements to be placed on all supply/demand responsive sources, which would include gas-fired generators and their pipelines.		11	13	11	14
2	16	What economic decisions should be made regarding the costs assumed by the gas-fired generators to back up the variable energy resources used? (Would this be similar to costs assumed for providing net load following service needed, (weather variability affecting consumption in conjunction with output of variable energy resources?)	20		19	2	7
2	17	Optimizing and servicing the growing electricity and natural gas capacity markets, and adding capacity to the markets may point to process improvement measures and structured communications, among other actions – which would necessarily involve all segments of the markets. Both natural gas and electricity capacity products in the future may need to divide into sub product characteristics, which for the electricity products, may impact the fuel service requirements - e.g. contingency reserves or peaking, net load following and the like.		14	18	12	13
2	18	To the extent that gas storage is sought to enhance reliability, need to address areas of the country where storage is geologically infeasible (perhaps via innovative above-ground storage technology for power plants or LNG needle peaking facilities or alternate fuel requirement).		14	20	2	14

CATEGORIZATION OF GEH OBSERVATIONS INTO ISSUES RELATED TO STANDARDS DEVELOPMENT, POLICY OR COMMERCIAL PRACTICES

POLICY - PRIMARY and SECONDARY CORE ISSUES & OBSERVATIONS			Primary Policy	Secondary Policy	Commercial	Standards	Comment
<p>3. Curtailment policies and practices are components of the interdependency of the two markets that impacts harmonization. Curtailment is interruption of service that has been scheduled.                      Core Issue: Should NAESB examine its existing or new standards (NAESB WGQ Standard No. 1.3.80 as an example) to support the movement of natural gas to support electric generation, and conversely, electricity needed by natural gas pipelines, to better respond in situations of potential curtailment and involuntary interruption of service, (improving capacity release program is an example)?</p>							
3	1	Generators can introduce flexibility through the use of reserves and ancillary services, which is determined through regionally based decisions and considered part of market design.		11	17	7	11
3	3	Knowing the status on dispatchable generation and pipeline capacity can be important in decisions to modify planned outages scheduled for gas-fired facilities, transmission, and pipelines. The information is also crucial in addressing unplanned outages. However, it is not clear how this impacts gas-electric market harmonization. Entities responsible for balancing electricity supply and demand need improved overall situational awareness of the potential impacts of pipeline operations. This includes ensuring sufficient notice of scheduled outages on natural gas pipelines; balancing authority knowledge regarding those entities that can be impacted by pipeline outages; and understanding between the balancing authority and the generator regarding the impact of a pipeline outage to generator operations. Similarly, pipeline and storage operators as well as LDC with gas generation behind their city-gate need improved overall situational awareness of the potential impacts on their operations from planned or unplanned generation or transmission outages, expected changes in electricity demand, and expected changes is renewable generation and the potential impact on gas generation requirements. This includes ensuring sufficient notice of likely impacts on gas generation served by the pipeline, storage or LDC. Nonetheless, public disclosure of information of this type could have unintended anti-competitive inter-fuel impacts.		19	5	26	4

CATEGORIZATION OF GEH OBSERVATIONS INTO ISSUES RELATED TO STANDARDS DEVELOPMENT, POLICY OR COMMERCIAL PRACTICES

POLICY - PRIMARY and SECONDARY CORE ISSUES & OBSERVATIONS			Primary Policy	Secondary Policy	Commercial	Standards	Comment
3	4	When determining actions to be taken by electric service providers in curtailment conditions, the information on critical infrastructure is needed. That information includes electric compressor locations for those interstate and intrastate pipelines' that use electric compressors, electric compressor locations for those LDCs that use electric compressors, gas processors' locations that use grid or utility provided electricity to maintain operations, storage operators locations that use grid or utility provided electricity to maintain operations, other locations that require electricity to maintain flow measurement and flow management/control would be helpful.		20	9	21	5
3	5	In imminent stress conditions leading to possible curtailments of firm service or interruption of balance of power deliveries, identification of the gas-fired generators to run, when they are going to run, and the contractual rights for needed capacity is information that is helpful to the decision making entities in both markets.		14	11	22	8
3	6	The decisions made as the two markets work together should focus on how best to serve the customer and balance the cost of delivered power against the assurance that firm service is not interrupted on days experiencing peak day conditions or other stress conditions.	16		11	8	14
3	7	Supply curtailment policies at the state level may need review, as well as state commissions' use of base gas instead of operational capacity to address shortages. Some generators may purchase gas from LDCs, and even those that purchase their own gas may be behind an LDC city-gate and its transportation policies. LDCs may use end use curtailment to support residential demand. Storage factors into curtailment policies if it is behind the city-gate, and may relieve constraints that could occur during peak periods.	30		6	5	5

CATEGORIZATION OF GEH OBSERVATIONS INTO ISSUES RELATED TO STANDARDS DEVELOPMENT, POLICY OR COMMERCIAL PRACTICES

POLICY - PRIMARY and SECONDARY CORE ISSUES & OBSERVATIONS			Primary Policy	Secondary Policy	Commercial	Standards	Comment
4. Additional and more formal structure for communications of the parties in the gas and electric markets is needed, particularly for unanticipated demand situations. Core Issue: Should NAESB examine a more comprehensive approach to communications between the two markets and among participants in each of the markets as the communications impact the interdependency of the markets?							
4	0	As information is made available to support market transparency and decision making that enhances market interoperability, care should be taken that the needed confidentiality is preserved so that anti-competitive aspects are not introduced. The purpose of the information, who provides the information, who accesses the information, and how the information is presented, should be analyzed to ensure that the needed confidentiality is preserved.		22	5	23	7
4	4	An information clearinghouse may be considered as a mechanism for accessing posted information and providing information to be posted, as not all electric utilities are represented by ISOs and RTOs, who as regional entities can provide a similar function to their stakeholders.		14	10	19	7
4	5	Under FERC Order No. 698, mechanisms are in place to provide information between the pipelines and gas operations group of the generators. Additional information needed is managed on an informal basis. It may be that a more formal structure would be advisable on the state of the electric system and the availability of gas from the pipelines. On peak days, notifications are sent when there are issues. It may be reasonable to provide additional structure on the communications. (Referenced also in item no. 3-8)		13	4	28	3
4	7	More formalized structure for communication should extend past pipeline and plant operators to any segment of the two markets that is impacted by or makes decisions that affects the interdependency of the two markets. This broader accessibility is tempered by the protection of and limited access to commercially or operationally sensitive data.		19	6	27	3

CATEGORIZATION OF GEH OBSERVATIONS INTO ISSUES RELATED TO STANDARDS DEVELOPMENT, POLICY OR COMMERCIAL PRACTICES

Below please find the list of observations where if noted in green indicate that they are primary, and in yellow indicate that they are secondary for commercial related issues that at this time would not lead to standards development. These observations have been consolidated, and reviewed in regard to:

- practices in existence today that address the underlying issues, but do not lend themselves to uniform market applicability,
- practices that are primarily adopted regionally or by specific pipeline, are distinct, and are unlikely to be extended to other regions or to all pipelines,
- observations that lead to a confidence that pipeline-specific or regional commercial practices have made significant progress to address gas-electric harmonization issues, and
- framing issues that put the observations in context, in particular recognizing the limitations of commercial initiatives that may encounter policy constraints.

COMMERCIAL - PRIMARY and SECONDARY CORE ISSUES & OBSERVATIONS			Policy	Commercial Primary	Commercial Secondary	Standards	Comment
1. Observations and Core Issues: Scheduling and other inconsistencies in the interactions of the two markets impact the effectiveness of providing gas and electric service. Core issue: Should NAESB examine: • The gas and electric scheduling timelines to create more certainty and flexibility in scheduling, recognizing that providing flexibility in one area may take away flexibility in another?							
1	1	For day-of operations, intraday nomination flexibility is key in contingency response, load following, and in backing up renewables.	10		14	22	5
1	2	As generation units sign up for firm transportation, the bumping rules in the tariff provisions may impede the benefit of holding firm gas transportation. Added flexibility and types of gas transportation services may be needed by gas-fired power generators to meet the clearing and reliability requirements of the electric market.	15	19		17	3

CATEGORIZATION OF GEH OBSERVATIONS INTO ISSUES RELATED TO STANDARDS DEVELOPMENT, POLICY OR COMMERCIAL PRACTICES

COMMERCIAL - PRIMARY and SECONDARY CORE ISSUES & OBSERVATIONS			Policy	Commercial Primary	Commercial Secondary	Standards	Comment
1	3	If a gas-fired generator submits a generation offer before scheduling gas and the generator is not informed as to whether its generation offer is accepted until after the deadline for a timely gas nomination, it runs the risk of being considered secondary firm, if the generator holds firm transportation, or interruptible. This exposes the generator to the risk of an obligation to generate without gas supply. On the other hand, if the gas-fired generator submits a timely nomination for transportation before knowing whether its generation offer has been accepted, it runs the risk of being caught long on gas supply that must be dealt with in the intraday market, exposing the generator to an economic loss or penalties.	12	13		12	12
1	4	Scheduling flexibility can be introduced on a pipeline by pipeline basis to the pipeline's customers. Natural gas market grid synchronization plays a role, as in multi-pipeline nominations which may cross multiple control areas, the least flexible pipeline in the chain of nominations will govern the timing of submittal and confirmation of transaction(s).	9		12	21	11
1	11	Using natural gas-fired generation to back up renewables could require enhanced and additional flexibility in day-of nominations and/or no-notice service or similar services.	16		14	14	12

CATEGORIZATION OF GEH OBSERVATIONS INTO ISSUES RELATED TO STANDARDS DEVELOPMENT, POLICY OR COMMERCIAL PRACTICES

COMMERCIAL - PRIMARY and SECONDARY CORE ISSUES & OBSERVATIONS			Policy	Commercial Primary	Commercial Secondary	Standards	Comment
<p>2. Observations and Core Issues as of April 24, 2012:</p> <p>Capacity issues including the availability and determination to use firm and interruptible capacity to support load requirements is a core issue in the interdependencies of the two markets, for both the day-of and the day-ahead markets.</p> <p>Core Issue: Recognizing the interdependency of the gas and electric markets in both the day-of and day-ahead operations, should NAESB examine:</p> <ul style="list-style-type: none"> <li>• the relationship of pipeline service options and the electric capacity equivalent, (i.e. the character and quality of firmness of natural gas service and generator service selections is consistent with the service obligation/expectation of the generators and system operators/RTOs), and</li> <li>• the structure of communications to make for a better utilization of existing infrastructure and capacity.</li> </ul>							
2	1	Firm gas transportation service customers may only experience problems on peak gas usage days, when they have not exercised their firm rights in accordance with the currently timely nomination cycle. Similarly, reliance in interruptible gas transportation service on peak gas usage days can be problematic, as it is likely that the firm gas transportation service customers exercising their rights may account for all available capacity.	7		12	7	22
2	2	A better understanding of the electric installed capacity and production requirements would take into account: (1) conditions under which generators determine to use firm fuel and capacity, (2) the capacity needed to support must serve loads, and (3) the barriers or economic forces that impede generators from contracting for services to meet must serve loads.	12		12	8	18
2	3	In RTO/ISO markets, with consideration for how plants are dispatched, the cost differentials between firm service and interruptible service should be examined, which may highlight the need for customer education and the definition of reasonable costs to support reliable service.	25		21	3	8
2	4	Variability in demand, such as unanticipated demand for natural gas or electricity, may be reflected as increased demand on gas-fired plants and other resources having short notice energy dispatch flexibility. Depending on the circumstances, costs and or prices may increase.	5		13	3	23

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COMMERCIAL - PRIMARY and SECONDARY CORE ISSUES & OBSERVATIONS			Policy	Commercial Primary	Commercial Secondary	Standards	Comment
2	6	Market design issues are regional and may be most appropriately addressed by the ISOs and RTOs directly – an example of which could be the coordination issues for long term forward capacity electric markets. Gas service fixed cost recovery should be considered, including who holds and pays for the gas pipeline capacity needed to back up renewables or to serve normal load requirements. Product definition requirements and the form of firm service appropriate to the operational obligations may need to align with those regional requirements, although there may be common elements that would facilitate defining the service characteristics and scheduling rights needed to serve the electric sector.	25		23	15	3
2	8	After the RTO/ISO markets have estimated the firm capacity needed to meet load requirements, there are several pricing programs and markets available to them in ensuring the needed capacity commitments and dispatch flexibility.	5		15	8	18
2	9	Price signal information, which could be an input to cost recovery, is needed by generators when making economic decisions on fuels and services in support of reliable service.	10	22		7	13
2	10	Incorporating use of LNG and storage facilities as peak-shaving units can provide flexibility for power generation and expands the capability of the market in meeting demand for power.	7	22		1	16
2	13	Adequate lead times to secure the replacement capacity and energy is needed in order to reliably address any stress that is introduced when generation units are retired or taken offline.	14		13	7	14
2	14	Intermittent wind and solar generation have an impact on pipeline capacity when gas-fired generation is used as a backstop to balance the system. ERCOT provides the data related to such generation in 15 minute increments to support planning. Weather conditions upwind of wind generation can be monitored to better plan for the requirements to be placed on all supply/demand responsive sources, which would include gas-fired generators and their pipelines.	11		13	11	14



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COMMERCIAL - PRIMARY and SECONDARY CORE ISSUES & OBSERVATIONS			Policy	Commercial Primary	Commercial Secondary	Standards	Comment
2	15	NAESB WGQ Standard No. 1.3.80 may be extended to better facilitate the quick movement of gas and/or capacity between shippers and generators downstream of a pipeline constraint, and in doing so, provide more effective use of existing infrastructure, and more liquidity to the market in an ICE like market: 1.3.80 To the extent the Transportation Service Provider's (TSP) other scheduling requirements are met, a TSP should support the ability of a Service Requester to redirect scheduled quantities to other receipt points upstream of a constraint point or delivery points downstream of a constraint point at any of the TSP's subsequent nomination cycle(s) for the subject gas day, at least under the same contract, without a requirement that the quantities be rescheduled through the point of constraint.	8		11	31	0
2	16	What economic decisions should be made regarding the costs assumed by the gas-fired generators to back up the variable energy resources used? (Would this be similar to costs assumed for providing net load following service needed, (weather variability affecting consumption in conjunction with output of variable energy resources?))	20		19	2	7
2	17	Optimizing and servicing the growing electricity and natural gas capacity markets, and adding capacity to the markets may point to process improvement measures and structured communications, among other actions – which would necessarily involve all segments of the markets. Both natural gas and electricity capacity products in the future may need to divide into sub product characteristics, which for the electricity products, may impact the fuel service requirements - e.g. contingency reserves or peaking, net load following and the like.	14	18		12	13
2	18	To the extent that gas storage is sought to enhance reliability, need to address areas of the country where storage is geologically infeasible (perhaps via innovative above-ground storage technology for power plants or LNG needle peaking facilities or alternate fuel requirement).	14	20		2	14

CATEGORIZATION OF GEH OBSERVATIONS INTO ISSUES RELATED TO STANDARDS DEVELOPMENT, POLICY OR COMMERCIAL PRACTICES

COMMERCIAL - PRIMARY and SECONDARY CORE ISSUES & OBSERVATIONS			Policy	Commercial Primary	Commercial Secondary	Standards	Comment
<p>3. Curtailment policies and practices are components of the interdependency of the two markets that impacts harmonization. Curtailment is interruption of service that has been scheduled.                      Core Issue: Should NAESB examine its existing or new standards (NAESB WGQ Standard No. 1.3.80 as an example) to support the movement of natural gas to support electric generation, and conversely, electricity needed by natural gas pipelines, to better respond in situations of potential curtailment and involuntary interruption of service, (improving capacity release program is an example)?</p>							
3	1	Generators can introduce flexibility through the use of reserves and ancillary services, which is determined through regionally based decisions and considered part of market design.	11	17		7	11
3	2	Most pipelines already offer a park-and-loan service that uses linepack in meeting intermittent capacity requirements and provides for greater market flexibility. The flexibility provided by the use of non-ratable takes is made possible through the use of linepack. Linepack however may not be suitable to address issues that arise in peak day demand conditions for generators that have not already contracted for park-and-loan service or non-ratable takes. Taking linepack can impact the pipeline's deliverability and cause the pipeline to shut down the unauthorized party to preserve the reliability of the system. In addition, there may well be occasions when linepack is fully utilized to support other pipeline operations.	10	17		5	13
3	7	Supply curtailment policies at the state level may need review, as well as state commissions' use of base gas instead of operational capacity to address shortages. Some generators may purchase gas from LDCs, and even those that purchase their own gas may be behind an LDC city-gate and its transportation policies. LDCs may use end use curtailment to support residential demand. Storage factors into curtailment policies if it is behind the city-gate, and may relieve constraints that could occur during peak periods.	30		6	5	5

**APPENDIX B: LIST OF NAESB GEH COMMITTEE MEMBERS**

<b>Member</b>	<b>Company/Organization</b>
Vicky Bailey	BHMM Energy Services, LLC
Jim Buccigross	8760 Inc.
Craig Colombo	Dominion Resources
<b>Valerie Crockett (Co-Chair)</b>	Tennessee Valley Authority
Lorraine Cross	Cross & Company, PLLC
Alex DeBoissiere	The United Illuminating Company
Michael Desselle	Southwest Power Pool
Katie Elder	Aspen Environmental Group
Bruce Ellsworth	New York State Reliability Council
Lisa Epifani	Van Ness Feldman
Doug Field	Southern Star Central Gas Pipeline
Michelle Foss	University of Texas
Christopher Freitas	US Department of Energy (non-voting)
Arthur Fusco	Central Electric Power Cooperative Inc.
William Gallagher	Vermont Public Power Supply Authority
Bob Gee	Gee Strategies Group, LLC
Michehl Gent	Open Access Technology International, Inc.
Michael Goldenberg	FERC (non-voting)
Joseph Hartsoe	American Electric Power Service Corp.
Jesse D. Hurley	Shift Research, LLC
Kevin Kirby	ISO New England, Inc.
Richard Kruse	Spectra Energy Transmission
Gregory Lander	Capacity Center
Wayne Moore	Southern Company
John Moura	North American Electric Reliability Corporation
Rana Mukerji	New York Independent System Operator, Inc. (NYISO)
Lou Oberski	Dominion Resources Services, Inc.
Joelle Ogg	DC Energy
Randy E. Parker	ExxonMobil Gas and Power Marketing Company
Marty Patterson	American Midstream Partners, LP
Keith Sappenfield	Encana Oil & Gas (USA), Inc.
Pam Silberstein	FERC (non-voting)
Commissioner Timothy Simon	California Public Utility Commission
Rick Smead	Navigant Consulting, Inc.
James Stanzione	National Grid
Terence (Terry) Thorn	KEMA Gas Consulting Services
<b>Sue Tierney (Co-Chair)</b>	Analysis Group, Inc.
Kenneth L. Yeasting	Cambridge Energy Research Associates

**APPENDIX C: COMMITTEE MEETING DATES**

**GAS-ELECTRIC HARMONIZATION COMMITTEE TIMELINE -- SCHEDULE OF MEETINGS AND DELIVERABLES**

✓	Date/Time	Meeting	Deliverables
✓	January 27, 1:00 pm to 4:00 pm C	Conference Call & Web Cast Full Committee - Organizational	Introduction to the Committee
✓	February 15, 1:00 pm to 4:00 pm C	Conference Call & Web Cast Full Committee	Review Work Plan and Assignments
✓	March 1, 10:00 am to 1:00 pm C	Conference Call & Web Cast Team 2	Work on core issues for coordination of transactions
✓	March 1, 1:30 pm to 4:30 pm C	Conference Call & Web Cast Team 1	Work on core issues for transparency of information
✓	March 2, 1:30 pm to 4:30 pm C	Conference Call & Web Cast Team 3	Work on core issues on commercial/operational issues
✓	March 5, 1:30 pm to 2:30 pm C	Conference Call & Web Cast Leadership Team	Review work of the teams and determine direction
✓	March 16, 9:00 am to 10:00 am C	Conference Call & Web Cast Full Committee	Review work of the teams, revise and prepare for NAESB Board meetings
✓	March 20, 1:00 pm to 4:00 pm C	Conference Call & Web Cast Full Committee	Review work of the teams, revise and prepare for NAESB Board meetings
✓	March 22, 9:00 am to 1:00 pm C	NAESB Board Meeting, Houston	Review of Progress of Committee
✗	April 4, 1:00 pm to 4:00 pm (Cancelled)	Conference Call & Web Cast Full Committee	Review Work Plan and Assignments and Progress Made to date regarding formation of recommendation
✓	April 24, 10:00 am to 4:00 pm E	Meeting, Conference Call & Web Cast, Baltimore, MD Full Committee	Review Work Plan and Assignments and Progress Made to date regarding formation of recommendation, Discuss categories and prepare survey
✓	May 16, 1:00 pm to 4:00 pm C	Conference Call & Web Cast Full Committee	Review Work Plan and Assignments and Progress Made to date regarding formation of recommendations based on survey responses
✓	June 8, 10:00 am to 4:00 pm E	Meeting, Conference Call & Web Cast, Baltimore, MD Full Committee	Review Work Plan and Assignments and Progress Made to date regarding formation of recommendation
✓	June 19, 1:00 pm to 4:00 pm C	Conference Call & Web Cast Full Committee	Review Work Plan and Assignments and Progress Made to date regarding formation of recommendation
✓	June 21, 9:00 am to 1:00 pm C	NAESB Board Meeting, Houston	Review of Progress of Committee with Possible Board Vote to Approve Recommendations
✓	July 18, 1:00 pm to 4:00 pm C	Conference Call & Web Cast Full Committee	Review Work Plan and Assignments and Progress Made to date regarding formation of recommendations to the Board of Directors
✓	August 2, 10:00 am to 4:00 pm E	Meeting, Conference Call & Web Cast, Baltimore, MD Full Committee	Review Work Plan and Assignments and Progress Made to date regarding drafting recommendations to the Board of Directors
✓	August 27, 1:00 pm to 4:00 pm C	Conference Call & Web Cast Full Committee	Review Draft Report and Vote
	September 20, 9:00 am to 1:00 pm C	NAESB Board Meeting, Houston	Review of Progress of Committee with Possible Board Vote to Approve Recommendations

APPENDIX D: REFERENCE DOCUMENTS

NAESB Gas-Electric Harmonization Committee – Reference Documents

#	Document	Link
1.	MIT Study, The Future of the Electric Grid	<a href="http://web.mit.edu/mitei/research/studies/documents/electric-grid-2011/Electric_Grid_Full_Report.pdf">http://web.mit.edu/mitei/research/studies/documents/electric-grid-2011/Electric_Grid_Full_Report.pdf</a>
2.	MIT Study, The Future of Natural Gas	<a href="http://web.mit.edu/mitei/research/studies/documents/natural-gas-2011/NaturalGas_Report.pdf">http://web.mit.edu/mitei/research/studies/documents/natural-gas-2011/NaturalGas_Report.pdf</a>
3.	FERC-NERC Joint Task Force Report on Outages and curtailments During the Southwest Weather Event on February 1-5, 2011	<a href="http://www.ferc.gov/legal/staff-reports/08-16-11-report.pdf">http://www.ferc.gov/legal/staff-reports/08-16-11-report.pdf</a>
4.	North American Natural Gas Midstream Infrastructure Through 2035: A Secure Energy Future Executive Summary Prepared by the INGAA Foundation	<a href="http://www.ingaa.org/File.aspx?id=14911">http://www.ingaa.org/File.aspx?id=14911</a>
5.	Implications of Greater Reliance on Natural Gas For Electricity Generation Prepared For the American Public Power Association	<a href="http://www.publicpower.org/files/PDFs/ImplicationsOfGreaterRelianceOnNGforElectricityGeneration.pdf">http://www.publicpower.org/files/PDFs/ImplicationsOfGreaterRelianceOnNGforElectricityGeneration.pdf</a>
6.	NAESB current Gas Nomination Standards and Gas-electric Coordination Standards	<a href="http://www.naesb.org/misc/geh_related_standards.docx">http://www.naesb.org/misc/geh_related_standards.docx</a>
7.	Electricity Advisory Committee Interdependence of Electricity System Infrastructure and Natural Gas Infrastructure	<a href="http://www.naesb.org/misc/electric_infrastructure_gas_infrastructure_oct2011.pdf">http://www.naesb.org/misc/electric_infrastructure_gas_infrastructure_oct2011.pdf</a>
8.	NERC 2011 Special Reliability Assessment: A Primer of the Natural Gas and Electric Power Interdependency in the United States – <b>DUPLICATE OF ITEM 13</b>	<a href="http://www.naesb.org/misc/nerc_primer_gas_electric_interdependency_nov2011.pdf">http://www.naesb.org/misc/nerc_primer_gas_electric_interdependency_nov2011.pdf</a>
9.	NERC Gas/Electricity Interdependencies and Recommendations, 2004	<a href="http://www.naesb.org/misc/nerc_gas_electricity_interdependencies_2004.pdf">http://www.naesb.org/misc/nerc_gas_electricity_interdependencies_2004.pdf</a>
10.	NPC Prudent Development – Executive Summary (may be replaced by the published version – Ken Yeasting)	<a href="http://www.naesb.org/misc/npc_north_american_resource_dev_exec_summ_volume_dec2011.pdf">http://www.naesb.org/misc/npc_north_american_resource_dev_exec_summ_volume_dec2011.pdf</a>
11.	NPC Prudent Development – Ch. 3 – Natural Gas Demand (may be replaced by the published version – Ken Yeasting)	<a href="http://www.naesb.org/misc/npc_demand_chapter_091511.pdf">http://www.naesb.org/misc/npc_demand_chapter_091511.pdf</a>
12.	Excerpt of NAESB Bylaws	<a href="http://www.naesb.org/misc/naesb_bylaws_section2.2_best_practices.pptx">http://www.naesb.org/misc/naesb_bylaws_section2.2_best_practices.pptx</a>
13.	NERC December 2011 Special Assessment - <b>DUPLICATE OF ITEM 8</b>	<a href="http://www.nerc.com/files/Gas_Electric_Interdependencies_Phase_I.pdf">http://www.nerc.com/files/Gas_Electric_Interdependencies_Phase_I.pdf</a>
14.	Natural Gas in a Smart Energy Future – American Gas Foundation, APGA Research Foundation, Canadian Gas Foundation, INGAA Foundation, Natural Gas Supply Foundation and their members	<a href="http://media.godashboard.com/gti/Natural_Gas_in_a_Smart_Energy_Future_01-26-2011.pdf">http://media.godashboard.com/gti/Natural_Gas_in_a_Smart_Energy_Future_01-26-2011.pdf</a>
15.	Summary of the North American Energy Standards Board Gas and Electric Interdependency Final Report to the Federal Energy Regulatory Commission in Docket No. RM05-28-000 “NAESB Report on the Efforts of the Gas-Electric Interdependency Committee” – U.S. DoE and NARUC	<a href="http://www.naesb.org/misc/icf_geic_primer062206.pdf">http://www.naesb.org/misc/icf_geic_primer062206.pdf</a>
16.	Nuclear Plant Interface Coordination – Standard NUC-001-2, NERC, April 2010	<a href="http://www.nerc.com/files/NUC-001-2.pdf">http://www.nerc.com/files/NUC-001-2.pdf</a>
17.	Natural Gas year in Review – EIA, December 9, 2011	<a href="http://205.254.135.7/naturalgas/review/">http://205.254.135.7/naturalgas/review/</a> , and <a href="http://205.254.135.7/naturalgas/review/print_version.cfm">http://205.254.135.7/naturalgas/review/print_version.cfm</a> (print version)

**APPENDIX D: REFERENCE DOCUMENTS**

**NAESB Gas-Electric Harmonization Committee – Reference Documents**

#	Document	Link
18.	ERCOT Nodal Protocols	<a href="http://www2.econ.iastate.edu/tesfatsi/ERCOT.DefinitionsAcronyms.Oct2011.pdf">http://www2.econ.iastate.edu/tesfatsi/ERCOT.DefinitionsAcronyms.Oct2011.pdf</a>
19.	Commission Role Regarding Environmental Protection Agency’s Mercury and Air Toxics Standards	<a href="http://www.ferc.gov/media/news-releases/2012/2012-1/01-30-12-notice.pdf">http://www.ferc.gov/media/news-releases/2012/2012-1/01-30-12-notice.pdf</a>
20.	How does the natural gas delivery system work – AGA web site	<a href="http://www.aga.org/Kc/aboutnaturalgas/consumerinfo/Pages/NGDeliverySystem.aspx">http://www.aga.org/Kc/aboutnaturalgas/consumerinfo/Pages/NGDeliverySystem.aspx</a>
21.	Request for Comments of Commissioner Moeller, on Coordination between the Natural Gas and Electricity Markets, February 3, 2011	<a href="http://www.ferc.gov/about/com-mem/moeller/moellergaselectricletter.pdf">http://www.ferc.gov/about/com-mem/moeller/moellergaselectricletter.pdf</a>
22.	Gas and Electric Infrastructure Interdependency Analysis, prepared for the Midwest ISO, February 22, 2012	<a href="https://www.midwestiso.org/Library/Repository/Communication%20Material/Key%20Presentations%20and%20Whitepapers/Natural%20Gas-Electric%20Infrastructure%20Interdependency%20Analysis_022212_Final%20Public.pdf">https://www.midwestiso.org/Library/Repository/Communication%20Material/Key%20Presentations%20and%20Whitepapers/Natural%20Gas-Electric%20Infrastructure%20Interdependency%20Analysis_022212_Final%20Public.pdf</a>
23.	Power Plants Likely Covered by the EPA Mercury and Air Toxics Rule, EPA, December 2011	<a href="http://www.epa.gov/mats/pdfs/20111221PowerPlantsLikelyCoveredbyMATS.pdf">http://www.epa.gov/mats/pdfs/20111221PowerPlantsLikelyCoveredbyMATS.pdf</a>
24.	NARUC Inventory on Gas Curtailment Planning, Institute of Public Utilities and the US Department of Energy, April 2005	<a href="http://www.naruc.org/Publications/CIP_GasCurtailmentInventoryReport_8.pdf">http://www.naruc.org/Publications/CIP_GasCurtailmentInventoryReport_8.pdf</a>
25.	Federal Engagement in Standards Setting; Executive Office of the President Office of Science and Technology, Executive Office of the President Office of Management and Budget & Executive Office of the President United States Trade Representative, January 2012	<a href="http://www.naesb.org/pdf4/geh051612w3.docx">http://www.naesb.org/pdf4/geh051612w3.docx</a>
26.	Natural Gas White Paper Draft, ISO New England, July 2012	<a href="http://www.naesb.org/pdf4/geh080212w1.pdf">http://www.naesb.org/pdf4/geh080212w1.pdf</a>



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