Via email and posting

March 5, 2012

**TO:** NAESB Board Committee – Gas Electric Harmonization

**CC:** Gas Electric Harmonization Distribution List

**FROM:** Rae McQuade, NAESB President

**RE:** Observations Identified by Core Issue

Dear Committee Members,

As we discussed in today’s call, I have attached a listing of the observations by core issue that were identified in our three team meetings. Feel free to modify or add to this work paper, and call or email if you have questions or want to discuss. In many cases, it was difficult to identify an observation to just one core issue, so some reassignments may be needed. Three paper s have been added to our list of reference documents. Once again, thanks so much for devoting your time to this committee --

*Rae*

Rae McQuade

President, North American Energy Standards Board

| **Gas-Electric Harmonization Committee Timeline -- Schedule of Meetings and Deliverables**  |
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|  | Date/Time | Meeting | Deliverables |
|  | January 27, 1:00 pm to 4:00 pm | Conference Call & Web CastFull Committee - Organizational | Introduction to the Committee |
|  | February 15, 1:00 pm to 4:00 pm | Conference Call & Web CastFull Committee | Review Work Plan and Assignments |
|  | March 1, 10:00 am to 1:00 pm C | Conference Call & Web CastTeam 2 | Work on core issues for coordination of transactions |
|  | March 1, 1:30 to 4:30 pm C | Conference Call & Web CastTeam 1 | Work on core issues for transparency of information |
|  | March 2, 1:30 to 4:30 pm C | Conference Call & Web CastTeam 3 | Work on core issues on commercial/operational issues |
|  | March 5, 1:30 to 2:30 pm C | Conference Call & Web CastLeadership Team | Review work of the teams and determine direction |
|  | March 16, 9:00 am to 10:00 am C | Conference Call & Web CastFull Committee | Review work of the teams, revise and prepare for NAESB Board meetings |
|  | March 20, 1:00 pm to 4:00 pm  | Conference Call & Web CastFull Committee | Review work of the teams, revise and prepare for NAESB Board meetings |
|  | March 22 – 9:00 am to 1:00 pm | NAESB Board Meeting, Houston | Review of Progress of Committee |
|  | April 4, 1:00 pm to 4:00 pm (Pending) | Conference Call & Web CastFull Committee | Review Work Plan and Assignments and Progress Made to date regarding formation of recommendation |
|  | May 16, 1:00 pm to 4:00 pm (Pending) | Conference Call & Web CastFull Committee | Review Work Plan and Assignments and Progress Made to date regarding formation of recommendation |
|  | June 5, 1:00 pm to 4:00 pm (Pending) | Conference Call & Web CastFull Committee | Review Work Plan and Assignments and Progress Made to date regarding formation of recommendation |
|  | June 21 – 9:00 am to 1:00 pm | NAESB Board Meeting, Houston | Review of Progress of Committee with Possible Board Vote to Approve Recommendations |
|  | September 20, 9:00 am to 1:00 pm | NAESB Board Meeting, Houston | Review of Progress of Committee with Possible Board Vote to Approve Recommendations |
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| NAESB Gas-Electric Harmonization Committee – Reference Documents  |
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| # | Document | Link |
| 1 | MIT Study, The Future of the Electric Grid | <http://web.mit.edu/mitei/research/studies/documents/electric-grid-2011/Electric_Grid_Full_Report.pdf>  |
| 2 | MIT Study, The Future of Natural Gas | <http://web.mit.edu/mitei/research/studies/documents/natural-gas-2011/NaturalGas_Report.pdf>  |
| 3 | FERC-NERC Joint Task Force Report on Outages and curtailments During the Southwest Weather Event on February 1-5, 2011 | <http://www.ferc.gov/legal/staff-reports/08-16-11-report.pdf>  |
| 4 | North American Natural Gas Midstream Infrastructure Through 2035: A Secure Energy Future Executive Summary Prepared by the INGAA Foundation | <http://www.ingaa.org/File.aspx?id=14911> |
| 5 | Implications of Greater Reliance on Natural Gas For Electricity Generation Prepared For the American Public Power Association | <http://www.publicpower.org/files/PDFs/ImplicationsOfGreaterRelianceOnNGforElectricityGeneration.pdf>  |
| 6 | NAESB current Gas Nomination Standards and Gas-electric Coordination Standards | <http://www.naesb.org/misc/geh_related_standards.docx>  |
| 7 | Electricity Advisory Committee Interdependence of Electricity System Infrastructure and Natural Gas Infrastructure | <http://www.naesb.org/misc/electric_infrastructure_gas_infrastructure_oct2011.pdf>  |
| 8 | NERC 2011 Special Reliability Assessment:  A Primer of the Natural Gas and Electric Power Interdependency in the United States *–* ***DUPLICATE OF ITEM 13*** | <http://www.naesb.org/misc/nerc_primer_gas_electric_interdependency_nov2011.pdf>  |
| 9 | NERC Gas/Electricity Interdependencies and Recommendations, 2004 | <http://www.naesb.org/misc/nerc_gas_electricity_interdependencies_2004.pdf>  |
| 10 | NPC Prudent Development – Executive Summary (may be replaced by the published version – Ken Yeasting) | <http://www.naesb.org/misc/npc_north_american_resource_dev_exec_summ_volume_dec2011.pdf>  |
| 11 | NPC Prudent Development – Ch. 3 – Natural Gas Demand (may be replaced by the published version – Ken Yeasting) | <http://www.naesb.org/misc/npc_demand_chapter_091511.pdf>  |
| 12 | Excerpt of NAESB Bylaws | <http://www.naesb.org/misc/naesb_bylaws_section2.2_best_practices.pptx> |
| 13 | NERC December 2011 Special Assessment - *DUPLICATE OF ITEM 8* | <http://www.nerc.com/files/Gas_Electric_Interdependencies_Phase_I.pdf> |
| 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 | <http://media.godashboard.com/gti/Natural_Gas_in_a_Smart_Energy_Future_01-26-2011.pdf> |
| 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 | <http://www.naesb.org/misc/icf_geic_primer062206.pdf> |
| 16 | Nuclear Plant Interface Coordination – Standard NUC-001-2, NERC, April 2010 | <http://www.nerc.com/files/NUC-001-2.pdf> |
| 17 | Natural Gas year in Review – EIA, December 9, 2011 | <http://205.254.135.7/naturalgas/review/>, and <http://205.254.135.7/naturalgas/review/print_version.cfm> (print version) |
| 18 | ERCOT Nodal Protocols | <http://www2.econ.iastate.edu/tesfatsi/ERCOT.DefinitionsAcronyms.Oct2011.pdf> |
| 19 | Commission Role Regarding Environmental Protection Agency’s Mercury and Air Toxics Standards | <http://www.ferc.gov/media/news-releases/2012/2012-1/01-30-12-notice.pdf>  |
| 20  | How does the natural gas delivery system work – AGA web site | <http://www.aga.org/Kc/aboutnaturalgas/consumerinfo/Pages/NGDeliverySystem.aspx> |
| 21 | Request for Comments of Commissioner Moeller, on Coordination between the Natural Gas and Electricity Markets, February 3, 2011 | <http://www.ferc.gov/about/com-mem/moeller/moellergaselectricletter.pdf> |
| 22 | Gas and Electric Infrastructure Interdependency Analysis, prepared for the Midwest ISO, February 22, 2012 | <https://www.midwestiso.org/Library/Repository/Communication%20Material/Key%20Presentations%20and%20Whitepapers/Natural%20Gas-Electric%20Infrastructure%20Interdependency%20Analysis_022212_Final%20Public.pdf> |
| 23 | Power Plants Likely Covered by the EPA Mercury and Air Toxics Rule, EPA, December 2011 | <http://www.epa.gov/mats/pdfs/20111221PowerPlantsLikelyCoveredbyMATS.pdf> |
| 24 | NARUC Inventory on Gas Curtailment Planning, Institute of Public Utilities and the US Department of Energy, April 2005 | <http://www.naruc.org/Publications/CIP_GasCurtailmentInventoryReport_8.pdf> |

| NAESB Gas-Electric Harmonization Committee Named Members  |
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| Member | Company/Organization |
| Catherine Abercrombie | ConocoPhillips Gas and Power Marketing |
| Vicky Bailey | BHMM Energy Services, LLC |
| Susanna B. Barry | Tennessee Gas Pipeline Company |
| Jim Buccigross | 8760 Inc. |
| Ralph Cleveland | AGL Resources, Inc. |
| Craig Colombo | Dominion Resources |
| Valerie Crockett *(Co-Chair)* | Tennessee Valley Authority |
| 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 |
| Christopher Freitas | US Department of Energy |
| 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 |
| 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 |
| 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 |
| Andrew Rodriquez | North American Electric Reliability Corporation |
| Keith Sappenfield | Encana Oil & Gas (USA), Inc. |
| Pam Silberstein | FERC |
| Commissioner Timothy Simon | California Public Utility Commission |
| Rick Smead | Navigant Consulting, Inc. |
| Terence (Terry) Thorn | KEMA Gas Consulting Services |
| Sue Tierney *(Co-Chair)* | Analysis Group, Inc. |
| Kenneth L. Yeasting | Cambridge Energy Research Associates |

| 1. Observations and Core Issues as of March 5, 2012:Scheduling and other inconsistencies in the interactions of the two markets impact the effectiveness of providing gas and electric service. |
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|  | Observation |
| 1-1 | If generation units sign up for firm transportation, can they actually use it? What are the core impediments? |
| 1-2 | There are regions of the US in which it may be difficult for firm gas transportation service customers to nominate in the timely cycle. If the nomination is made in later cycles, it is considered secondary firm service unless the subject firm service is a no-notice service. |
| 1-3 | Scheduling flexibility can be introduced on a pipeline by pipeline basis to the pipeline’s customers. |
| 1-4 | 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.. |
| 1-5 | Intraday nomination flexibility is key in contingency response, load following, and in backing up renewables. |
| 1-6 | Significant differences in day-of service and day-ahead service could lead to separate considerations in drafting recommendations. |
| 1-7 | The timely nomination process, which is iterative, can take from three to four hours. The hourly 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. |
| 1-8 | There are a number of options offered by some pipelines that introduce flexibility through the use of hourly firm non-ratable takes. |
| 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. |
| 1-10 | 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. In this fully electronic expedited process, the bumping rules should be re-examined. |
| 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. |

| 2. Observations and Core Issues as of March 5, 2012: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. |
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|  | Observation |
| 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.  |
| 2-2 | A better understanding of the conditions under which generators determine to use firm fuel and capacity, the capacity needed to support must serve loads, and the barriers or economic forces that impede generators from contracting for services to meet must serve loads would be helpful in preparing recommendations improving the effectiveness of two markets working together.  |
| 2-3 | In organized markets, with consideration for how plants are dispatched, the price 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. |
| 2-4 | Unanticipated demand, specifically in the shoulder months, poses problems more than in the colder or hotter months where conditions can be more predictable. Gas-fired electric generation can become a chokehold, and procedures and regional considerations, including the price impacts, point to a reliability quotient as part of the price of electricity. |
| 2-5 | In organized electric markets, fuel neutrality is a principle adhered to by ISOs and RTOs 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. |
| 2-6 | Long term forward capacity electric market issues are regional market design issues and may most appropriately addressed by the ISOs and RTOs. Gas service fixed cost recovery should be considered, including who pays for the gas pipeline capacity needed to back up renewables. Product definition requirements and the form of firm service appropriate to the operational obligations may need to align with those regional requirements. There may be common elements that would facilitate defining the service characteristics and scheduling rights needed to serve the electric sector. |
| 2-7 | In considering changes to capacity, many of the generators affected by EPA Mercury and Air Toxics (MATS) rule are not in the organized markets. |
| 2-8 | After the organized markets have estimated the firm capacity needed to meet load requirements, there are several models available to them in ensuring the needed capacity commitments and dispatch flexibility.  |
| 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. |
| 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. |
| 2-11 | While their charters do not permit it and there are regulatory considerations, if ISOs held capacity on pipelines, they would provide additional flexibility to the market. |
| 2-12 | Hoarding of pipeline capacity to meet demand for a few hours should be avoided. |
| 2-13 | Information on the retirement of coal or oil generation, or on generation units taken offline for economic or other reasons may impact the available capacity to the market may prove helpful as there would be a resultant increase in the demand and transportation of other fuels used for power generation.  |
| 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. |
| 2-15 | NAESB WGQ Standard 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. |
| 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?) |
| 2-17 | What has to happen to optimize and service the growing capacity market and what has to happen to add capacity to the market? Process improvement measures and structured communications are examples. It should be stressed that this question is directed to a broad audience of segments of the two markets that make the decisions or are impacted by them as capacity issues are resolved. (Capacity products in the future for may need to divide into sub product characteristics that may also impact the fuel service requirements- e.g. contingency reserves or peaking, net load following and the like.  |
| 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). |

| 3. Observations and Core Issues as of March 5, 2012:Curtailment policies and practices are components of the interdependency of the two markets that impacts harmonization. |
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|  | Observation |
| 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. |
| 3-2 | If pipeline services could be designed that would allow for use of linepack in meeting intermittent capacity requirements, market flexibility would be increased. However, it is unclear how information on linepack could be transparently communicated in real-time or how linepack would contribute to improving the efficiency of the existing infrastructure in peak day demand conditions, as 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. There may well be occasions when linepack is fully utilized to support other pipeline operations. |
| 3-3 | Knowing the status on dispatchable non-gas fired generation, such as coal or nuclear fired, can be important in decisions to modify planned outage scheduled outages for gas-fired facilities, and to make decisions needed when there are unplanned outages. However, it is not clear how this impacts gas-electric market harmonization, and may have unintended anti-competitive inter-fuel impacts. Availability status of other resources in the fleet may impact the scheduling requirements for the day but perhaps can be inherently accommodated if the harmonization issues are addressed in general.  |
| 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. |
| 3-5 | In imminent stress conditions leading to possible curtailments, 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.  |
| 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 service is not interrupted on days experiencing peak day conditions. |
| 3-7 | Curtailment policies at the state level may need review. Some generators may purchase gas from LDCs, and even those that purchase their own gas may be behind an LDC citygate and its transportation policies. As such it may be both a federal and state issue. Storage factors into curtailment policies and may relieve bottlenecks that could occur during peak periods. |
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| 4. Observations and Core Issues as of March 5, 2012 :Additional and more formal structure for communications of the parties in the gas and electric markets is needed, particularly for unanticipated demand situations. |
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|  | Observation |
| 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. |
| 4-2 | Nuclear Power Plant Communications (Report 16) could be used as a template for a more formal structure for communications. |
| 4-3 | The availability of information will be impacted for the information that is commercially or operationally sensitive. |
| 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. |
| 4-5 | Under FERC Order 698, mechanisms are in place to provide information between the pipelines and gas operations group of the generators. Much of the communications of the 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. |
| 4-6 | As infrastructure ages, an increase the number of planned outages due to maintenance may be seen which emphasizes the importance of communication process in notified affected parties to ensure that appropriate planning occurs..  |
| 4-7 | More formalized structure for communication 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. |
| 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. |
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| 5. Observations and Core Issues as of March 5, 2012:Other observations or issues not addressed in the first 4 groupings. |
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