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Quadrennial Energy Review Secretariat
Quadrennial Energy Review Interagency Task Force
U.S. Department of Energy
1000 Independence Avenue SW
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To Whom it May Concern:

INTRODUCTION

Alcoa is global industrial company which is exposed to competition in all of our businesses. With 26,000 U.S.-based employees and a major presence in 22 states, Alcoa's activities are heavily rooted in the U.S. and rely greatly on U.S. energy infrastructure. All of our areas of business are highly energy intensive, and as a result, we participate in many aspects of energy markets, including:

- Energy-intensive manufacturing
- Two power plants in the U.S. – Indiana (coal) and North Carolina (hydro)
- Demand response system in e.g., Indiana, Washington State, New York.
- Alcoa Oil & Gas business unit active in hydraulic fracturing and deepwater development
- State and national leader on associations including PGC, IECA, ELCON and diverse state associations

Across these energy focus areas, Alcoa relies on energy that is affordable and reliable with prices that are stable and predictable. When Alcoa ponders the role of Federal Government action undertaken as a result of the Quadrennial Energy Review (QER), we think along these lines:

- Does it enhance or maintain the competitiveness of our nation?
- Are our actions in the area of energy in the public interest?
- Do we have a robust and up to date definition of the public interest for the policy items we are deciding?
- Does it appropriately balance the interests of all stakeholders?
- If there are costs, are those causing the cost bearing them?

Our comments on the QER process are underpinned by these key questions. Alcoa believes that the Federal Government faces a tremendous opportunity to enhance the competitiveness of our nation by addressing broad infrastructure challenges that affect the competitiveness of U.S. businesses and the needs of U.S. consumers, while also ensuring that those stakeholders driving certain costs for their benefit are the ones who bear those costs.

The QER is an excellent opportunity to reassess our national energy infrastructure, transportation and distribution priorities and to ensure that any investment recommendations are closely aligned with the broad public interest.

Our comments for the QER, included below, fall into three broad categories:

- Planning and Funding Energy Infrastructure
- Demand Response and FERC Order 745
- Pipeline Capacity for Electric Generators, developed in conjunction with the Process Gas Consumers (PGC)

The third topic could be viewed as a subset of the first, but the first topic is intended as a broader discussion. Correspondence and communications regarding these comments should be addressed to the undersigned as follows:

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PLANNING AND FUNDING ENERGY INFRASTRUCTURE

PROBLEM STATEMENT

The nation's infrastructure for transporting, storing and delivering energy, especially natural gas, is inadequate to present needs. Moreover, without prompt action, the gap between capability and need will continue to grow as the role of natural gas in residential, transportation, industrial, power generation and foreign export applications are all expected to increase.

Certain events during the winter of 2013-14 highlight the severity of the immediate deficiencies in interstate natural gas pipeline capacity. With the recent growth in natural gas as a power generation fuel, the natural gas and electricity markets have become increasingly interrelated. Furthermore, because natural gas is expected to continue to expand its role as a power generation fuel, the interrelationships between these two energy markets and infrastructures will also continue to intensify. These complex interrelationships have created significant challenges to the operation and reliability of both the interstate natural gas pipeline network and the nation's electricity grid. In fact, these challenges are so significant

and so widespread that FERC has seen fit to open a number of separate dockets on questions pertaining to the sharing of non-public information[1] and the harmonization of the trading and scheduling of natural gas and electricity[2]. The challenges to availability, reliability and price of natural gas and electricity related to the occurrence of the polar vortex during the winter of January 2014 were also the subject of a FERC Technical Conference on April 1, 2014[3]. One result of this Technical Conference is a continuing question on whether there is sufficient interstate pipeline capacity to move supplies of natural gas to the locations needed in a reliable and cost effective manner. In fact, preliminary FERC Staff Findings presented during the Technical Conference include:

- "Natural gas prices were high and deliverability into market areas was a concern. Although shale supplies are plentiful, some gas did not make it to market demand centers in the east due to pipeline constraints, contributing to the extreme basis.
- Further, increasing natural gas demand for industrial uses and power burn in the long-term, and continuing infrastructure constraints in the near-term, may exert upward pressure on natural gas prices which staff would expect to see reflected in electricity prices."[4]

Beyond these existing deficiencies, there is growing evidence that without correction, conditions threaten to worsen. In addition to being used as the fuel for growing electricity demand, natural gas will also be used to fuel generation capacity needed to replace present coal-fired units that will soon be retired due to age or compliance with new regulation. During the July 29 hearing before the House Energy and Commerce Committee, all of the five FERC Commissioners agreed that more planning and coordination between FERC and EPA was advisable in the implementation of EPA's new Clean Plant Program.[5] On numerous other occasions various FERC commissioners have opined that we must find more effective ways to plan, site and fund energy delivery infrastructure.

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[1] U.S. FERC, Docket No. RM13-17-000; Order No. 787, November 15, 2013, "SUMMARY: In this Final Rule, the Federal Energy Regulatory Commission (Commission) amends the Commission's regulations to provide explicit authority to interstate natural gas pipelines and public utilities that own, operate, or control facilities used for the transmission of electric energy in interstate commerce to share non-public, operational information with each other for the purpose of promoting reliable service or operational planning on either the public utility's or pipeline's system. The revised regulations will help maintain the reliability of pipeline and public utility transmission service by permitting transmission operators to share information with each other that they deem necessary to promote the reliability and integrity of their systems."

[2] U.S. FERC, Docket Nos. RM14-2-000, EL14-22-000, EL14-23-000, EL14-24-000, EL14-25-000, EL14-26-000, EL14-27-000, RP14-442-000, Item Nos. M-1, M-2 & M-3, March 20, 2014, Press Release: "In two separate but related orders, FERC established proceedings under the Federal Power Act (FPA) and Natural Gas Act (NGA)." "This past winter has highlighted the critical and growing interdependence of natural gas pipelines and electricity markets," Acting Chairman Cheryl LaFleur said. "Today's orders take steps to recognize and address that interdependence to optimize the use of our gas and electric networks for the benefit of all customers." "Today's set of orders build upon our earlier efforts to better coordinate the actions of the natural gas and electricity industries, with particular emphasis now on improving the scheduling practices of the natural gas transportation and electricity markets," Commissioner Philip Moeller said.

[3] U.S. FERC, Docket No. AD14-8-000 Technical Conference "Winter 2013-2014 Operations and Market Performance in Regional Transmission Organizations and Independent System Operators" April 1, 2014.

[4] FERC, Docket No. AD14-8-000 Technical Conference "Winter 2013-2014 Operations and Market Performance in Regional Transmission Organizations and Independent System Operators", Staff Presentation, April 1, 2014.

[5] U.S. House of Representatives Energy and Commerce Committee Hearing "FERC Perspectives: Questions Concerning EPA's Proposed Clean Power Plan and other Grid Reliability Challenges" July 29, 2014.

More specifically and more comprehensively, on August 6, the Eastern Interconnection Planning Collaborative (EISPC) issued a draft study that analyzes the potential long-term infrastructure requirements for the electric and natural gas industries, including integration of the operational constraints of both industries into their infrastructure development, and draws the following six sobering conclusions[6]:

- New natural gas supplies that will enter the interstate pipeline system are going to require supplementary pipeline capacity. The most significant regional capacity additions will originate from the northeastern and southwestern states.
- The northeastern capacity increases will primarily be driven by Marcellus and Utica gas development and the southwestern additions by growth in production from the Eagle Ford and Haynesville shale plays, as well as a number of other unconventional plays. The Southwest is also seeing substantial load growth, especially in the form of gas exports to Mexico and at LNG terminals, and increasing petrochemical gas use.
- The southeastern and central states will see sizable capacity increases, primarily because a significant number of coal plants are expected to be retired, and gas-fired capacity will be serving as the primary replacement.
- Fuel infrastructure needs between 2014 and 2030 in the U.S. portion of the Eastern Interconnection are projected to range between $83.3B and $121.9B, depending upon the scenario.
- Much of the capacity increases will occur over the next 10 years, which will coincide with the robust production and market growth that is anticipated to transpire over the same time period. If both production and market growth decelerate, natural gas pipeline expansion will slow accordingly.
- Site selection of natural gas pipelines and other natural gas infrastructure requires an understanding of the major impacts and concerns associated with the facilities themselves, as well as an understanding of the permitting, consultation, and environmental review requirements of federal and state agencies.

More to the point, this EISPC study also finds that total infrastructure costs are lower when planners in both the electricity and natural gas sectors collaborate, compared to when market participants develop their solutions separately.

This present and growing pipeline capacity deficit demands attention because it has many costs. Just from the polar vortex events of the past winter, the direct costs are estimated at between 1% and 3% of each customer's total annual spend on electricity.[7] However, these direct costs are only the beginning of the story. The indirect costs imposed by price volatility and a perceived threat of unreliable supply are far higher: they send strong warning signals

[6] "Long-Term Electric and Natural Gas Infrastructure Requirements White Paper" Draft Study by ICF for EISPC released August 6, 2104 The study examines natural gas infrastructure build-out needs over the range of policy futures explored in the EISPC transmission study and demonstrates a methodology for co-optimizing power sector and natural gas sector infrastructure expansions. Reliability and resource adequacy are explored in the context of fuel infrastructure needs and the siting requirements for new gas pipelines are also discussed. This report sets forth methods for optimizing natural gas infrastructure in the context of future system needs and provides a blueprint for the joint consideration of power system reliability and natural gas fuel infrastructure adequacy in the context of anticipated increases in power sector demand for natural gas.

[7] "Polar Vortex Effect on Electricity Prices", Energy Research Council Research Brief, July 14, 2014.

to those planning expansion or new investments. The economic costs of these uncertainties are far worse.

SOLUTIONS

To address the immediate pipeline capacity deficit driven by the recent expansion of natural gas as a power generation fuel, we suggest a clear and simple rule[8]: require the sale of 'firm' electricity to be supported by 'firm' fuel. That is, a rule requiring any generator offering firm electricity for sale into the grid to maintain and be able to show that the sale can be guaranteed by adequate supplies of coal on the pile, oil in the tank or firm natural gas pipeline capacity in the ground coupled to supply.[9] The rule would have its strongest impact where it is needed the most: in states where the electricity markets have been restructured. Such a requirement is clear and direct, and while it does not proscribe construction of pipeline capacity, it would have much the same effect.

Further, this rule is not a new concept; it merely restores a protection that existed in a different form. While states with regulated electricity markets do not (and did not) have any explicit rules for minimum fuel inventories, requirements and allowances in other areas combined to produce the same result. Regulated utilities are (and were) required to maintain a certain, minimum degree of system reliability. State commissions allowed utilities to recover the cost of the consequent minimum fuel inventories either through base rates or through permissive fuel cost recovery surcharges. The near guarantee of recovery for these costs combined with the severe financial and political consequences of an avoidable electricity shortfall to form a de-facto minimum inventory rule. In restructured markets, the utility's obligation for reliable service is now an arm's length (at minimum) from the generator's fuel management practices. This gap is at the root cause of much of the price volatility and energy deliverability problems experienced during the recent polar vortex. The rule we suggest closes that gap.

To address the longer-term challenges, we note that real solutions are inherently complex and involve many concerns addressed by many constituencies across many layers of government and private sectors. Solutions developed and suggested in isolation from other perspectives will not be viable. Consequently, we suggest empowerment of a working group representing the various stakeholders to engage interactively in a process to draw a comprehensive long-term solution from some combination of the following two mechanisms to plan, site and fund capital-intensive infrastructure:

- <u>Regional Model: New England States Committee on Electricity (NESCOE)</u>
  NESCOE is a not-for-profit organization representing the collective interests of the six New England States on regional electricity matters. It is directed by managers appointed by the six New England Governors and advances policies to provide electricity at the lowest possible price over the long term, while maintaining reliable electric service and environmental quality.

[8] This rule could be promulgated by FERC or NERC, depending upon the specifics of jurisdiction.

[9] This rule would need to be accompanied by adjustments to rules in ISO (Independent System Operator) to ensure generators have appropriate recovery of cost.

- Public Private Partnership Model: Infrastructure Finance Working Group
  The Presidential Memorandum of July 17, 2014 "Expanding Public-Private Collaboration on Infrastructure Development and Financing" established the Infrastructure Finance Working Group. While the initial thrust of this effort appears to be aimed at transportation infrastructure, the Secretary of Energy (or designee) was also given a place on this working group. This should be seized as an opportunity to include energy infrastructure into this promising process.[10]

These models are not put forth as exact structures to be duplicated; rather, they are starting points and illustrative examples to explore ways energy stakeholders and the federal government could address the challenges we are facing today.

We are willing to participate in process we suggest, and we look forward to working with you more broadly on building the energy transportation and delivery systems needed to support robust manufacturing growth in the US.

DEMAND RESPONSE AND FERC ORDER 745

For many Alcoa locations in North America, Demand Response has become an integral part of daily operations because it provides a powerful tool for mitigating rising energy costs while providing valuable support and cost effective solutions for the operation of the electric grid. With over 5 years of continuous supply of ancillary services, Alcoa locations have proven that Demand Response (DR) can be reliable, accurate and extremely economic. One of the best examples of DR implementation is Alcoa's Warrick operations which has given direct control of the amount of aluminum produced to the operator of the Mid-West Electric Grid. In this instance, Alcoa's Warrick smelter supplies almost 17% of the entire Mid-West Electric Grid's spinning reserve requirements and up to 8% of the entire frequency regulation requirements for the system. The details of how Alcoa participates as a DR provider are outlined in the attached DOE paper, which is being updated at this time.

Although Alcoa was an active Demand Response provider before FERC Order 745, the issuance of this landmark ruling opened the door for Alcoa to expand best practices and for many locations to begin providing Demand Response support to the electric grid. Order 745 insured that DR resources would receive the same compensation as other types, including traditional generators, when DR supplied the same type of response. The recent DC Circuit Court ruling to vacate Order 745 will potentially remove many resources from market participation because there will not be a mechanism to monetize performance when needed for system support.

Alcoa believes that Demand Response provides significant benefits to the electric grid operator, the end use consumer and the location involved with performing the response. Whether Demand Response is compensated as outlined in Order 745 or through some other mechanism, it is essential that DR be allowed to participate in wholesale markets in order to give flexibility to electric grid operators and allow consumers the opportunity to balance

[10] "Building a 21st Century Infrastructure: Increasing Public and Private Collaboration with the Build America Investment Initiative," White House Fact Sheet July 17, 2014.

production costs against economic viability. Any support that the DOE can give to promote DR as a real and economically valuable tool for grid operations would be help with the struggle to keep DR as a part of wholesale markets.

Recent action on Order 745:

Alcoa strongly believes, by helping create these opportunities with the DOE, that Demand Response is a tool which is consistent with all public policy objectives. In particular, it makes us more competitive and it is in the public interest. With the advent of reliable, low cost data communication tools, demand response can be expanded well beyond the wholesale level into the retail markets and micro grids. While this may indeed be beyond the legal authority of the FERC, as contested recently, encouraging this down to the appropriate level, either through consultation, idea-sharing or other more structured means of expanding access to a sound set of operating principles may be worth pursuing so that the concepts of demand response can be advanced. The segregation of markets into wholesale and retail should not be a barrier to implementation of sound practices which are effective ways of reducing minimizing the cost or need for future infrastructure.

> ***Attachment: Alcoa/Oak Ridge National Lab White Paper: "Providing Reliability Services through Demand Response: A Preliminary Evaluation of the Demand Response Capabilities of Alcoa Inc.," January, 2009.***

PIPELINE CAPACITY FOR ELECTRIC GENERATORS, DEVELOPED IN CONJUNCTION WITH THE PROCESS GAS CONSUMERS (PGC)[11]

The nation's electric utilities are increasingly relying on natural gas to produce electricity. According to the Energy Information Administration ("EIA"), the United States' total natural gas consumption is expected to grow from 25.6 trillion cubic feet ("Tcf") in 2012 to 31.6 Tcf in 2040 (or by approximately 23 percent).[12] The EIA predicts that natural gas consumption for electric power generation will grow by about 2 Tcf – or approximately 33 percent of the overall increase – in total natural gas consumption by 2040.[13] Yet, despite this increasing reliance on natural gas, some participants in the electric industry have been reluctant to commit to purchasing firm transportation on pipelines, instead relying upon interruptible transportation to meet their growing natural gas needs.

As the most recent winter proved, reliability in supply and stability of price demand that the sale of firm power be backed by an equally firm source of fuel – whether that be coal on the pile, oil in the tank, or natural gas capacity in the pipe.[14] The price spikes last winter resulted from inadequate natural gas pipeline capacity in the Northeast and forced outages in that

[11] Comments first submitted by PGC on October 10, 2014, to QER; Alcoa participated in the development of these comments and supports them, hence the inclusion in this set of comments.

[12] See Market Trends: Natural Gas, Industrial and Electric Power Sectors Drive Growth in U.S. Natural Gas Consumption (May 7, 2014), available at http://www.eia.gov/forecasts/aeo/MT_naturalgas.cfm.

[13] Other forecasters believe these estimates are too low.

[14] This rule may require appropriate changes in electric market rules.

area. To that end, PGC believes that the generation of firm (and reliable) electricity requires firm access to fuel supplies: firm gas-fired electricity generation should not be dependent upon interruptible delivery of natural gas supply. As was later uncovered following the winter season, pipelines in the Northeast did not curtail service to firm transportation customers during the extreme weather events; only interruptible transportation customers faced supply shortages due to lack of transportation capacity. The fact that delivery of natural gas supplies to generators relies upon interruptible transportation capacity in this region placed the reliability of the grid at risk this past winter.

To the extent that generators allege that the wholesale electric markets do not compensate the generators for this cost, then the compensation issue should be investigated and addressed on the electric side. However, to the extent that the Federal Energy Regulatory Commission finds any market design flaws in electric markets, these flaws should not to compromise the reliability of natural gas transportation or increase costs to existing shippers. Unless electric generators secure firm pipeline capacity rights (and stop relying significantly upon interruptible service), natural gas pipelines lack the financial incentive to build additional pipeline infrastructure to serve this load. Indeed, this fact underlies a critically important – and often overlooked – fact about the gas industry: instead of an “if we build it, they will come” mentality, natural gas pipelines historically are built under a “if they come, we will build it” mindset. Thus, once electric generators demonstrate a commitment to purchasing firm capacity, pipelines will build infrastructure to deliver that capacity. To ensure the reliability of the electric grid during future extreme weather events (and indeed, in general), PGC believes electric generators must have sufficient firm transportation to access fuel supplies. Given the high value industrials place on reliability, PGC members support appropriate changes in market rules that are necessary to accomplish that goal.

As end users of natural gas, PGC members place a high value on reliability – even if that reliability comes at a higher cost. However, these costs should be borne by the specific users of the services provided, not subsidized by others or socialized in general. Price stability and predictability are necessary to encourage continued industrial investment. PGC is concerned that while this past winter saw “extreme” cold weather, the weather the United States experienced this winter could become more common. Further, anticipated retirements of base load power plants, such as coal and nuclear plants, and the increasing reliance on intermittent renewable resources will only exacerbate existing infrastructure challenges in the Northeast and the need for reliable, available gas supply. PGC believes the issues surrounding inadequate pipeline infrastructure, particularly in the Northeast, should be addressed.

Respectfully submitted,

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