**Summary of Comments by Topic Areas Identified by FERC and NERC Staff**

1. **Measures to improve gas-electric information sharing for improved system performance during extreme cold weather emergencies**
   1. **Whether and how natural gas information could be aggregated on a regional basis for sharing with Bulk Electric System operators in preparation for and during events in which demand is expected to rise sharply for both electricity and natural gas, including whether creation of a voluntary natural gas coordinator would be feasible**

*Summary of Comments – Comments 125, 128, 130, 136, 142, 143, 145, 148, 149, 153, 155, 158, 166, and 256*

* 1. Consider the creation of an industry tool that can disseminate aggregated information regarding the operational status of natural gas pipelines, either at a regional or national level.
  2. Consider the development of additional coordination and information sharing practices, specifically for use during critical events.
     + These could include greater information sharing between ISOs/RTOs and natural gas pipelines regarding the condition of system operations as well as expanding coordination practices to cover information sharing with additional market participants, such as LDCs and generators, to provide enhanced details during critical events regarding natural gas supply, pricing, and natural gas pipeline capacity.
  3. Consider the development of best practices for ISOs/RTOs regarding the aggregation of information from EBBs operated by natural gas pipelines and the dissemination of such information to market participants.
  4. Consider providing regional operators with additional information regarding the types of contracts under which natural-gas fired generators, within its footprint, procure natural gas through the expansion of requirements under the NERC Reliability Standards as identified in Recommendations 1.g and 8 of the Winter 2021 Report.
  5. Consider using third parties (for example, the Texas Energy Reliability Council) to bring together important critical sectors during extreme events in order to facilitate collaboration and coordination at a regional level, better informing decision making between critical sector participants.
  6. Consider developing a singular portal by which parties can access all critical notices issued by any natural gas pipeline.
  7. Consider developing additional posting requirements, to be used during critical events, for natural gas facility operators regarding operational issues that are encountered.
  8. Consider developing a mapping tool for interstate natural gas pipelines that provides, in real-time, regional information related to Operational Flow Orders, ratable take requirements, and force majeure.
  9. Consider the development of a computer model of the gas-electric system to simulate scenarios that will inform any operational decision making.
  10. Consider a review of existing natural gas market products and services to assist natural gas-fired generators in fuel procurement.
  11. **Expanding/revising natural gas demand response/interruptible customer programs to better coordinate the increasing frequency of coinciding electric and natural gas peak load demands and better inform natural gas consumers about real-time pricing**

*Summary of Comments – Comments 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 91, 123, 126, 129, 200, and 230*

1. Consider steps to facilitate the development of advanced exchange agreements between end users, including natural gas-fired generators.
2. Consider the utilization of asset managers, asset sharing mechanisms, and/or asset sharing agreements for electric generation, similar to those by LDCs, to assist in procurement of natural gas.
3. Modifications or Expansion of Secondary/Capacity Release Markets
   * Consider expanding bilateral markets, including through the development of a standardized method, to allow for the direct buying/selling of unused capacity between natural gas end users, and to better accommodate the voluntary release of unused firm capacity by “non-critical” end users during extreme events or other critical periods.
   * Consider developing a specific capacity/natural gas swap or exchange trading platform, for use during critical events, that enables natural gas pipelines to coordinate with shippers to facilitate the sale/purchase of any available capacity or supply voluntarily made available by market participants.
   * Consider creating standardized methods to post, transact, and facilitate secondary market capacity release.
   * Consider requirements that natural gas pipelines provide additional information related to aggregations of capacity release data, such as the percentage of how often secondary points are available during peak day periods.
   * Consider creating an intrastate-specific capacity release market.
   * Consider providing real-time information regarding capacity release.
   * Consider enhancing intraday transaction reporting requirements to increase transparency regarding wholesale gas price formation on the secondary market, such as providing the quantity of available capacity and the associated price at the start of each scheduling cycle.
4. Consider modifications to the procurement practices for LDCs that reduce the amount of required natural gas contingency reserves.
5. Consider requiring generators to procure back-up services to ensure continued generation, such as from demand response, in the development of new generation projects.
   1. **Electric and natural gas industry interdependencies (communications, contracts, constraints, scheduling)**

*Summary of Comments – Comments 29, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 89, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 115, 115, 116, 117, 118, 119, 120, 121, 122, 124, 127, 128, 130, 133, 134, 135, 136, 137, 138, 139, 140, 141, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 156, 157, 158, 160, 161, 162, 163, 164, 165, 167, 211, 215, 217, 228, 229, 230, 232, 233, 238, 239, 246, 247, 248, 249, 252, 254, 255, 257, 258, 259, 260, 262, 263, 264, 265, 266, 27, 268, 270, 271, 273, 274, and 283*

* + - 1. Gas Market Scheduling

Consider if revisions should be made to the gas nomination cycles such as changes to the timing of the nomination processes, shortening of cycle periods, or additional intraday cycles.

Consider the exploration of hourly gas nominations.

Consider the elimination of the “no bump” policy for natural gas pipeline nominations to help ensure that parties who have contracted for firm transportation rights can access the service.

Consider, during weekends and holidays, provisions that would allow for natural gas to be traded and scheduled/adjusted for individual days, or available during extreme weather events.

Consider non-ratable flow options to provide increased flexibility in purchasing of natural gas, especially during weekends or holidays.

* + - 1. Electric Market Design

Consider changes to scheduling practices within organized markets so that there is better alignment between market clearing times, the issuance of day-ahead awards, and the dispatching of generators, such as adjusting the timing of day-ahead awards to better coordinate with the start of the natural gas timely nomination cycle.

Consider the use of multi-day clearing processes during and/or in advance of extreme weather events.

Consider if natural gas-fired generators should be required to purchase bundled packages of fuel transport and supply.

Consider if there are mechanisms, such as modifications to credit and collateral practices, to better promote diversification of natural gas suppliers, especially during an extreme event.

* + - 1. Consider hourly reporting of price formation during the gas day.
      2. Consider the development of FERC transactional reporting requirements for intraday transactions similar to timely cycle transactional reporting requirements.
      3. New pipeline service offerings

Consider new pipeline services that could provide greater flexibility for natural gas-fired generators by offering alternatives to traditional offerings (e.g. year-round firm service), such as new firm transportation and storage options and/or premium capacity services tailored to accommodate daily winter peak periods.

Consider the development of specific tariff services for natural gas pipeline capacity during critical weather events.

* + - 1. Consider methods to encourage market engagement that will provide more liquidity to the natural gas market and better support natural gas purchasing outside of the timely nomination cycle. These mechanisms could include the utilization of price signals that induce natural gas sellers to hold reserve for release and/or ensure the availability of physical assets capable of providing natural gas to accommodate unplanned flows which can be used to encourage market engagement
      2. Consider the creation of a 24/7 natural gas market for critical weather events.
      3. Information sharing

Consider if additional details should be provided by natural gas pipelines regarding actual gas flow.

Consider the development of standardized information sharing practices for ISOs/RTOs and natural gas pipelines, to provide a more robust, wide-area view of system operations.

Consider if there is a need for additional guidance regarding the impact of FERC’s duty of candor rule and the types of information shared as part of coordination communications under FERC Order No. 787.

Consider the development of a mechanism by which generators can provide timely notice to regional operators regarding potential issues that may impact operations, including the sourcing of natural gas, such as possible reductions in firm supply or transportation commitments.

Consider the development of communication coordination protocols for natural gas pipeline operators and shippers to convey information regarding overtakes in order to help avoid operational flow orders and curtailments. This may include the ability of natural gas end users to be able to provide equipment information that can be used to help identify potential demand reductions.

Consider the development of information sharing protocols between natural gas-fired generators and natural gas pipelines, such as natural gas facility information and/or mechanisms to provide information regarding expected hourly takes by natural gas-fired generators that could be used to create a baseline for allocating capacity during periods of constrained demand.

Consider if there should be information sharing requirements between retail gas utilities and any natural gas-fired generation those utilities serve.

Consider the use of best practices for electric system operators to better assimilate, on a regional level, data shared by natural gas pipelines.

Consider the use of the NAESB and FERC processes to explore new technologies, mechanisms, and/or industry tools that can streamline and add efficiencies to reporting, posting, and data sharing processes of natural gas pipelines.

Consider if communication protocols should be developed to facilitate real-time information sharing of system conditions by natural gas pipelines with natural gas end users. This information could include capacity and operational information as well as production, supply, and delivery issues.

Consider if there should be posting requirements for wellhead and mid-stream facility operators regarding any encountered operational issues.

* + - 1. Consider the expansion of generator performance risk assessment by ISOs/RTOs to incorporate an evaluation of the natural gas contracting practices for a natural gas-fired generator as well as the generator’s access to natural gas transport and supply, potentially through the creation of new NERC Reliability Standards. ISOs/RTOs could also monitor FERC’s Index of Customers.
      2. Critical Notices

Consider if there should be further standardization regarding the issuance and content of critical notices, such as specified minimum geographical locational information and an identification of the event leading to the notice being issued.

Consider if, similar to the Energy Emergency Alert system, a tiered approach can be utilized for the issuance of operational flow orders to allow for quicker, easier distinguishment in the expected level of impact.

* + - 1. Planning/Forecasting

Consider modifying ISO/RTO planning processes to include criteria regarding a generation resource’s supply portfolio in order to better ensure the scheduling of resources with the firmest supplies during peak periods. This could include consideration of incentives to encourage more competitive procurement practices and the implementation of reliable fuel practices that better account for the possibility of natural gas constraints during peak demand periods, such as requirements for generators to contract for back-up services.

Consider if there are modifications to planning processes and/or market design that will provide for greater predictability regarding the future dispatch of a generator in order to encourage firm fuel and transport procurement. This could include the procurement of generation to meet peak load and reserve needs at least a season in advance or additional contingencies as part of load forecasting.

Consider increased transparency regarding natural gas planning processes, including long-term reliability and contingency planning.

Consider if there are mechanisms to increase interactions between the natural gas and electric industries during planning processes, such as the siting of natural gas generation and natural gas pipeline expansions, scenario based planning, and long-term planning processes.

Consider the development of forecasting and/or planning best practices to assist ISOs/RTOs in managing unanticipated demand due to critical weather events.

Consider a mechanism by which input can be provided to planning entities by all market participants regarding established requirements for forecasting and planning.

Consider if there would be a benefit in providing, as part of electric demand forecast, specific information regarding anticipated natural gas needs.

1. **Measures to improve reliability of natural gas facilities during cold weather (freeze protection, electric supply)**
   1. **Additional state actions (including possibly establishing an organization to set standards, as NERC does for Bulk Electric System entities) to enhance the reliability of intrastate natural gas pipelines and other intrastate natural gas facilities**

*Summary of Comments – Comments 53, 131, 157, 159, 170, 200, 201, 202, 205, 206, 207, 208, 209, 210, 212, 213, 214, 215, 216, 217, 218, 219, 222, 223, 251, 280, 282, 284, 286, 303, and 304*

* + - 1. Consider state mandated information sharing/transparency requirements between intrastate pipelines, storage operators, state regulatory bodies, generators, and other end users related to capacity, planned outages, operations, gathering and receipt point production issues, and other delivery issues, which may require the use of Electronic Bulletin Boards.
      2. Consider the development of or modification to capacity release markets for intrastate pipelines, including needed transparency requirements.
      3. Consider separation of intrastate pipeline operational and marketing functions as well as intrastate pipeline affiliates and other entities that compete for transportation and storage contracts.
      4. Consider greater visibility into the firm contracting practices and circumstances creating force majeure events in the intrastate markets.
      5. Consider the adoption or expansion of applicability of FERC transparency requirements to Hinshaw Pipelines and intrastate pipelines subject to FERC jurisdiction under section 311(a)(2) of the Natural Gas Policy Act.
      6. Consider requirements for LDCs to develop methodologies to reforecast demand, specify reserve margin calculations, and release excess capacity and/or natural gas during extreme weather events.
      7. Consider resiliency requirements for gas infrastructure similar to those of other critical facilities.
      8. Consider the implementation of recommendations from the American Gas Foundation Resiliency Study as appropriate within state jurisdictions.
      9. Consider a review of state policies to ensure that requirements placed upon LDCs to procure reserves are appropriate, efficient and align with other state policies, such as electrification and decarbonization.
  1. **Programs to encourage and provide compensation opportunities for natural gas infrastructure facility winterization**

*Summary of Comments – Comments 187, 280, 281, 282, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, and 296*

* + - 1. Consider targeted requirements for critical gas facilities reliant on electric power for operations, along the supply chain to maintain on-site gas generation, deploy resiliency strategies, such as microgrids, or maintain other forms of back-up generation.
      2. Consider strategies or requirements to incentivize the modernization and weatherization of production, gathering, processing, transmission and storage of natural gas infrastructure, such as changes to force majeure language in the NAESB Base Contract for Sale and Purchase of Natural Gas.
    1. **[Recommendation 24] Federal and state entities with jurisdiction over natural gas infrastructure should cooperate to further study and enact measures to address natural gas supply shortfalls during extreme cold weather events, including possible financial incentives for the natural gas infrastructure system necessary to support the BES to winterize or otherwise prepare to perform during extreme cold weather events.**

*Summary of Comments –* *Comments 170, 181, 231, 244, and 269*

* + - 1. Study recommendations include:
         * State Commissions should explore new methodologies that better capture the true value gas infrastructure provides to the resilience of the entire energy system.
         * FERC should hold a technical conference to examine the need for federal and state coordination and oversight of pipeline capacity to ensure adequate interstate natural gas pipeline capacity for the manufacturing sector.
         * NERC should conduct a study, in conjunction with a diverse group of interests, to assist the industry in better understanding requirements within each region regarding the level of pipeline capacity required to accommodate new generator usage patterns for ramping.
         * Conduct an analytical analysis study that (1) evaluates supply/demand balance under extreme conditions; (2) identifies which generating units must operate under such conditions; (3) describes and explores the risk of extreme events; and/or (4) ranks cost and effectiveness of solutions for making supply more secure, such as winterizing wells, adding underground storage, new pipeline capacity, etc.
         * Conduct a study, performed by the U.S. Department of Energy, NERC, or a national laboratory, to evaluate if there are adequate generator resources in place to accommodate the increased use of variable resources as well as sufficient fuel supplies to support those resources.
  1. **Methods to streamline the process for, and eliminate barriers to, identifying, protecting, and prioritizing critical natural gas infrastructure load [See also Recommendation 28 – Guidelines to identify critical natural gas facility loads]**

*Summary of Comments – Comments 127, 132, 137, 227, 235, 272, 275*

* + - 1. Consider a federal and state information sharing effort between electric system operators and critical natural gas facility operators to identify the circuits for critical natural gas facilities that are powered solely by electricity and ensure that they are protected from load shed.
      2. Consider the establishment of natural gas curtailment plans as part of tariffs or state commission orders that define priorities for natural gas customers.
      3. Consider increased collaboration between pipelines and RTOs to shift generation to areas where gas is available in accordance with planning targets.
      4. Consider the adoption of emergency preparedness plans that include items such as Jones Act waivers as well as short-term waivers of air emission limits, RPS requirements, and pipeline quality specifications.

1. **Measures to improve the ability of generators to obtain fuel during extreme cold weather events when natural gas heating load and natural gas-fired generators are both in high demand for natural gas, at the same time that natural gas production may have decreased**
   1. **Which entity has authority to require certain natural gas-fired generating units to obtain either firm supply and/or transportation or dual fuel capability, under what circumstances such requirements would be cost-effective, and how such requirements could be structured, including associated compensation mechanisms, whether additional infrastructure buildout would be needed, and the consumer cost impacts of such a buildout**

*Summary of Comments – Comments 1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 18, 19, 20, 21, 22, 23. 24, 25, 26, 27, 28, 30, 31, 32, 34, 35, 36, 37, 38, 39, 41, 42, 45, 46, 47, 48, 49, 50, 51, 52, 54, 168, 169, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 188, 189, 190, 191, 192, 193, 194, 195, 199, 203, 204, 234, 241, 259, 261, 266, 267*

* + - 1. Consider electric market reforms/mechanisms that allow for cost recovery for certainty in fuel procurement and transportation costs, similar to those in place by LDCs and vertically integrated utilities.
      2. Consider firm service or storage requirements or the adoption of reliability or must-run agreements for generators as a condition of participation in the wholesale electric markets.
      3. Consider the development of new market-based products, such as Firm Fuel Supply Services, and services that provide rapid/fast ramping and frequency services, pay-for-performance programs, and other incentives for long-term contracting arrangements.
      4. Consider grid reliability reservation charges for utilities and renewable generators for the cost of fast-ramping resources to balance variations and volatility from renewable resource output or proof of firm, dispatchable fuel supply.
      5. Consider the development of fuel-neutral policies to provide certainty in long-term cost recovery by electric generators that align with obligations to run, such as dual-fuel capabilities, additional transmission or transportation capabilities, storage, and/or onsite LNG.
      6. Consider de-rating generators that do not provide adequate reliability.
      7. Consider new incentives to spur infrastructure investments and forward energy supply chain arrangements to meet reliability and flexibility needs of generators.
      8. Consider providing input by stakeholders and electric market operators regarding the need for natural gas as a balancing resource and/or information regarding the types of resources capabilities that may be necessary to ensure electric reliability, such as dispatchable fast ramping, if FERC moves forward in consideration of broader factors in determinations of the public interest for new infrastructure.
      9. Consider creating a reliability surcharge for electric customers to address costs associated with building out additional needed capacity for electric generation.
      10. Consider incentives for additional storage infrastructure in production areas and along the pipeline system and/or additional compression.
      11. Consider methods to streamline the certificate review process to avoid delays and help natural gas companies better manage federal, state, and local permitting processes that can be overlapping, inconsistent, and duplicative.
      12. Consider legislation to ensure sufficient interstate natural gas pipeline capacity at peak demand for the reliability of natural gas and electricity supply(?), including expediting pipeline permitting and construction and providing national oversight to ensure a smooth transition to decarbonization.
      13. Consider if allowing pipelines to build in reserve capacity within expansion projects to account for contingencies when faced with constrained transportation conditions and allowing pipelines to facilitate the use of third-party storage for short notice/no notice service could help in the short term.
      14. Consider requirements for firm supply/transportation or dual fuel capability for electric generators as part of resource adequacy planning, potentially modeled on Western Power Pool’s proposed Western Resource Adequacy Program.
      15. Consider the development of mechanisms to evenly disperse fuel procurement costs during critical events among all consumers within a region.
    1. **[Recommendation 24] Federal and state entities with jurisdiction over natural gas infrastructure should cooperate to further study and enact measures to address natural gas supply shortfalls during extreme cold weather events, including market/public funding for generators to have firm transportation and supply and invest in storage contracts. Such funding may need to finance infrastructure necessary to provide additional firm transportation capacity, because many existing pipelines were financed and constructed to serve LDCs and may not have sufficient additional firm capacity.**

*Summary of Comments – Comments 170, 181, 231, 244, and 269 [see also: 13, 16, 20, 34, 35, 37, 39, 45, 49, 51, 52, 54, 168, 169, 171, 177, 178, 179, 180, 188, 189, 190, 191, 192, 193, 194, and 230*

* + - 1. Study recommendations include:
         * State Commissions should explore new methodologies that better capture the true value gas infrastructure provides to the resilience of the entire energy system.
         * FERC should hold a technical conference to examine the need for federal and state coordination and oversight of pipeline capacity to ensure adequate interstate natural gas pipeline capacity for the manufacturing sector.
         * NERC should conduct a study, in conjunction with a diverse group of interests, to assist the industry in better understanding requirements within each region regarding the level of pipeline capacity required to accommodate new generator usage patterns for ramping.
         * Conduct an analytical analysis study that (1) evaluates supply/demand balance under extreme conditions; (2) identifies which generating units must operate under such conditions; (3) describes and explores the risk of extreme events; and/or (4) ranks cost and effectiveness of solutions for making supply more secure, such as winterizing wells, adding underground storage, new pipeline capacity, etc.
         * Conduct a study by the U.S. Department of Energy, NERC, or a national laboratory to evaluate if there are adequate generator resources in place to accommodate the increased use of variable resources as well as sufficient fuel supplies to support those resources.
  1. **[Recommendation 24] Possible options for increased regasification of liquid natural gas (including possible Jones Act Waivers)**

*Summary of Comments – Comments 13, 22, 225, and 272*

* + - 1. Consider cost recovery mechanisms and emergency response programs that support the utilization of LNG including short-term or temporary waivers to the Jones Act and other requirements such as air emissions and RPS to respond to emergency situations.
  1. **Which entity has authority, and under what circumstances, to take emergency actions to give critical electric generating units pipeline transportation priority second only to residential heating load, during cold weather events in which natural gas supply and transportation is limited but demand is high**

*Summary of Comments – Comments 127, 130, 132, 137, 226, 227, 242, 245, 276, 277, 278, and 279*

* + - 1. Consider new transparency and information sharing requirements between RTOs, generators and large end users concerning actual gas flows, available capacity and price formulation to determine allocations during extreme weather events, in conjunction with regulators and emergency service offices.
      2. Consider the development of regulatory requirements to address prioritization of service among firm natural gas service customers in situations where firm customers, including electric generators, may face curtailment due to operational, physical, or cyber incidents that disrupt natural gas pipelines or otherwise cause reductions in firm service. The prioritization should recognize the human needs value of maintaining short term reliability of electric service along with other human need requirements and may require federal and/or state regulators to mandate that existing firm service to “non-critical” customers be shifted to critical entities.
      3. Consider the development of standardized best practices regarding natural gas prioritization tiers, including the categories of consumers that should be considered part of critical human need.
  1. **Whether resource accreditation requirements for certain natural gas-fired generating units should factor in the firmness of a generating unit’s gas commodity and transportation arrangements and the potential for correlated outages for units served by the same pipeline(s)**

*Summary of Comments – Comments 3, 10, 11, 12, 16, 17, 28, 30, 31, 33, 34, 36, 37, 39, 40, 41, 42, 43, 44, 45, 46, 47, 66, 230, 241, 243, 246, and 247*

* + - 1. Consider fuel security as a capacity attribute or required for participation in the wholesale electric markets rather than penalty-based systems.
      2. Consider enhancing capacity performance/pay-for-performance programs and price signals that encourage fuel procurement in advance of critical weather events.
      3. Consider alternative service options that value reliability, fast-ramping, and frequency attributes.
      4. Consider reexamining the duration of commitments in capacity auctions.
      5. Consider developing capacity accreditation requirements that take into account actual expected generation availability for all resources.
  1. **Whether there are barriers to the use of dual-fuel capability that could be addressed by changes in state or federal rules or regulations. Dual-fuel capability can help mitigate the risk of loss of natural gas fuel supply, and issues to consider include facilitating testing to run on the alternate fuel, ensuring an adequate supply of the alternate fuel and obtaining the necessary air permits and air permit waivers. The forum could also consider the use of other resources which could mitigate the risk of loss of natural gas fuel supply**

*Summary of Comments – Comments 24, 31, 32, 35, 49, 66, 71, 196, 241, 272, and 299*

* + - 1. Consider incentives for power customers to make investments in additional infrastructure for dual fuel capability to meet peak demand.
      2. Consider passing costs of developing fast-ramping resources to balance intermittent volatility to operators of renewable generation.
      3. Consider regulatory requirements to provide evidence of firm supply/transportation or dual fuel capability as part of resource adequacy planning.
      4. Consider fuel-neutral policies to provide certainty in long-term investments in dual fuel capabilities for electric generators.
  1. **Increasing the amount or use of market-area and behind-the-city-gate natural gas storage**

*Summary of Comments – Comments 13, 35, 37, 49, 66, 92, 93187, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 230, and 299*

* + - 1. Consider requirements to increase line-pack in the pipeline one to two days prior and during times of anticipated critical weather events modeled on the emergency facility ratings utilized by the electric industry.
      2. Consider mechanisms that incentivize investment in reliability through natural gas services and infrastructure, including storage options.
      3. Consider expanding third-party storage opportunities or more storage along mainline pipeline systems for short notice/no-notice service.
      4. Consider allowing pipelines to build in reserve capacity within expansion projects to account for contingencies during constraint events.
      5. Consider expanding the integration of alternative fuels or LNG produced and stored behind the city gate.
  1. **[Recommendation 24] Federal and state entities with jurisdiction over natural gas infrastructure should cooperate to further study and enact measures to address natural gas supply shortfalls during extreme cold weather events, including possible investments in strategic natural gas storage facilities, which could be located to serve the majority of pipelines supplying natural gas-fired generating units, and preserved for use during extreme cold weather events**

*Summary of Comments – Comments 170, 181, 231, 244, and 269 [see also: 188, 189, 190, 191, 192, 193, 194, 250, and 299]*

* + - 1. Study recommendations include:
         * State Commissions should explore new methodologies that better capture the true value gas infrastructure provides to the resilience of the entire energy system.
         * FERC should hold a technical conference to examine the need for federal and state coordination and oversight of pipeline capacity to ensure adequate interstate natural gas pipeline capacity for the manufacturing sector.
         * NERC should conduct a study, in conjunction with a diverse group of interests, to assist the industry in better understanding requirements within each region regarding the level of pipeline capacity required to accommodate new generator usage patterns for ramping.
         * Conduct an analytical analysis study that (1) evaluates supply/demand balance under extreme conditions; (2) identifies which generating units must operate under such conditions; (3) describes and explores the risk of extreme events; and/or (4) ranks cost and effectiveness of solutions for making supply more secure, such as winterizing wells, adding underground storage, new pipeline capacity, etc.
         * Conduct study by the U.S. Department of Energy, NERC, or a national laboratory to evaluate if there are adequate generator resources in place to accommodate the increased use of variable resources as well as sufficient fuel supplies to support those resources.
  1. **Whether or how to increase the number of “peak-shaver” natural gas-fired generating units that have on-site liquid natural gas storage.**

*Summary of Comments – Comments 13, 32, 197, 198, 300*

* + - 1. Consider regulatory policies, such as a reliability surcharge, that encourage the development of LNG needle peaking units aside existing pipelines or located near generators.
      2. Consider the creation of a call market option for LNG.

1. **Other Comments**

* Explore the implementation of a “beneficiary pays” approach model that could be adopted for the natural gas pipeline industry. This could be done by analyzing existing FERC precedents regarding ISO/RTO cost allocation for reliability upgrades. [Comment 69]
* Explore the ability of preemptive waivers of imbalance penalties by pipelines during critical periods for shippers that are supply gas to the system. [Comment 70]
* Engineering and design can account for low probability events ahead of time with lower costs, in principle. [Comment 236]
* Engineering/design analyses can identify vulnerable points across gas & power supply chains, which can be cheaper and quicker to fix. [Comment 237]
* Installation of telemetry for hourly meter readings. [Comment 253]
* More flexible natural gas grid to serve both LDCs and power generators with back up fuel for compression. [Comment 297]
* Improve downstream city gate pipeline interconnections. [Comment 298]
* Require ISOs/RTOs to operate capacity markets. [Comment 301]
* FERC and state regulators should establish policies that aim to prevent over dependence on electric natural gas compression stations. [Comment 302]