UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Essential Reliability Services and the Evolving Bulk-Power System—Primary Frequency Response	Docket No. RM16-6-000

SUPPLEMENTAL COMMENTS OF THE ELECTRICITY CONSUMERS RESOURCE COUNCIL (ELCON)

The Electricity Consumers Resource Council (ELCON) respectfully submits these supplemental comments in response to the Commission's Notice of Proposed Rulemaking (NOPR) in the above-captioned docket.

In our initial comments filed on January 24, 2017, ELCON identified one major concern with the LGIA and SGIA language as proposed in the NOPR. In particular, the currently proposed wording[1] could imply that all industrial behind-the-meter generation (BTM), including but not limited to combined heat and power (CHP) units, would be required to provide primary frequency response (PFR) in the event of frequency deviations. Such an across-the-board requirement would not be compatible with the integration of industrial CHP units and the manufacturing processes that they

[1] *See* the proposed language as currently drafted in section 9.6.4.2 of the revised LGIA (at page 45 of the NOPR) and section 1.8.4.2 of the SGIA (page 47 of the NOPR).

support. In these supplemental comments, ELCON further addresses this issue, including the current circumstances in California ISO, ISO-NE and ERCOT, proposes a specific exemption from the proposed LGIA and SGIA language for industrial CHP units, and recommends that over the longer term FERC pursue a market-based solution for PFR.

Background on Special Characteristics of Behind-The-Meter Industrial Generation

Generation equipment that is integrated with industrial process equipment is planned and operated to optimize the overall manufacturing process including the safe operation of critical infrastructure. The reliabilities of the generation and the industrial process are tightly coupled, and they act as a single integrated facility. This is especially true of behind-the-meter generation (BTM) such as CHP that is sized to serve the on-site load and has no material export capability. As one tangible example explained in our initial comments, many manufacturing processes use steam (or other thermal applications) as the primary driver and the cogeneration of steam and electricity is an essential feature of the process. These devices, which are part and parcel of the load itself, cannot be treated as if they were conventional, stand-alone generators, and forcing them to act as stand-alone generation will compromise and potentially harm the manufacturing process by interfering with the steam or thermal balance. The proposed changes to the LGIA and SGIA also provide no option for mitigating this risk—a risk that is detrimental to reliable, safe and profitable operation of the entire integrated facility.

An additional layer of complexity results from the wide variety of configurations and capacities in the universe of CHP generators that are dedicated to an industrial process. Some CHP industrial facilities are designed to generate electricity in excess of their load and have more dynamic capabilities (i.e., they have the ability to quickly adjust their real output). In connection with their sales or exports to the grid, these facilities generally have the flexibility to provide PFR to the extent that their industrial processes would not be impacted. Other CHP industrial facilities are sized to closely match (or are smaller than) their industrial load and are operated in more of a static or baseloaded manner. In other words, "sized to the industrial load" in reality means sized to the steam or thermal requirement of the host manufacturing process. Such facilities cannot reasonably provide PFR service without compromising the efficiency, reliability and safe operation of the manufacturing process. As one example among many, resources operating at full capacity cannot provide PFR. A one-size-fits-all approach to PFR provision will not work for industrial generation.

By way of further explanation, synchronized CHP generation capability that is sized to the industrial load—and designed with no intention to export power (real or reactive) apart from the minor deviations encountered during normal operation—will automatically respond in real time to changes in system frequency and attempt to provide PFR. However, the governor response will be limited in duration by the operational constraints of the manufacturing process. The generation output will (and must) automatically adjust to ensure that the steam or thermal requirement is being met. That is the number one priority of the facility. In the extreme event of any attempt

to override this process, the host facility may need to initiate emergency actions to protect the assets and prevent a hard shutdown or crash.

When a frequency excursion results in a higher interconnection frequency (such as when load has been curtailed somewhere on the interconnection), the generation capability will reduce real power and steam (or thermal) production, which can impact the manufacturing process in multiple ways. One outcome is that load is curtailed and the normal operation of the manufacturing process has to be suspended for the duration of the frequency event.

As a real world example, to an increasing extent manufacturers are installing "lean" combustion turbines at their industrial CHP facilities, a technology that offers significantly reduced emissions and other benefits. A trade-off associated with this type of turbine, however, is susceptibility to loss of combustion under certain frequency excursion conditions. This can be acceptable when the manufacturer plans to operate the turbines at steady conditions in order to maintain steam and/or when the magnitude and number of frequency excursions on the interconnection historically have been low. If loss of combustion occurs in response to a frequency excursion, however, the consequences for the manufacturer would be substantial. Loss of the steam system supporting the industrial processes would trigger shutdown of manufacturing and execution of emergency procedures to properly de-pressure and stabilize equipment. The implications typically would include loss of production, possibly for an extended period, additional maintenance and repair costs for equipment, additional personnel costs, excess emissions during shutdown and startup

procedures, and although the shutdown process is designed to be executed safely and effectively, some increased potential for safety, health and environmental consequences.[2] One ELCON member company experienced such an event at a facility where the "lean" combustion turbines were installed. A large earthquake caused a significant system disturbance that mimicked what would be seen during a frequency excursion large enough to require a significant frequency response from the turbines. All the converted units tripped off-line.

Another example of PFR potentially causing harm is related to the real-time steam balance of the integrated CHP units and manufacturing process units. Similar to operators of the bulk power system being tasked with providing reliable electricity to end-use customers, steam system operators within an industrial facility are tasked with providing reliable mechanical and thermal energy to end-use manufacturing process units. Typically each manufacturing unit uses multiple types of equipment to extract mechanical and thermal energy from the steam system, which must maintain the steam throughput, temperature, and pressure required for safe and efficient operations. To ensure reliability of the system, operators must: (i) balance the real-time supply and demand; (ii) determine and ensure appropriate reserves (steam cushion); and (iii) monitor and operate industrial control systems to allow response to any changes.

[2] These manufacturing facilities operate under a Zero Tolerance policy regarding the health and safety of the plant workers and the surrounding community. Examples of harms to the facility or risks to the community depend on the particular facility and may include: boiler explosions; ruptured pipes and pumps; tripped or damaged motors and other host site units and equipment; hydrogen and other flammable gas leaks; the venting or flaring of toxic gases and vapors such as chlorine, hydrogen sulfide, and a variety of dangerous hydrocarbons such as butadiene and butane; and discharges of hazardous liquids and slurries. Any unpermitted release of a listed hazardous substance in excess of its reportable quantity must be reported to the National Response Center (NRC) that is administered by the US Coast Guard. The information in this note was taken from NRC reports.

Requiring industrial CHP units to respond to frequency excursions can introduce a sudden fluctuation that is outside of their control. Any fluctuation introduced into this process is a risk to the reliability of the steam system and can lead to unplanned unit or facility shutdowns, with the consequences as described above.

Similar risks exist when generation trips somewhere on the interconnection, resulting in a response to a low frequency event. One difference in this case is the generation capability, in providing PFR, will attempt to produce more real power resulting in steam in excess of the operating requirements of the manufacturing process. As mentioned, the same risk exists in that any fluctuations imposed on the steam system could lead to cascading effects that end in unit shutdowns. An additional risk, however, is presented in this type of response since it produces excess steam which may lead to over-pressuring parts of the system, triggering unexpected operation of pressure relief devices.

Some manufacturing configurations operate the generation capability at less than its rated base-loaded capability. In this example, often called pre-select mode, a fixed value of power is set from the control room, and the generator operates at this value with little deviation from the set point. For example, if the steam/thermal requirement needs 30 MWs from a 40-MW generator, the set point is set at 30 MWs. When there is a frequency deviation, the governor will automatically respond by increasing or decreasing real power, but control equipment will also engage to quickly return the operation to the 30-MW set point to protect the integrity of the site. Thus, while

temporarily providing PFR, the CHP unit operated in pre-select mode would not provide PFR for the duration of the triggering frequency event.

In summary, requiring PFR from industrial CHP units presents significant risk of substantial consequences that are unique to, and pose unacceptable consequences for, the related manufacturing processes. Ambient temperature limitations, industrial operating limitations, steam balance, the need for reliability and predictability, the multiple harms that would result from outage of manufacturing and related mechanical equipment, and safety, health and environmental hazards all must be respected. ELCON notes that safety and reliability considerations were behind the NOPR's blanket exemption for nuclear units. Under foreseeable scenarios anticipated as a result of the large penetration of wind and solar resources, the NOPR requirements are too general, too open ended and too broad to ensure that manufacturing processes are also not jeopardized. Manufacturing facilities that deploy BTM such as CHP should not be penalized for failing to exceed the operating limits of the host manufacturing process.

Experience of Industrial Generation in California ISO, ISO-NE and ERCOT

Questions have arisen about the experiences of industrial generation with any existing PFR obligations in California ISO, ISO-New England and ERCOT. ELCON is not aware of any requirements or attempts to enforce such obligations to date in California ISO and ISO-New England on behind-the-meter industrial generation that is sized to its on-site load (or at least not exporting material amounts of power). Those jurisdictions may still be in the process of implementing the requirements. In California

ISO, ELCON understands that some export-capable behind-the-meter industrial generators are providing PFR service on a discretionary basis, to the extent that it would not impact their industrial processes. In addition, many CHP facilities in California (and elsewhere) that are PURPA QFs are still under long-term contracts with the host utility.

The circumstances in ERCOT have posed a greater concern and highlight the need for revision of the NOPR to address this issue. The experience of ELCON's members is that in ERCOT, applicable behind-the-meter industrial generators are fully complying with the PFR obligations in BAL-001-TRE-01. But it should be noted that the requirements of BAL-001-TRE-01 are results-based, requiring PFR performance above a certain level (Requirements R9 and R10), whereas the NOPR requirements are a one-size-fits-all. There are also requirements similar to the NOPR in Nodal Protocol 8.5.1.1(1). For BTM industrial generators that are ERCOT Market Participants, specifically ones that are sized to match their on-site load, the obligation is met by providing only token amounts of PFR, which is the maximum possible without risking impact to their industrial processes. The situation in ERCOT is suboptimal and should not be repeated at the federal level. One concern is the uncertainty that future PFR obligations will exceed the affected generator's ability to respond.

Potential Impact on Investment in New CHP Facilities

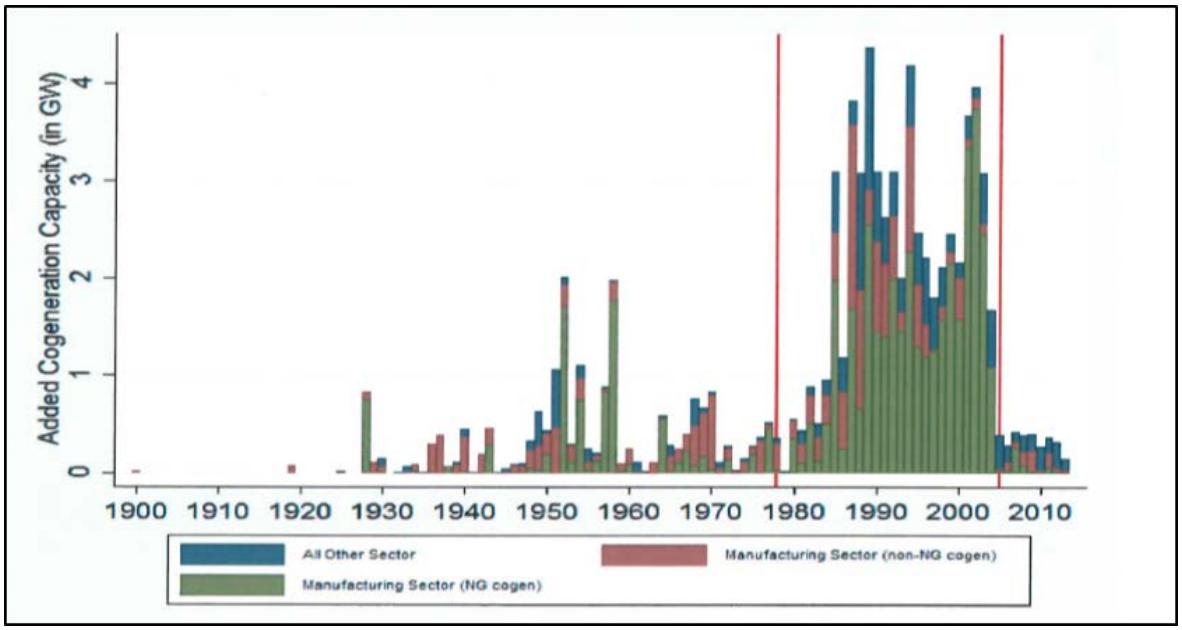
An additional and equally important concern is that, as a result of adding a PFR mandate, development of new CHP facilities will be discouraged because of the added investment cost, operational risk, efficiency loss and regulatory burden.

As mentioned above, certain types of turbine technologies can provide environmental benefits at a lower investment cost but may not be a best fit for responding to frequency excursions. Even if manufacturers were willing to forego the environmental benefits and opt for the higher cost units that can reliably provide PFR, there still exists a risk to their steam systems. Under the interconnection agreement requirements in the NOPR, manufacturers would have to accept this risk in order to interconnect an industrial CHP unit. Manufacturers strive to find cost-effective methods for mitigating all risks to their operations; however, the NOPR would exclude this possibility since uninhibited response to frequency excursions would have to be provided over the full range of the governor, as determined by the prescribed settings. This is essentially requiring the manufacturer to commit to providing a "blank check" in terms of PFR, even though there would be scenarios that could potentially harm their process.

Instead, facilities may choose to forego CHP altogether, purchase all electricity requirements off the grid, and separately generate steam or other forms of thermal energy with natural gas-fired boilers, losing the efficiencies of CHP. Low cost natural gas and FERC's implementation of FPA section 210(m) make this outcome all but certain. Hence promulgating the NOPR requirements as written will tend to eliminate

any response capability from this class of generation resources by suppressing installation of new CHP and further reducing the net amount of synchronized generation interconnected with the grid.

As illustrated by the following chart,[3] erosion of the PURPA protections as a result of enactment of FPA section 215 already has resulted in a dramatic decline in new industrial CHP installations:



Consequently, the exemption requested below, while necessary to preserve those opportunities that remain to achieve the efficiencies and other benefits of new industrial

[3] Mary Li, Cogeneration Technology Adoption in the US, Department of Economics, University of Chicago, 2015 (Source: Data from ICF International CHP Installation Database).

CHP, would, from a total grid perspective, have limited impact on the provision of PFR to the grid and therefore should not raise any meaningful grid reliability concerns.

Recommended Revision to the Proposed LGIA and SGIA Language

To address this issue in the short term, clarification is needed to the LGIA and SGIA language proposed in the NOPR to explicitly exempt industrial generation units, as is proposed by FERC for nuclear generation, from the PFR requirement. Exemption from the mandatory obligation still could allow industrial processes that are capable of providing PFR to opt-in to such arrangements. Specifically, ELCON proposes the following revision to draft Section 9.6.4.3 of the LGIA:

> 9.6.4.3 Exemptions. Large Generating Facilities that are regulated by the United States Nuclear Regulatory Commission and industrial behind the meter generation that is sized to load (i.e., the industrial load and the generation are near-balanced in real-time operation and the generation is primarily controlled to maintain the unique thermal, chemical, or mechanical output necessary for the operating requirements of its host industrial facility), shall be exempt from Sections 9.6.4, 9.6.4.1, and 9.6.4.2 of this Agreement.

The same language should also be added to Section 1.8.4.3 of the SGIA.

In Addition to the Exemption Language, ELCON Urges FERC to Pursue a Market-Based Solution to PFR Over the Longer Term

The NOPR proposes a command-and-control fix to a problem that is arguably created by imperfect market signals. As noted in comments filed in this docket by R Street Institute (RSI), "[r]equiring resources that intend to provide one set of services to provide a separate service they otherwise find uneconomical, is unduly

discriminatory."[4] RSI also identifies five reasons why the PFR mandate will likely result in higher, long-term production and capital costs compared to the establishment of a separate PFR product market: (i) a blanket requirement will likely over-procure PFR capability; (ii) mandates do not procure PFR capability cost-effectively; (iii) mandates diminish incentive to innovate; (iv) requiring generator-only PFR capability precludes demand-side resources from also providing PFR; and (v) mandates may raise costs for non-PFR services by deterring co-optimized investment.[5] RSI goes on to recommend the creation of a PFR product in the ISO/RTO markets that would signal more efficient production and investment behavior and further recommends that the Commission direct ISOs and RTOs to study the procurement of PFR capability and/or delivery as voluntary, market-based compensated services.[6] ELCON supports these recommendations.

Comments filed by San Diego Gas and Electric Company (SDG&E) echo the recommendations of R Street Institute. SDG&E further notes that a market-based solution will expand the resource base for PFR capability by incentivizing existing generation to provide PFR.[7] The NOPR does not do this. SDG&E goes on to say:

> A centralized market for primary frequency response would allow balancing authorities to procure the amount of primary frequency response needed in each settlement interval—and no more than that amount. The market would produce clearing prices that would enable generators to make economically rational decisions as to when it does, and

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[4] Comments of the R Street Institute, Docket No. RM16-6-000 ("Essential Reliability Services and the Evolving Bulk-Power System—Primary Frequency Response"), February 1, 2017, at 3.

[5] Id. at 3-4.

[6] Id. at 5.

[7] Comments of the San Diego Gas and Electric Company, Docket No. RM16-6-000 (("Essential Reliability Services and the Evolving Bulk-Power System—Primary Frequency Response"), January 23, 2017, at 3.

> does not, make sense to offer primary frequency response. Further, these price signals can be used by generation developers to make the commercial decision as to whether expected primary frequency response revenues are likely to offset the capital costs of installing the equipment and software necessary to provide the service. … If, instead, all new generation owners are mandated to incur these costs, consumers will, one way or another, end up paying for primary frequency response capability that is not needed and under-used.[8]

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In light of the above, ELCON respectfully requests that the Commission accept these supplemental comments and grant the relief described in its initial comments, as supplemented by these supplemental comments. Moreover, over the longer term, ELCON urges the Commission to pursue market-based solutions that could replace mandates and more fully address the PFR issue.

[8] Id. at 3-4.

NOTICES AND COMMUNICATIONS

Notices and communications with regard to these proceedings should be addressed to:

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Dated: March 10, 2017

CERTIFICATE OF SERVICE

I hereby certify that I have this day caused to be served the foregoing document upon each person designated on the official service list compiled by the Secretary of this proceeding.

Dated at Washington, D.C.: March 13, 2017

/s/ W. RICHARD BIDSTRUP
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