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June 3, 2019

Lora W. Johnson, CMC, LMMC
Clerk of Council
Room 1E09, City Hall
1300 Perdido Street
New Orleans, LA 70112

Re: *Resolution & Order Establishing a Docket and Opening Rulemaking Proceeding to Establish Renewable Portfolio Standard*
Council Docket No. UD-19-01

Dear Ms. Johnson:

Enclosed please find an original and three copies of Entergy New Orleans, LLC's ("ENO") Comments in Response to Council Resolution R-19-109 Concerning the Establishment of Renewable Portfolio Standards in the above referenced docket. Please file an original and two copies into the record in the above referenced matter and return a date-stamped copy to our courier.

Should you have any questions regarding the above, I may be reached at (504) 576-2984. Thank you for your assistance with this matter.

Sincerely,

Harry M. Barton

HMB/ttm

Enclosures

Cc: Official Service List (*via electronic mail*)

BEFORE THE

COUNCIL OF THE CITY OF NEW ORLEANS

RESOLUTION AND ORDER ESTABLISHING A DOCKET AND OPENING RULEMAKING PROCEEDING TO ESTABLISH RENEWABLE PORTFOLIO STANDARD	)))))	**DOCKET NO. UD-19-01**

ENTERGY NEW ORLEANS, LLC'S COMMENTS IN RESPONSE TO COUNCIL RESOLUTION R-19-109 CONCERNING <u>THE ESTABLISHMENT OF RENEWABLE PORTFOLIO STANDARDS</u>

NOW BEFORE THE COUNCIL OF THE CITY OF NEW ORLEANS (the "Council"), through undersigned counsel, comes Entergy New Orleans, LLC ("ENO" or the "Company"), which respectfully submits its Comments in response to Council Resolution R-19-109 that addresses the establishment of a potential Renewable Portfolio Standard ("RPS") for the City of New Orleans ("Resolution R-19-109").

I. Executive Summary

Entergy Corporation ("Entergy") is a long-time proponent of environmental stewardship and, in 2001, became the first major United States utility to adopt a voluntary carbon dioxide reduction goal. Because of its work, Entergy today enjoys one of the lowest carbon emission rates of its peers in the U.S. electric industry. Like Entergy, ENO also believes strongly in protecting the environment through smart and sustainable strategies that lower carbon dioxide emissions while also keeping rates as low as reasonably possible for customers and that considers grid reliability. Today, 50% percent of the energy with which ENO serves customers is clean, and ENO enjoys an emission rate that is about one-half the national average. By building on ENO's already clean resource portfolio with a well-crafted clean energy plan, the Council can place the City of New Orleans in the forefront of the fight to mitigate carbon emissions to address climate change.

For these reasons, ENO welcomes the opportunity to provide its Comments on the Council's policy for the City of New Orleans (the "City"). And while its goal of reducing carbon emissions aligns with those of the Council, ENO believes that accomplishing this objective requires a comprehensive clean energy policy focused on carbon reductions across all sectors of New Orleans, using all tools available, including increased utilization of solar and other renewable resources, electrification of transportation and other sectors, other measures that reduce the City's carbon footprint, demand-side management ("DSM"), and the incorporation of existing emission-free nuclear and hydro generation.

To that end, ENO proposes a voluntary, goals-based Clean Energy Standard ("CES") that is comprehensive in nature, but also is consistent with the utility's ongoing obligation to provide safe, adequate, and reliable service at the lowest reasonable cost. Specifically, ENO recommends that the Council adopt an aggressive goal of serving 70% of ENO's customers' energy needs with zero (or very low) carbon emitting resources by 2030, with the ability to readjust in the future and to set a longer-term target (2050) to increase that amount. The preferred path to achieving this increase in clean energy involves primarily, but not exclusively, adding new, large-scale solar resources of at least 240 Megawatts ("MW"), including 90 MW of new solar resources already proposed by ENO to the Council, as well as electrification opportunities such as the City's Sewerage and Water Board ("S&WB") pumping load in order to reduce S&WB costs and significantly reduce air pollution in the City. The addition of these solar resources, which ENO views as critical for its long-term clean energy portfolio, plus the energy efficiency in ENO's current plan and the electrification efforts for the S&WB, would produce Clean Energy Credits ("CEC")[1] equal to approximately 15% of ENO's forecasted 2030 customer load.

As part of its proposed CES, ENO also recommends that the Council include provisions that insulate customers from undue upward pressure on rates by placing an appropriate cap on average price increases associated with clean energy commitments and by approving rules and procedures that allow the Company to meet its clean energy target in the most affordable manner possible. The absence of needed flexibility in implementing clean energy targets could lead to very high (15% or more, depending upon the target level of reductions) increases in customer bills, which would be an unacceptable outcome. ENO also emphasizes that any CES adopted by the Council should include mechanisms for timely and effective cost recovery for clean energy measures implemented by ENO.

ENO expects that some parties may argue for the establishment by the Council of an RPS that would mandate the use of specific types of technologies, or that would eliminate the use of clean resources other than renewable resources, that serve the function of reducing the carbon footprint of the utility's portfolio. Numerous examples in the industry over the past ten years illustrate the perils and ultimate cost to customers of focusing too narrowly on one or the other specific renewable technologies instead of taking the flexible approach of including all forms of zero-emissions energy in setting clean energy targets. As experience in other places has shown, a policy that is overly prescriptive about the mix and scale of additional measures to be employed, or that would mandate a significantly higher clean energy requirement than is realistically achievable, could have significant negative impacts on customers.

In summary, ENO urges the Council to adopt a comprehensive, voluntary, goals-based CES. Such a policy represents a viable and cost-effective solution to achieving overall carbon emissions reductions for New Orleans and would allow this Council to position the City as a leader in reducing carbon emissions to combat climate change.

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[1] One CEC represents one megawatt hour ("MWh") of clean generation or energy efficiency/DSM; electrification clean energy credits are calculated on an emissions reduction equivalent basis.

II. Comments

A. Long-standing Environmental Stewardship Place Entergy and ENO as Leaders in Clean Energy.

1. Entergy's Environmental Commitments.

The Company, along with Entergy and its other four Operating Companies,[2] understands that climate change presents many significant risks to customers, to the communities that ENO serves, and to ENO's business operations. For nearly two decades, Entergy has advocated for national action on climate issues. In 2001, Entergy committed to its own voluntary goals to reduce carbon emissions and was the first investor-owned U.S. utility to cap emissions voluntarily, a goal that extends to 2020.[3] Entergy's commitment through 2020 is to maintain carbon emissions from its utility-owned power plants and controllable power purchases at 20% below year 2000 levels through 2020.[4] This early action has led Entergy to have one of the lowest overall CO_2 emission rates among large generation companies in the U.S.

In March 2019, Entergy announced a new climate goal to extend beyond 2020. Entergy's new goal is to continue its portfolio transformation to achieve a 50% reduction in emission rate (pounds of CO_2 per MWh) from its year-2000 level by 2030, even while demand for electricity in its various service areas is expected to increase.[5] Implementation of Entergy's new overall emission rate goal is expected to reduce total emissions by approximately 28% below the 2000 baseline, while at the same time significantly increasing the amount of electricity it produces in order to support increased electrification of—and resulting lower carbon emissions from—industrial, commercial, and transportation sector sources, which today are generally higher-emitting.[6]

To put Entergy's overall emissions profile in context, Entergy is the sixth-largest of the top 100 power producers in the United States.[7] Among the top 20 of these power producers that are

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2 In addition to ENO, the five Entergy Operating Companies include Entergy Louisiana, LLC; Entergy Arkansas, LLC; Entergy Mississippi, LLC; and Entergy Texas, Inc.

3 Entergy's first commitment was to stabilize emissions at 2000 levels through 2005. After beating that target by over 20%, Entergy renewed and strengthened this commitment twice, while expanding it to include power purchases from which it could reasonably determine a carbon dioxide ("CO_2") emission rate.

4 This is a cumulative goal over the period, not an annual goal.

5 Entergy announced its new goal in the 2019 Integrated Report and in a report titled "Climate Scenario Analysis and Evaluation of Risks and Opportunities," *available at* www.entergy.com/climatereport.

6 In 2018, Entergy's overall utility-only emission rate from the ownership share of generation was 763 pounds of CO_2 per MWh, much lower than the most recently published national average of 1,009 pounds of CO_2 per MWh. The 2018 emission rate across Entergy's operations represents an approximately 28% reduction from the 2000 emission rate level. *Id.* at p. 8.

7 *See* Benchmarking Air Emissions report, June 2018, by M.J. Bradley & Associates, based on 2016 generation and emissions data (the latest year for publicly available benchmarking data), *available at* https://www.mjbradley.com/sites/default/files/Presentation_of_Results_2018.pdf.

investor-owned, Entergy ranks fourth in the production of zero-emitting energy and has the fourth-lowest carbon emission rate. Due to Entergy's early work in this area and ongoing portfolio transformation efforts, Entergy expects to continue to have one of the lowest overall emission rates for large generators through 2030. Entergy intends to accomplish this goal even in a region with little-to-no cost-effective access to utility-scale wind resources.

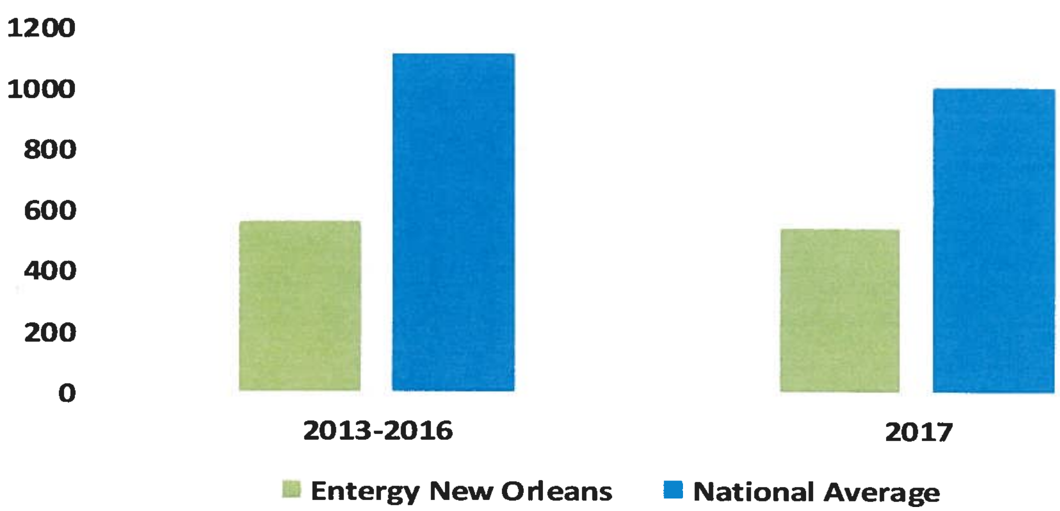
In sum, Entergy supports broad clean energy goals that focus on lowering total carbon emissions while also maintaining safe, affordable, universal energy supply and reliable service to their customers. As discussed in greater detail below, the Company suggests that this can be best accomplished through the triennial Integrated Resource Plan ("IRP") process, in which ENO is currently engaged with the Council's Advisors and other stakeholders, and which reevaluates ENO's future resource needs every three years.[8]

2. *ENO's Clean Energy Portfolio Today – Nuclear, Hydro, and Solar PV.*

Under the Council's oversight, ENO has been committed to clean energy, sourcing approximately half of the energy used to serve New Orleans customers with clean energy resources already in place today and providing a strong platform upon which to build a more robust clean energy portfolio. The zero-emitting energy ENO delivers today consists of a combination of nuclear resources, a small amount of hydro, and a growing solar photovoltaic ("solar PV") portfolio, which results in a carbon footprint roughly half the national average for U.S. utilities.

As reflected in Figure 1 below, from a carbon dioxide emissions rate perspective (pounds of CO_2 per MWh), ENO's total existing portfolio average is below the national average for electric utilities.[9]

Figure 1 ENO's Carbon Dioxide Emission Rate Compared to National Average



8 2018 Triennial Integrated Resource Plan of Entergy New Orleans, Inc., Docket No. UD-17-03.

9 Chart depicts total ENO generation resources, including resources sold in the wholesale market.

The chart above reflects recent actuals and does not account for the Company's commitment to add 100 MW of solar PV resources, of which 90 MW is pending before the Council for approval, nor does it account for the load and energy reductions that would result from increasing DSM investments. Should the Council approve those additions, ENO would rank in the top 10 in terms of solar per customer when compared to areas as large as entire states, and fourth in terms of resource mix when compared to similarly sized utilities. Together with ENO's planned energy efficiency ("EE")/DSM investment, these additions will further reduce its carbon emissions by 400,000 tons.

The Company views solar PV as a key resource for its long-term clean energy portfolio and as noted previously, ENO has requested the Council's approval to add 90 MW of utility-scale solar capacity. Further, ENO has engaged in several projects to increase the solar footprint within New Orleans as evidenced by the following:

- The Company has installed approximately 2.7 MW of commercial-scale rooftop solar PV and is in the process of securing sites to reach its 5 MW target, under a Council-approved effort that has shown strong customer interest.[10]

- In 2016, the Company installed 1 MW of solar generation with advanced lithium-ion battery back-up at its A.B. Paterson plant site, one of only a handful of projects in the U.S. at the time designed to pilot the integration of batteries with solar PV.

- In 2018, the Company announced a pilot for utility-owned residential rooftop solar PV, and the first installation was completed in December 2018.[11]

- ENO is also working to foster increased solar PV and related investments, including a recent grant made by the Entergy Charitable Foundation, which will help an affordable apartment community intended to help veterans transition to civilian life achieve "net zero" status.[12]

ENO notes that it does not have a "need" for additional resources beyond those already planned from a capacity/reliability perspective prior to 2030,[13] but the Company believes that

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10 *See* Council Resolution No. R-18-222.

11 The Company continues to work on that project with an overall goal to install rooftop solar PV systems on 100 low- to moderate-income customer homes by the end of 2019.

12 The Entergy Charitable Foundation and ENO's grant of $1.1 million will help a local affordable apartment community achieve "net zero" status through the inclusion of a rooftop solar PV system, advanced battery energy storage system and significant energy efficiency upgrades to enhance lighting, appliances and the building's mechanical systems.

13 It is also important to note that the focus of the analysis presented in these comments is different from the focus of the triennial Integrated Resource Planning process, which seeks to present a range of options for meeting identified long-term resource needs over the 20-year period from 2019 to 2038 under varying planning scenarios and strategies, all with different assumptions for key inputs. The comments provided here are intended to present analysis of different ways in which the Company could build upon its clean energy mix by attempting to comply with a policy

adding up to an additional 240 MW of large-scale solar PV resources (including the 90 MW of new solar resources already proposed by ENO to the Council) by 2030 can both displace less efficient/higher-emitting resources in Midcontinent Independent System Operator ("MISO"), and be done while still maintaining affordability for ENO's customers and achieving additional emissions reductions in the near term.[14]

As discussed in greater detail below, however, solar PV resources are not the only clean energy resources that should be utilized to lower carbon emissions. Rather, a comprehensive policy that uses all tools available is the better path forward. As of 2018, ENO's generation supply serving retail load consisted of approximately 42% non-carbon-emitting resources, including nuclear from Grand Gulf and a small amount of hydro and solar, with the remainder mostly natural gas-fired resources, purchases in the MISO market, and a small share of coal.[15] In 2019, with Grand Gulf not scheduled for a refueling outage, ENO's retail load is projected to be served by approximately 50% non-carbon-emitting resources, and that value is expected to increase further by 2021 as ENO's proposed 90 MWs of solar capacity comes on-line.

In sum, ENO recommends that any policy adopted by the Council should build on ENO's existing portfolio of clean energy resources and incorporate multiple forms of clean energy investments, including nuclear generation, energy efficiency and demand response, and on-going collaborative efforts with S&WB, discussed below, as well as broader efforts around electrification of transportation and other sectors of the economy.

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goal established by the Council to increase the amount of clean energy in ENO's portfolio over a 12-year period (2019-2030).

14 Additional sustainability-related customer offerings were included in ENO's 2018 Combined Rate Case that will further reduce carbon emissions, including CO_2, in the City of New Orleans. The Company submitted several progressive proposals designed to fulfill the Council's policy goals related to sustainability, renewable generation, and conservation. On the renewable generation front, the Company has proposed (i) a Green Power Option, which would allow customers to offset some or all of their electricity consumption with energy generated by renewable resources; and (ii) a Community Solar Option, which is designed to help complement the Council's own community solar efforts by allowing customers to participate in 6 MW of total solar generation that ENO is in the process of constructing (described above). The Company also has proposed investments in electric vehicle ("EV") charging infrastructure on both public and private property, including a pilot for publicly-accessible EV charging stations to be located on City-owned property, all in furtherance of the Council's goal "that the construction, location and operation of electric vehicle ["EV"] charging stations on both private and public property should be encouraged." *See* Council Resolution No. R-18-100 at Ordering Paragraph 2. The Company also has proposed a new and innovative approach that, if approved, would provide a permanent source of dedicated funding for increased Energy Smart investments and fulfill the Council's long-standing goal "to align incentives equally for efficiency and supply resources." *See* Council Resolution No. 07-600 at p. 3.

15 ENO's current 2% coal share relates to a small allocation from coal-fired units in Arkansas that are slated to close in the late-2020s.

B. The Council Should Adopt a "Clean Energy Standard."

1. An "all tools in the toolbox" approach that includes all clean energy resources is widely-recognized as the preferred approach to reducing CO_2 emissions.

As explained by the Council in Resolution R-19-109, a pure RPS mechanism places an obligation on utilities to meet a specified percentage of their load with power generated from renewable energy sources. On the other hand, a CES incorporates multiple forms of clean energy investments that extend beyond renewables, including emission-free nuclear and hydro generation, increased DSM, and broader efforts around electrification of transportation and other sectors of the economy that traditionally rely almost exclusively upon fossil fuels. As a result, a CES can have a broader and more meaningful impact on the reduction of overall carbon emissions than an RPS and can do so in a more cost-effective manner.

Therefore, the Council's policy should incorporate multiple forms of clean energy investments, not limited to renewables, creating flexibility in meeting the objective of carbon emissions reductions, while also providing more avenues to maintain affordability for ENO's customers. To that end, the Company supports a well-designed, voluntary CES that meets the following key objectives:

1. Include average annual clean energy targets that are consistent with the outcome of an IRP process to help ensure consistency with a utility's ongoing obligation to provide adequate and reliable service at the lowest reasonable cost;

2. Provide reasonable goals that (a) ensure affordability and reliable service for customers and (b) encourage the development of clean energy initiatives through expedited regulatory review and approval, appropriate treatment of costs, and timely cost recovery necessary to promote the development by ENO of reliable and economical choices for customers;

3. Recognize the carbon emission reduction benefits of all low carbon-emitting resources, including existing nuclear, and the reductions achievable through solutions that reduce load, including DSM investments via Energy Smart; and

4. Include investments that would reduce, when and where feasible, the "carbon footprint" associated with carbon emissions, including reductions associated with electrification efforts, which may increase overall electricity generation, while providing broader carbon reductions overall.

The inclusion of various forms of technology to achieve lower emissions as proposed by ENO is consistent with the guidance from many industry experts. Though leaders and experts from the energy and environmental advocacy sectors urge the adoption of policies that are "technology inclusive" and "allow all proven low-carbon-emitting technologies to play a role," rather than "pledges and policies that target only a subset of favored generation technologies."[16]

The need for the "all tools in the toolbox" strategy was confirmed in a recently-published study co-chaired by Ernest J. Moniz, the former Secretary of Energy in President Obama's administration. This study comprehensively evaluated the current and future landscape of clean energy innovation and technology to identify technologies that will play critical roles in economic growth, security, and addressing climate change.[17] The study identified several key technologies, including advanced nuclear reactors, grid modernization and smart cities, large-scale carbon management, and carbon capture, as critical to these goals. It recommended that "states should consider adopting technology-neutral clean energy portfolio standards and zero-emissions credits in order to strengthen markets for clean energy innovation—to include renewables and other forms of zero or low-carbon energy."[18]

Last month the International Enery Agency issued a report emphasizing the role that nuclear generation needs to play in controlling climate change.[19] In the document's Forward, Dr. Fatih Birol, Executive Director of the agency, makes the point bluntly: "Wind and solar energy need to play a much greater role in order for countries to meet sustainability goals, but it is extremely difficult to envisage them doing so without help from nuclear power."[20] The report continues to explain that "despite the impressive growth of solar and wind power [globally], the overall share of clean energy sources in total electricity supply in 2018, at 36%, was the same as it was 20 years earlier because of the decline in nuclear." In fact, to meet global goals, power generation needs to see "an 80% increase in global nuclear power production by 2040." According to the report, if no additional investments are made to extend the life of existing nuclear where feasible and to encourage new nuclear technologies and units, even with a significant expansion of renewables, "gas and, to a lesser extent, coal would play significant roles in replacing nuclear" and "cumulative CO_2 emissions would rise by 4 billion tonnes by 2040."[21]

The report also focuses on the additional economic implications of leaving nuclear out of the global clean energy future:

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16 CLEARPATH, Center for Climate and Energy Solutions, American Council for Capital Formation Center for Policy Research, Bipartisan Policy Center, Cresforum (February 2019), *Clean Energy Solutions Must Include Nuclear: A Briefing for Everyone Concerned about Climate Change*, *available at* https://static.clearpath.org/2019/02/ce-solutions-must-include-nuclear.pdf, at pp. 1, 8 ("CLEARPATH, *et al.*, 2019").

17 Moniz, Ernest J., *et al.* (February 2019), *Advancing the Landscape of Clean Energy Innovation,* IHS Markit, *available at* https://ihsmarkit.com/Info/0219/clean-energy-innovation.html.

18 *Id.* at 19.

19 International Energy Agency, *Nuclear Power in a Clean Energy System* (May 2019) (https://webstore.iea.org/download/direct/2779?fileName=Nuclear_Power_in_a_Clean_Energy_System.pdf).

20 *Id.* at 2.

21 *Id.* at 3-4.

> Taking nuclear out of the equation results in higher electricity prices for consumers. A sharp decline in nuclear in advanced economies would mean a substantial increase in investment needs for other forms of power generation and the electricity network. Around USD 1.6 trillion in additional investment would be required in the electricity sector in advanced economies from 2018 to 2040. Despite recent declines in wind and solar costs, adding new renewable capacity requires considerably more capital investment than extending the lifetimes of existing nuclear reactors. The need to extend the transmission grid to connect new plants and upgrade existing lines to handle the extra power output also increases costs. The additional investment required in advanced economies would not be offset by savings in operational costs, as fuel costs for nuclear power are low, and operation and maintenance make up a minor portion of total electricity supply costs. Without widespread lifetime extensions or new projects, electricity supply costs would be close to USD 80 billion higher per year on average for advanced economies as a whole.[22]

Leading industry and environmental experts further urge that the best chance of fighting climate change lies with policies that drive reductions throughout the economy and that embrace clean, low-carbon energy resources of all kinds (not simply those that favor renewable resources such as wind and solar alone), whether through a direct price on carbon, a CES program, or another type of action. The CLEARPATH study points to the cautionary tale of Germany, "which made a substantial commitment to wind and solar and nuclear closure, [and] has had to add generating stations that burn brown coal to replace its missing nuclear and balance its renewables," and, as a result, "hasn't lowered its greenhouse gas emissions for nine years."[23] Meanwhile, although Germany has made significant strides in adding renewable resources, the country's electric rates are now among the highest in the industrialized world.[24] From this example, the study concludes that "we don't have the luxury of taking proven low-carbon technologies off the table before new alternatives emerge."[25]

A number of widely-respected national environmental groups, including the Union of Concerned Scientists, increasingly recognize and publicly state the importance of preserving existing nuclear capacity to help address climate change concerns.[26] Further, numerous experts from the energy and environmental sectors have acknowledged the important role that nuclear resources, along with other zero or low-carbon resources, must play in decarbonizing the electricity sector and combating climate change. In fact, "[n]uclear is already the largest source of low-carbon energy in the United States and Europe and the second largest source worldwide (after

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22 Id. at 5.

23 CLEARPATH, *et al.*, 2019, at 3.

24 *See* Thalman, Ellen; Wehrmann, Benjamin, *What German households pay for power* (April 1, 2019), *available at* https://www.cleanenergywire.org/factsheets/what-german-households-pay-power.

25 CLEARPATH, *et al.*, 2019, at 5.

26 Editorial, *A Warming World Needs Nuclear Power*, Bloomberg.com (Dec. 31, 2018) (www.bloomberg.com/opinion/articles/2018-12-31/nuclear-power-is-part-of-the-solution-to-climate-change).

hydropower)."[27] These experts advocate for the adoption of policies that are "technology inclusive" and would facilitate investments in a broad range of clean energy technologies.[28] Following this trend, several states that were early adopters of RPS policies, including Illinois, New York, New Jersey, and Connecticut, have already begun to modify existing RPS goals to be more technology-inclusive, while several others, including New Mexico, Washington, Wisconsin, and Minnesota, have either recently enacted or are proposing legislation surrounding the development of CES policies.

Further to this point, ENO notes that several leading organizations have submitted letters or comments to the Council emphasizing the need for an "all tools in the toolbox" approach. These include America's Wetlands Foundation, Clean Air Task Force, Third Way, Environmental Progress, and Edison Electric Institute. ENO is appending these writings to its comments as Attachments A, B, C, D, and E, respectively.

The Council has already made clear that reductions in carbon emissions must be achieved cost-effectively and must not compromise reliability.[29] In keeping with the findings of the Climate Action Plan issued by the City of New Orleans, namely, that nuclear power has a lower lifecycle carbon impact than solar power,[30] nuclear generation (which is zero-emitting and represents the lowest dispatch cost of energy in the Company's current resource portfolio) should not be excluded as a resource to reduce carbon emissions through this rulemaking. Not including the contribution of nuclear resources would result in a policy that is too narrowly-focused and could have significant financial consequences for customers since nuclear generation represents a large percentage of ENO's current generation mix and has allowed ENO to be one of the cleanest utilities in the U.S.[31]

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27 Parsons, John; Buongiorno, Jacopo; Corradini, Michael; Petti, David, "A Fresh Look at Nuclear Energy," *Science Magazine* (Jan. 11, 2019), *available at* sciencemag.org, Vol. 363, Issue 6423, at p. 105 ("Parsons, *et al.*, 2019").

28 *See also* Achieving Energy for Sustainable Development, Outcome Document of the Ministerial Conference and the Ninth International Forum on Energy for Sustainable Development, Kiev (Nov. 12-15, 2018), *available at* https://www.unece.org/fileadmin/DAM/energy/se/pdfs/eneff/9th_Forum_Kiev_Nov.2018/Outcome_Document_v05 pdf (concluding that "[a]ll energy sources, including renewables, nuclear and high efficiency fossil fuel with carbon capture and storage (CCS), must be considered along with new business models and significant improvements in energy efficiency and productivity to ensure that the energy needed for sustainable development is available and affordable"; noting that "[n]uclear power is the second largest source of low carbon electricity after hydroelectricity"; and recommending that "[d]ecisions regarding the future energy mix should be made on the basis of a technology-neutral policy framework where all supply and demand options are recognized for their contribution").

29 See Resolution R-17-428, in which the Council recognized the City's Climate Action strategy to reduce greenhouse gas emissions dramatically by 2030 but noted that it must be done "in a manner consistent with the Council's duty to ensure the reliable provision of energy to the citizens of New Orleans and just and reasonable rates."

30 *See* Climate Action for a Resilient New Orleans, issued July 2017, which establishes various goals including reducing annual carbon emissions by 50% from current (2017) levels through use of cleaner electricity generation, reduced transportation-related emissions, and lowering waste via enhanced recycling.

31 In Council Motion M-17-611, dated December 17, 2017, the Council recognized this fact. The Council also noted that ENO has less than 2% of generation from coal-fired generation (all through purchases from affiliate companies) which would be retiring early (currently slated for retirement in the late-2020s). The Motion further stated

2. *The unintended consequences of a mandatory RPS could harm customers by raising costs and compromising reliability.*

If the Council were to establish an overly aggressive mandatory renewables-only policy, unintended consequences of such a policy could include higher customer rates than would otherwise be the case. And an RPS that mandates a specific amount of in-City only renewables in the form of a "carve-out," which realistically (for an urban area) means rooftop or sub-utility-scale solar PV, could be especially costly for customers given New Orleans' geography and relative lack of suitable and inexpensive land for large-scale solar development. Other consequences include potentially impaired utility financial health if there is not full and timely cost recovery (whether resources are owned by the utility or energy is purchased from a third party).

Recent academic research concludes that imposing a mandatory renewable energy-specific policy will necessarily lead to increased electric bills and may in fact be one of the higher cost strategies relative to other options. A new working paper from the University of Chicago Energy Policy Institute, issued April 22, 2019, preliminarily has found that state renewable portfolio standards have been a pricey avenue for curbing CO_2 emissions.[32] The working paper, which is seeking peer review and comment, describes research that estimates costs of compliance of RPS policies across 29 states after 7 and 12 years, respectively, from the date of implementation. The results of the research indicate that, on average across the states studied, mandatory renewable technology-specific policies result in high and inefficient CO_2 abatement costs ($ per ton of carbon dioxide mitigated), as well as significantly higher retail electric rates. Some critics have charged that the study is not completely up-to-date as far as the time period under consideration relative to lower costs for technologies like wind and solar. However, while costs for wind and solar have indeed fallen, the criticism over timing does not blunt the overall message that renewables only-focused policies may not be the most cost-effective way to address the actual issue at hand – finding the most cost-effective and efficient ways to reduce carbon emissions that contribute to climate change.

To illustrate the potential negative impacts on customers of an RPS policy that is prescriptive about the mix and scale of technologies to be employed, that establishes set-asides for higher cost options, or that would mandate a significantly higher clean energy requirement than is realistically achievable, ENO conducted certain high-level analyses on potential cost implications based on choosing various technologies to reduce carbon emissions. In Figure 2 below, ENO targets a 70% clean energy portfolio by 2030, which could be met with incremental measures that achieve an emissions reduction of 605,000 tons per year in three separate scenarios. These three

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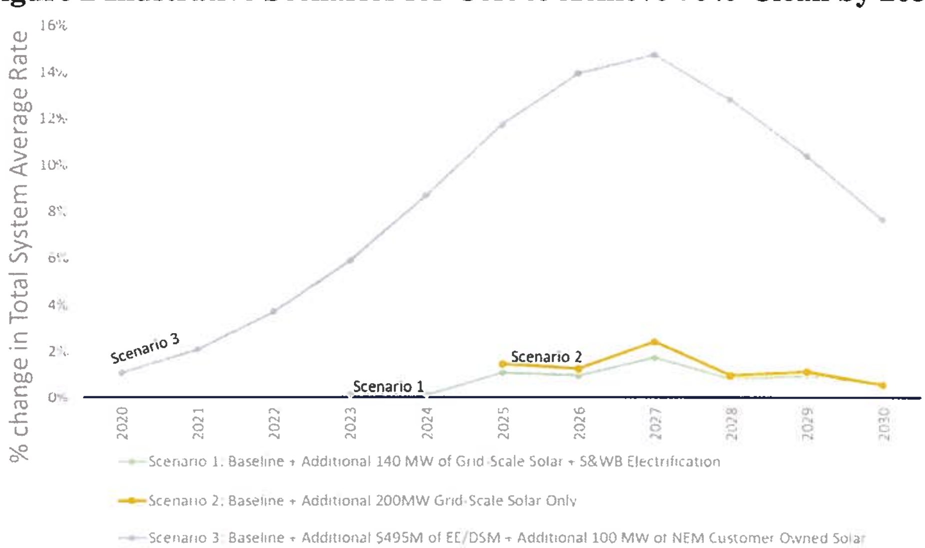
that the Advisors would be recommending that the retired coal-fired generation be replaced with beneficial results of energy efficiency investments and with renewable energy resources.

32 *See* Greenstone, Michael; McDowell Richard; Nath, Ishan, Working Paper No. 2019-62, *Do Renewable Portfolio Standards Deliver?* (April 2019), *available at* https://bfi.uchicago.edu/wp-content/uploads/BFIEPIC_WP_201962_v3.pdf.

scenarios each represent a set of measures in addition to the existing nuclear, solar, hydro, EE/DSM, and utility-scale solar that are already assumed by ENO.

Scenario 1 reflects the expected overall cost increase if ENO were to add grid scale solar PV and invest in electrification, for example, to facilitate improvements in S&WB infrastructure (many opportunities exist for electrification in the industrial and transportation sectors). Overall, Scenario 1 yields modest cost increases attributable to the clean measures, which ultimately would be reflected in an average customer rate increase peaking at just under 2% in 2027 and then declining. Scenario 2 focuses solely on additional grid scale solar PV; investments in the S&WB are removed. In this scenario, the same emissions reductions are achieved as in Scenario 1, but average customer rates increase over Scenario 1 by roughly 1% due to the loss of the extremely low-cost emissions reductions associated with the S&WB electrification. In Scenario 3, both grid-scale solar PV and S&WB investments are removed, and an additional $495 million is assumed to be invested in EE/DSM from 2019-2030 to achieve an incremental 4.7% reduction of ENO's 2030 retail sales together with an incremental 100 MW of net energy metering ("NEM") customer-owned solar PV, in order to achieve the targeted emission reduction.[33] In this scenario, the adoption of more expensive choices causes average customer rates to increase substantially, peaking at nearly 15% by 2030. The scenarios depicted in Figure 2 below illustrate why it is critical to ensure that any decisions that are made regarding the mix of technologies and resources to satisfy a CES goal – as opposed to a mandatory RPS policy that would not allow for such flexibility – should be carefully planned and assessed in terms of both customer effects and carbon emissions reductions potential.

Figure 2 Illustrative Scenarios for Cost to Achieve 70% Clean by 2030



The Company believes that distributed-scale solar PV systems have a role to play as a means to incorporate more renewables within a densely populated, urban area such as New

33 The technical feasibility of increases at this scale in EE/DSM and NEM Solar to achieve 70% goal by 2030 is highly questionable, but the example is provided to show the cost effects of taking this type of approach to reducing carbon emissions.

Orleans. That said, large-scale solar farms offer several distinct cost and operating performance advantages over smaller-scale solar PV systems. With respect to initial cost, large-scale solar resources provide greater economies of scale that significantly lower total installed costs on a $ per MW-basis. Interconnection costs, while greater from a dollar magnitude perspective for transmission-interconnected projects, can also be lower when expressed on a per-MW-basis because that cost is being spread over a much larger amount of installed capacity. A large-scale solar farm in an open field with optimal tilt and single-axis tracking will produce significantly more energy per MW of capacity than a DG-scale, rooftop-mounted solar PV system. Annual monitoring, and operations, and maintenance ("O&M") expenses also tend to be lower for large-scale solar PV resources located in rural areas because of greater economies of scale as well as factors like lower costs for leasing (or purchasing) rural versus more valuable urban property, and even potentially lower property tax rates. Putting these many factors together, greater scale and lower upfront and operating costs coupled with higher energy output yields better cost-effectiveness.

With the foregoing data in mind, the Company suggests that to design an effective CES policy and help mitigate unintended consequences, the Council should consider several key assumptions and considerations. The following important assumptions and considerations need to be carefully studied before enacting a policy that will have wide-ranging implications:

- Market potential (policy implementation/impacts, regulatory limits, investor response, regional competition with other energy sources);
- Economic potential (projected technology costs, projected fuel costs);
- Technical potential (system/topographic constraints, land-use constraints, system performance); and
- Resource potential (physical constraints, theoretical physical potential, energy content of resource).[34]

The Council also should consider inclusion of program elements that allow cost-effective efforts at carbon neutrality such as the creation of high-quality, verified carbon offsets. The Company believes that an appropriate balance can be achieved by incorporating clean energy goals into ENO's IRP process, which is the most appropriate forum that also considers market, economic, technical, and resource potential, while also ensuring long-term planning decisions are consistent with achieving the lowest reasonable costs for customers.

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34 *Chapter 5. Renewable Portfolio Standards*, EPA Energy and Environment Guide to Action (2015), at page 8, *available at* https://www.epa.gov/sites/production/files/2017-06/documents/guide_action_chapter5.pdf.

3. *Cost containment safeguards, use of Renewable Energy Credits ("RECs"), and compliance penalties in a CES.*

Cost containment is an important design feature of any clean energy policy, especially any mandatory annual compliance target imposed through a CES or RPS. Compliance and cost containment work differently in vertically-integrated jurisdictions (such as Louisiana and the City of New Orleans) compared to retail open access regions, and it is important to understand these differences in order to determine appropriate rate protections for ENO customers.

With regard to an alternative compliance payment ("ACP") as described in Resolution R-19-109,[35] it is important to note that in instances where an ACP is in place, the ACP is not a penalty mechanism that imposes a cost on utilities that cannot be recovered from retail customers via rates – rather, the ACP functions both as a price signal to the market and helps facilitate the cost of RPS requirements being "priced into" retail supply costs. In other words, the ACP is an alternative path to comply with a standard and, if utilized, is included in costs charged to customers. In addition, as explained below, ACPs generally apply to retail open access regions and are not appropriate for vertically-integrated states.

In non-retail open access jurisdictions such as the City of New Orleans, customers are served by vertically-integrated utilities. Under this regulatory model, which covers over half of the United States, environmental goals such as renewable energy and clean energy are most often implemented through vertically-integrated utilities' long-term resource planning efforts, which are state-jurisdictional or municipal-jurisdictional. In these jurisdictions, there are often cost containment provisions that apply to the utility plans, so that the utility is excused from meeting a specific renewable/clean target if complying would be unreasonably expensive for the utility's customers.

In contrast, in retail open access states (*i.e.*, states where customers can choose their electricity supplier), mandatory RPS policies rely on REC procurement instead of resource planning. The state regulator does not have direct jurisdiction over the generation planning process; instead, it has jurisdiction over competitive retail suppliers. Most supply comes from unregulated merchant generators, not regulated generators. By requiring the competitive retailers to obtain a certain number of RECs, the state is ensuring that there is financial support for renewable generation resources to be in the market. It is an indirect form of state resource planning.[36]

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35 *See* Resolution R-19-109, at, pp. 7-8: "[T]hirteen other states have created an 'alternative compliance payment' that a utility would pay if they fail to meet the RPS, with such funds often being used to assist in-state renewable generators. This functions both as a penalty for failure to meet the RPS standard and a ratepayer protection because it can also have the effect of sending the utilities a price signal – if the price of renewables or RECs exceeds the alternative compliance payment price, then the utility would be more prudent to make the alternative compliance payment than to purchase renewables or RECs."

36 As noted in Resolution R-19-109, the competitive retail supplier (or a utility having the wholesale default supplier role), in deciding how to price its supply offers to potential retail customers, must take the anticipated cost of procuring RECs into account, and reflect those costs in their pricing. As a result, most of these retail open access states have instituted ACPs, which are designed to protect competitive retail electricity suppliers and their respective customers against an illiquid market for RECs or an unforeseen run-up in REC prices. Concerns about REC market

Given that the need for ACPs is driven by restructuring and retail open access, and in response to the Council's request for comments relating to ACPs in Resolution R-19-109, there is no clear reason to import this concept into a CES in the Company's single-parish service area. In the case of ENO, there are no competing retail suppliers who will need to purchase RECs, nor would ENO necessarily plan to rely primarily on purchased RECs for meeting any Council-mandated policy. Rather, compliance will be achieved primarily through ENO's direct utility ownership or energy procurement via power purchase agreements ("PPAs"). Second, even if ENO were to purchase RECs separate from physical energy for purposes of RPS or CES compliance, if RECs become too expensive, ENO would not be obligated to buy them – it could pursue other opportunities to provide clean energy in order to comply with the policy or notify the Council that a cost cap has been reached.

Notwithstanding the lack of ENO's reliance on purchased RECs, it still is important to note that the ability to use RECs to comply with an RPS or CES at the lowest reasonable cost for utility customers largely depends on the number of RECs available in the market. For example, in Entergy's footprint, Texas is the only jurisdiction with an RPS (*see* Table 1, below). The statewide standard is unusual (specific MWs versus %-based) and was exceeded years ago and has not been increased since. For Entergy Texas, Inc. ("ETI"), the lowest reasonable cost method to comply with the RPS in Texas is through the purchase of RECs, the costs of which are included in customer rates.[37] This is because there is a significant excess supply of renewable energy in Texas (historically wind, and an anticipated increase in utility-scale solar PV investment in Electric Reliability Council of Texas ("ERCOT"), making RECs the least expensive method of compliance.[38]

An issue related to RECs is the physical location of generation resources that might be used to comply with the Council's ultimate clean energy policy. For example, if the Council were to enact a policy that restricted qualifying generation resources (renewable or otherwise) to only those located in Louisiana, it would most likely be considered in violation of the Commerce Clause of the United States Constitution as it would be considered "facially discriminatory." The Council observes as much in Resolution R-19-109. The dormant Commerce Clause refers to the prohibition, implicit in the Commerce Clause, against states passing legislation that discriminates

liquidity and overall costs have led states to include ACP provisions. With an ACP in place, a competitive retail supplier knows its maximum cost of meeting its RPS obligation (the ACP) and can base its supply offers to retail customers on the ACP value. And to meet its obligation, the retail supplier does not need to worry about REC market liquidity or uncertainties in the load it will serve over the year. The retail supplier can procure RECs to meet its obligation so long as the REC price is at or below the ACP – but it can always pay the ACP price instead, if RECs are not available at a price below the ACP. So, the ultimate price paid by any retail electric customer (including any default customers served by a transmission and distribution utility acting as a retail supplier) includes the cost of RECs and/or the ACP.

37 ETI has relied exclusively on RECs for RPS compliance, primarily because it can obtain RECs from wind resources in ERCOT at low cost. That situation may change however as ETI recently issued an Request or Proposal ("RFP") seeking up to 200 MW of renewable resources.

38 For example, in 2018, ETI purchased 766,670 RECs (1 REC = 1 MWh) to comply with the Texas RPS.

against or excessively burdens interstate commerce.[39] This issue arose early on in several states that undertook efforts to restrict or otherwise limit out-of-state generation resources from participating in renewable policies. For example, in 2008, the Massachusetts legislature ratified Chapter 169, An Act Relative to Green Communities (the "Act"). Section 83 of the Act provided in pertinent part:

> "Commencing on July 1, 2009, and continuing for a period of 5 years thereafter, each distribution company, as defined in section 1 of chapter 164 of the General Laws, shall be required twice in that 5 year period to solicit proposals from renewable energy developers and, provided reasonable proposals have been received, enter into cost-effective long-term contracts to facilitate the financing of renewable energy generation ***within the jurisdictional boundaries of the commonwealth, including state waters, or in adjacent federal waters***."[40]

After a lawsuit was filed by TransCanada Power Marketing Ltd, alleging that the Act violated the Commerce Clause, the Act was revised to permit generation located outside the state to participate.[41]

A similar issue arose in Louisiana in 2010 when the Louisiana Public Service Commission ("LPSC") was contemplating a renewable energy pilot that initially would have restricted out-of-state resources from participating in planned utility RFPs. After several renewable energy developers threatened legal action, the LPSC voted 4-1 in October 2010 to allow any renewable energy resource to participate in the pilot and through RFPs if the resource qualified as "new" per the LPSC's rules and was physically deliverable to the utility.

Considering the foregoing examples, the Company recommends a measured approach toward achieving carbon emission reductions, through broad clean energy goals that are focused on productive investments within the City of New Orleans *and* in surrounding states that help achieve the lowest reasonable cost for ENO's customers. As the Council itself recognizes, the Commerce Clause issue is an important consideration that limits the Council's ability to restrict the purchase of renewable resources to the City's boundaries.

As for ENO's possible use of RECs, except for the Texas RPS discussed above, the only RECs that are created and transferred in the Entergy region are voluntary in nature, purchased by customers with individual sustainability goals. For instance, Entergy Louisiana, LLC acquires RECs associated with several long-term renewable PPAs that emerged from the LPSC's 2010 renewable pilot discussed above. There are purchasers in the national voluntary market today for these RECs produced in Louisiana. As such, the Company recommends that the Council should ensure that any CES policy allow for use of RECs as long as they qualify (generated from qualifying resources, independently verified by a third-party and retired).

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39 *See* Resolution R-19-109.

40 *See* An Act Relative to Green Communities (Acts 2008), *available at* https://malegislature.gov/Laws/SessionLaws/Acts/2008/Chapter169 (emphasis added).

41 Complaint of Petitioner, *Transcanada Power Mktg. LTD v. Bowles*, No. 40070-FDS (D. Mass. Apr. 16, 2010).

Finally, as noted above, the Company believes that there is no need for an ACP as part of any Council-imposed CES policy. Although an ACP does not make sense for a Council-imposed CES policy, however, the issue of cost containment in a CES to prevent excessive customer bill impacts is critical and there are ways to incorporate it into the planning process. Possible approaches for the Council to consider include: (1) no explicit cost cap, but require Council approval of each major new resource, which is already the case; or (2) Council establishment of a maximum annual cap for CES-related customer bill impacts, with approval of new resources to include a finding that the costs of the new resource will fit within the cost cap.[42] Moreover, from ENO's perspective, any cost containment feature (however designed), if it were to be triggered, must override the CES target in that year without penalty, and any incremental compliance-related costs that are imposed on the utility for not meeting any goal or target, either voluntary or mandatory, should be recoverable from customers.

In addition, the Council may also need to consider and address whether a CES policy and its related costs should apply to all of ENO's customers, or whether certain large commercial, industrial, and/or governmental customers should be exempted. The Company does not advocate a policy position on cost allocation related to compliance with a CES policy but notes that the issue of whether or not all customers participate and pay can be challenging because the benefits of certain renewable energy resources (*e.g.*, zero marginal cost energy from solar PV offsetting fuel costs) are not easily disentangled from monthly recovery of fuel and purchased power costs. In other words, while it would be easy to exempt a customer class from paying for a particular policy assuming a specific cost recovery mechanism (such as a rider) is employed, it is much more difficult, if not impossible, to fully isolate the resulting benefits of that policy such that the exempted customers would not unfairly be receiving benefits in the form of lower fuel and purchased power costs for which they did not contribute.

4. A goals-based CES policy omits the need for a non-compliance penalty mechanism.

Policymakers pursuing a goal-based approach rather than an RPS mandate appear to be driven at least partially by enacting legislation that includes some form of an evaluation of the availability and cost-effectiveness of increasing renewables in the state's fuel mix. For example, North Dakota enacted legislation in March 2007 establishing an objective that 10% of all retail electricity sold in the state be obtained from renewable and recycled energy by 2015, while in South Dakota, similar legislation was enacted in early 2008. In both states, before each affected utility built qualifying generation, entered into long-term contracts, and/or purchased qualifying RECs, the utility was required to determine if the increased use of renewables and/or recycled energy would be cost-effective when considering other alternatives. In order to protect customers from adverse bill increases as well as maintain each utility's financial health, it was determined

[42] An example of the latter policy feature would be an explicit $ per month residential bill impact (*e.g.*, not to exceed $2/month total compliance cost) or a maximum percentage such as no more than a 2% overall residential bill increase.

that it would be impractical and unfair to penalize a utility that could not cost-effectively meet the renewable goal imposed on it by the legislation's own requirements.

In Utah, legislation enacted in March 2008 established a state-wide *Energy Resource and Carbon Emission Reduction Initiative*, which included guidelines for determining the cost-effectiveness of acquiring a renewable energy resource. Utah's guidelines require an assessment of whether acquisition of the resource will result in the delivery of electricity at the lowest reasonable cost, as well as an evaluation of long-term and short-term impacts, risks, reliability, and financial impacts on the affected utility. Like the Dakotas, because Utah's state-wide goal required its utilities to consider the financial implications of acquiring additional renewable resources, it would have been a Catch-22 to then penalize the utility for not meeting the goal if meeting the goal resulted in acquiring higher-cost resources.

A handful of other states in the region also have implemented renewable energy policies. The following table summarizes key elements of each of the five state's renewable energy policies.

Table 1 - Summary of Key Policy Parameters for States in the Region.

Parameter	**TX**	**OK**	**SC**	**NC**	**VA**
Enacted	2000	2010	2014	2007	2007
Type	Mandate	Goal	Goal	Mandate	Goal
Description	5,880 MW by 2015; goal of 10,000 MW by 2025	15% of total installed generation capacity by 2015	2% of aggregate generation capacity by 2021	IOUs: 12.5% by 2021; munis and coops: 10% by 2018	15% of base year (2007) sales by 2025
Applies to	IOUs (4) and competitive REPs in ERCOT	IOUs, munis, and coops	IOUs only; DG-focused	IOUs, munis, and coops	IOUs only
ACP	No	No	No	No	No
Technology Carve-Outs	500 MW voluntary non-wind target by 2015	No	1% from 1 to 10 MW; 1% from < 1 MW (25% for systems < 20 kW)	Solar 0.2% by 2018 Swine waste 0.2% by 2020 Poultry waste 900,000 MWh by 2016	No
REC Trading	Yes	No	No	Yes	Yes, up to 20%
Annual Cost Cap	No	No	No	$27 Residential $150 Commercial $1,000 Industrial	No

Cost Recovery	Normal ratemaking		Rider	Rider	
Other Features				Energy efficiency and demand reduction both count	200% credit for solar, onshore wind, animal waste; 300% credit for offshore wind

Additionally, a handful of cities around the U.S. have established renewable portfolio goals that require the cooperation of the local, municipal utility. Examples in the Southeastern region include Austin, Jacksonville, and San Antonio. Each of these three cities has established varying renewable energy goals and policies that are based on a percentage of sales or relative to a baseline value. None of the three cities impose non-compliance penalties on themselves. For example, the City of Austin increased its renewable energy goal in 1999, 2007, 2014, and again in 2015, without ever introducing compliance penalties for Austin Energy, a municipal utility owned and operated by the City.

Jacksonville Electric Authority ("JEA") and CPS Energy serving San Antonio both established their own voluntary renewable energy goals. JEA has reached its stated goal of 7.5% of electric capacity from green energy sources by 2015 and has undertaken recent efforts to add additional utility-scale solar PV projects.[43] CPS Energy's Vision 2020 goal (20% of electrical peak demand met with renewable energy by 2020) appears achievable based on CPS Energy's entering into long-term solar PPAs and its ability to procure inexpensive wind within ERCOT, as well as inclusion of existing nuclear as part of a separate 65% total carbon-free generation goal.

C. ENO's Proposed Clean Energy Goal.

As noted above, the Company recommends that the Council set voluntary clean energy goals through a comprehensive CES, review and approve the Company's implementation plans, and retain the ability to revisit the goals based on changing circumstances and technology developments. Specifically, the Company proposes that the Council adopt a goal-based CES policy that targets 70% of ENO retail sales served by zero-emission resources, both supply-side and demand-side, by 2030. The 70% zero-emission supply-side and demand-side resource goal translates to ENO taking additional measures which produce CECs equal to 15% of its forecast 2030 customer load. The CES-based approach has several major advantages over other alternatives:

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43 *See* JEA Solar Initiatives, *available at* https://www.jea.com/About/Electric_Systems/Generation_Strategy/Alternative_Energy/Solar_Generation/.

- The CES would recognize and build on ENO's existing Council-approved supply portfolio which, based on zero-emission nuclear and hydro generation, is already approximately 50% "clean."

- Within a CES framework, ENO's current plans will increase the percentage of retail sales supplied with zero-emission energy from about 50% to about 63% by 2030, largely driven by the addition of 100 MW of utility solar and the continuation of the current Energy Smart EE/DSM programs which, combined, will reduce ENO's 2030 carbon emissions by approximately 400,000 tons.

- A CES framework would promote other affordable mechanisms for reducing CO_2 emissions within the City of New Orleans, including energy efficiency and electrification. In particular, it would provide ENO, through electrification options such as power operations at the S&WB, the opportunity to meaningfully reduce air emissions.

Achieving the Company's proposed 70% CES goal for 2030 through inclusion of a broad range of opportunities would result in the following significant benefits to the City of New Orleans:

- Reduction of year-2030 carbon emissions of 605,000 tons.

- Addition of about 240 MW of utility-scale solar PV resources, which includes the pending request before the Council to approve 90 MW from three separate solar projects including one in New Orleans.

- Investments in infrastructure to serve the S&WB pumping load in order to reduce S&WB costs and significantly reduce air pollution in the City and reduce net carbon emissions by 75,000 tons/year.

- Potential other electrification efforts in the transportation sector which would reduce air emissions in the City and provide further net CO_2 emissions reductions.

Under the Company's proposed plan, ENO would continue working with the Council to offer energy efficiency programs building on the first nine years of Energy Smart programs and would seek to add several hundred additional MW of solar capacity over the next decade. The Company believes that, properly structured, this emissions reduction goal can be achieved without harmful rate impacts.

1. Types of resources that should qualify for the proposed CES.

For the reasons discussed above, and in order to most cost-effectively address carbon emissions and the risks of climate change, the Council's CES policy should incorporate a broad definitional view of qualifying resources and technologies, as well as factor in clean energy progress made to date. As noted above, the Company is opposed to inclusion of any "carve-out" or similar measure that mandates a specific amount in MW or percentage of a single resource type or technology. Including such a feature in a CES policy will naturally hamper flexibility and increase costs, which are ultimately borne by customers via higher rates. By casting a wide net and not mandating specific outcomes, the Company should be able to achieve the largest benefits possible as far as reducing carbon emissions and do so on a more thoughtful and measured path that will help yield the lowest reasonable cost of achieving those reductions.

Thus, the Company advocates that, in addition to future renewable resource additions, any cost-effective CES policy must include contributions from the following:

- Emission-free nuclear resources, which constitute a significant share of ENO's current fuel mix (as noted by the Council on various occasions);
- ENO's growing portfolio of DG- and utility-scale solar PV resources;
- Existing legacy renewable resources like conventional hydro projects that today make up a small portion of ENO's fuel mix;
- Reductions to future sales kilowatt hour ("kWh") and peak load (kW) from the Company's Energy Smart and other EE and DSM investments, which will play an increasingly important role per Council directives;
- ENO's growing efforts to help electrify market segments like transportation through adoption of EVs and charging infrastructure;
- Assisting key customers like S&WB to help reduce use of older, legacy assets that use fossil fuels; and
- Customer-owned and operated DG-scale renewable resources like rooftop solar PV systems that take advantage of Council policies like NEM.

In response to Resolution R-19-109's listing of a number of resource types that could be considered for inclusion in a Council-adopted CES, and after carefully reviewing and evaluating the list of suggested resource types and technologies, the Company (1) supports the inclusion of all of the identified resource types with two important exceptions, which are discussed further below; and (2) notes that some of the technologies listed may be technically-feasible and cost-effective in some geographic locations, but not necessarily today within Orleans Parish, the state of Louisiana, or even the broader region for that matter. To be clear, noting such limitations is not to suggest that the Council should exclude these resource types as qualifying for a CES policy; instead, this information is intended to help set expectations that there is little likelihood certain resources would realistically be used in the near-future. The Company has prepared a high-level assessment of each of these resource types and technologies, attached hereto as Attachment F.

With respect to specific resource types, Resolution R-19-109 lists two that are problematic in the Company's view for several reasons and should therefore be excluded: (1) combined heat & power ("CHP" or "cogeneration") and (2) fuel cells using non-renewable fuels. The Company's concerns with these resource types would be addressed, however, if a qualifier is attached requiring the fuel source to be "renewable" such as from landfill gas and/or anaerobic digestion. Otherwise, including technologies like CHP and fuel cells that rely upon fossil fuels is counter-productive to the overarching goal of mitigating carbon emissions and helping to address future climate change concerns inherent in the Council's considering adoption of a clean energy policy in the first place. It is important to note that Louisiana already has almost 7,000 MW of CHP resources located at commercial and industrial customer sites the majority of which is fossil fuel-fired.[44] Determining how any of these existing CHP resources might participate in a CES would be problematic to say the least.

In addition, allowing such fossil fuel-fired resources to participate in a CES policy also could undermine the expansion of other clean energy resources that otherwise would contribute to reducing fossil fuel usage. And if the Council's policy were to adopt some kind of utility-sponsored incentive mechanism for new CHP and/or fuel cell projects, not only would ENO's customers have to bear the costs of those incentives, but customers also would be negatively affected by higher rates to the extent the CHP or fuel cell resource was located behind a retail electric customer's meter and the output of the resource reduced what otherwise would have been purchased from the utility. Such an outcome would be self-defeating on multiple fronts.

2. *Development and review of the proposed CES.*

ENO suggests that the preferred way to implement the proposed CES would be for the Company to incorporate appropriate analysis and discussion into future IRP processes, outlining the steps that ENO intends to take to fulfill the stated clean energy goals, and the expected outcomes, costs, and resulting rate impacts. The Council would then review the proposed plan as part of the larger IRP report and, upon its approval, the Company would proceed with the plan as it does today with Energy Smart implementation.

ENO also proposes to put in place regular reporting through the implementation of its plan, which would include reporting results, costs, as well as any unanticipated barriers to implementing the plan, including any unexpected changes in costs, technology, or other factors that could change the advisability of proceeding with the Council-approved plan. Commencing in 2020, the Company would begin to measure and track total clean energy (both supply-side and demand-side) as a percent of retail electric sales. The Company proposes that it would make its first CES report filing by May 31, 2021 (for the year 2020) and at the end of May during each successor year. As part of these reports, the Company would recommend changes and the Council would decide how to proceed in such circumstances. The Company proposes this deadline because it is important to allow sufficient time at the beginning of each year for the conclusion of other reporting efforts, which efforts are necessary information sources for the CES report.[45]

The Company also proposes that the reports be subject to review as to whether implementation of the plan, as approved or as modified with Council approval, was done prudently. And given the level of uncertainty involved with renewable resource additions, the Company also suggests that the Council should explicitly address the reporting and decision-

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44 *See* https://www.energy.gov/sites/prod/files/2017/11/f39/StateOfCHP-Louisiana_2.pdf.

45 Examples include the submittal of the Company's FERC Form 1 report in mid-April each year and the time needed to compile results for the prior year's Energy Smart investments.

making process relative to establishing prudence in the CES policy to help mitigate issues that may arise in future years.

The Company notes that it is not envisioning the submittal of an annual report of this sort to trigger any form of litigated process with the Council's Advisors and/or stakeholders. Instead, ENO would propose several steps each year including, for example, a public meeting to foster stakeholder questions as well as one opportunity for filed written comments. The Company would then have an opportunity to formally respond in writing to any written comments received to help address any concerns raised, and to inform the Council of any changes to ongoing and/or future activities.

Second, for certain clean energy resource acquisitions undertaken to meet the goal-based CES, the Company plans to seek Council pre-approval before moving forward. Examples would include building or acquiring any new utility-scale supply-side resource or entering into a long-term PPA with a third party. The Company will also regularly inform the Council, its Advisors, and other stakeholders regarding Energy Smart DSM investments via other processes. For example, the Company has a pending request in the 2018 Combined Rate Case for a new and innovative cost recovery mechanism for Energy Smart called the Demand-Side Management Cost Recovery Rider ("Rider DSMCR"). If approved by the Council, implementation of Rider DSMCR would involve its own annual reporting and review requirements. And, in addition, the IRP process will continue beyond 2018 with the next planning cycle scheduled for 2021.

Finally, it is important to note that the Company's CES proposal represents a long-term goal and that progress will be made incrementally over time through a variety of efforts. Nuclear generation will play an important role each year in providing a significant share of ENO's clean energy. There may be instances where unforeseen operational issues, severe weather, or other *force majeure*-type events in a given year reduce output from a nuclear unit that supplies ENO. Under those circumstances, the percentage of clean energy in a given year may fluctuate down unexpectedly. The most important measuring stick, however, is whether or not ENO is making real progress over time towards achieving the proposed 70% goal for the year 2030 and is doing so in a way that directly benefits customers and at the lowest reasonable cost.

D. Both cost recovery and rate design are critical to achieving reduced carbon emissions.

Timely cost recovery of its investments is important to ensure that ENO's financial health remains strong enough to support continued investment required to meet the clean energy goals discussed herein. ENO suggests that, depending on the level of investment, mechanisms such as the Formula Rate Plan, Rider DSMCR for DSM investments, including performance incentives, as well as other mechanisms such as the capacity cost recovery mechanism ("PPCACR") are viable approaches for recovery of investments made by ENO to meet the Council's CES objectives. All of these mechanisms have been proposed or, in some instances, addressed in ENO's 2018 Combined Rate Case.

However, if these mechanisms are not approved as part of the 2018 Combined Rate Case, ENO urges the Council to establish appropriate incentives as well as mechanisms for contemporaneous cost recovery of any investments necessary to meet the Council's CES objectives as well as appropriate incentives to support such investment. This should include investments in demand-side management, energy efficiency, and more traditional renewable resources.

Establishing appropriate incentives and cost recovery mechanisms is critical to placing all resources, both demand and supply-side, on an equal footing by providing the utility an opportunity to earn similar returns on either investment and ensuring that, whatever the Council's preference may be in selecting a strategy to reduce carbon emissions, ENO will have the financial wherewithal to implement that strategy.[46] As ENO discussed extensively in its testimony filed in the pending rate case, because DSM measures are often expensive to implement and, absent supportive ratemaking mechanisms, provide little to no value to a utility's shareholders and lenders in terms of having an opportunity to earn a return on DSM investments funded by these same shareholders and lenders, investor-owned utilities face challenges in implementing DSM.[47] In order to make utilities, and the shareholders who supply them with capital, indifferent between investing in supply-side resources and DSM, supportive ratemaking would include mechanisms that create the opportunity for the utility to earn a return on investment in DSM in order to encourage robust investments in DSM.

Ultimately, putting demand-side investments on a more level playing field with supply-side resources and other traditional infrastructure investments would provide a supportive and stable regulatory model where utilities can treat DSM as a meaningful component of their core business and make the necessary plans for long-term sustainable investment.

Likewise, it is important that rates be designed appropriately to ensure that undue intra-and inter-class subsidies are addressed. Today, because so much of ENO's costs are recovered through volumetric charges, customers who install solar systems or aggressive energy efficiency measures wind up paying a lower level of fixed costs than needed to provide them service due to their reduced kWh usage. This results in these customers' electric usage being subsidized by customers without solar systems or access to aggressive energy efficiency. ENO has proposed to begin to correct these issues through the rate design set forth in its rate case (*i.e.*, by proposing a fixed charge that is more aligned with its fixed cost), but the issue of designing rates for today's customers and challenges should be a top priority.

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46 It is common practice in states that have RPS goals or mandates to provide utilities with cost recovery assurances through contemporaneous recovery mechanisms. Several states that have enacted clean energy goals have provided utilities with explicit recovery through separate riders and/or non-bypassable surcharges including Arizona, Colorado, Connecticut, Washington D.C., Delaware, Iowa, Illinois, Massachusetts, Michigan, Minnesota, and Missouri, to name a few.

47 *See* the Revised Direct Testimony of Dr. Ahmad Faruqui, submitted with ENO's 2018 Combined Rate Case, which discusses the various types of financial incentives and ratemaking mechanisms that progressive regulators use to support expansive utility DSM and the high correlation between such incentives and successful DSM programs.

III. Conclusion

ENO shares the Council's goal of reducing carbon emissions. To accomplish this goal, ENO recommends that the Council adopt a comprehensive Clean Energy Standard focused on carbon reductions across all sectors of New Orleans, using all tools available, including increased utilization of solar and other renewable resources, electrification and other measures that reduce the City's carbon footprint, demand-side management, and the incorporation of existing emission-free nuclear and hydro generation. The experience of other places has shown that the establishment of an RPS is not a workable or cost-effective way to achieve significant carbon reductions. Therefore, in keeping with the views of leading industry experts, ENO requests that the Council establish a Clean Energy Standard that builds on ENO's existing clean fleet, adding renewables, electrification programs, and other innovative measures and technologies that will drive further carbon emissions reductions for the betterment of the City and ENO's customers.

Respectfully submitted:

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CERTIFICATE OF SERVICE
<u>Docket No. UD-19-01</u>

I hereby certify that I have served the required number of copies of the foregoing report upon all other known parties of this proceeding, by the following: electronic mail, facsimile, overnight mail, hand delivery, and/or United States Postal Service, postage prepaid.

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New Orleans, Louisiana, this 3rd day of June, 2019.

Harry M. Barton

April 18, 2019

Honorable Helena Moreno VIA EMAIL
Honorable Jason Rogers Williams
Honorable Joseph I. Giarrusso
Honorable Jay H. Banks
Honorable Kristin Gisleson Palmer
Honorable Jared C. Brossett
Honorable Cyndi Nguyen

Re: Docket. No. UD-19-01
In Re: Resolution and Order Establishing a Docket and Opening a Rulemaking to Establish Renewable Portfolio Standards

Dear Ms. Moreno:

Entergy has partnered with the America's WETLAND Foundation on numerous occasions in the past 15 years, as part of our ongoing effort to inform local coastal communities about the impact of sea level rise and climate change on community sustainability.

Notably, their support for a study by zip code of communities in the Gulf Coastal Zone led to vital information from which to draw the first community self-assessments as parts of a 11 city Blue Ribbon Resilient Communities leadership forum series where research led to resiliency profiles for most of the Gulf Coast.

This study and these benchmark events by AWF have now led to a series of Adaptation Forums, the first of which was held at Nicholls State University this past fall, where coastal leaders imagined the "new normal" for residents who must make plans to live with the rising tide and more serious storm events.

We write all of this because one cannot uncouple the years of carbon emissions from power plants with the advancement of global warming and its impact on our biodiversity and ecosystem health.

While the Foundation is neither a proponent or opponent of nuclear power, we are in agreement that as a transition from coal, today the nuclear power option makes sense.

Entergy was a very early proponent of the need to outwardly address climate change.

We feel that our longstanding partnership with the company and its work to build the possibility for a future where carbon sequestration and valuing help to reduce a company's carbon footprint is extremely important to the challenge of a carbon neutral society.

For all of the above stated reasons, we support the Entergy proposal.

Very truly yours,

Val Marmillion, Managing Director
America's WETLAND Foundation

cc: Ms. Lora W. Johnson, CMC, LMMC, Clerk of Council
Ms. Erin Spears, Chief Council Utility Regulatory Office

Clean Air Task Force
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May 30, 2019

New Orleans City Council

Re: Informal comment letter in Docket. No. UD-19-01, *In Re: Resolution and Order Establishing a Docket and Opening a Rulemaking to Establish Renewable Portfolio Standards*

Dear Honorable Council members:

My name is Armond Cohen, and I am Executive Director of the Clean Air Task Force (CATF), a nonprofit environmental organization that has been dedicated for nearly a quarter century to advancing public policies that reduce or eliminate harmful air pollution and climate-warming emissions from the world's energy system.[1] We have worked with environmental groups and governments in nearly all states, including Louisiana, to advance state and city policies that can also be models for national policy. I appreciate the opportunity to submit this letter today and request that it be placed in the record of the above docket.

I will address my comments mainly to question #1 in RESOLUTION, R-19-109 establishing the above docket:

1. *What would an appropriate RPS target for New Orleans be, and should it be a requirement or a goal?*

[1] CATF is an independent philanthropically supported organization that does not accept donations from for-profit corporations or federal, state or local governments. More information on CATF can be found at www.catf.us.

a. *What percentage of ENO's load should be met through renewable resources, and what data or other information exists indicating that the target is achievable in New Orleans?*

CATF urges Council members to follow five progressive states – California, Colorado, Washington State, New Mexico and Nevada – who have recently established a "clean energy standard" in preference to a renewable-only RPS.[2] ***Such a standard would require ENO to provide, by a date certain such as 2045 or 2050, all of the City's electricity from zero-carbon energy sources***. These sources could include, of course, renewable energies such as wind and solar, but could also include other zero carbon sources that are commercial today or, over time, those that are in commercial demonstration today.

Focus on carbon, not technologies

Why focus on a goal of zero carbon energy rather than a specific set of technologies such as solar and wind?

First and foremost, because the dominant environmental objective must be, given the scientific evidence at hand, the fastest reduction of ***carbon emissions*** we can achieve at an affordable cost.

The world's climate, and Louisiana's, is changing rapidly. At present rates of change, half the world's population can expect, by 2030, to experience much different climates than we experienced in the late 20th century. [3]

I do not have to tell elected representatives of this great City the stakes in limiting catastrophic climate change which will likely include, among other things, an increase in the intensity of tropical storms. Katrina was just one example of extreme weather we

[2] Amy Harder, "States and companies ramp up clean energy targets," (May 7, 2019), https://www.axios.com/clean-energy-targets-states-companies-43b9a60e-c866-45c5-b1a1-d93005bddf3b.html

[3] See Diffenbaugh, Noah S., et al. "Quantifying the influence of global warming on unprecedented extreme climate events." *Proceedings of the National Academy of Sciences* 114.19 (2017): 4881-4886.

can expect from our warming of the oceans.[4] Global warming has increased the probability and severity of extremely hot and wet weather worldwide.
While the political shouting in Washington DC continues, there is a broad scientific consensus that these climatic changes are driven by the heating of Earth's atmosphere from carbon dioxide released by the burning of fossil fuels: oil, gas and coal.[5] If we are going to limit extreme climate change, we need to make every effort to utilize every non-fossil energy source we have as fast as we can.

Second, timing matters. Because of the high levels of carbon dioxide already in the atmosphere, the additional amounts that emitted in coming decades even if we begin a rapid decline in our emissions rate, and the century-scale natural decay rate of carbon dioxide, the only way to limit global warming is to reach net zero emissions of greenhouse gases in the coming decades. Indeed, as the recent report of the Intergovernmental Panel on Climate Change demonstrates, we will not just need to drop emissions to zero around mid-century; we will likely eventually need *negative* emissions technologies to *remove* carbon from the atmosphere.[6] (See Figure 1 below)

[4] See Trenberth, Kevin E., John T. Fasullo, and Theodore G. Shepherd. "Attribution of climate extreme events." *Nature Climate Change* 5.8 (2015): 725-730.
[5] See Intergovernmenal Panel on Climate Change, *Understanding and Attributing Climate Change* (2007), http://www.ipcc.ch/publications_and_data/ar4/wg1/en/spmsspm-understanding-and.html
[6] IPCC, 2018. *Special Report: Global Warming of 1.5 °C.* "Chapter 00: Summary for Policymakers." Intergovernmental Panel on Climate Change. https://www.ipcc.ch/sr15/chapter/summary-for-policy-makers/

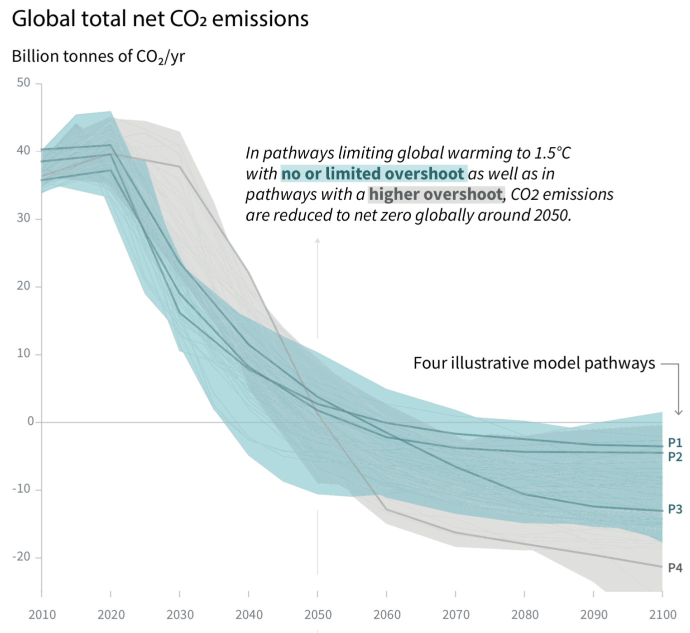

Figure 1: Carbon emissions reductions required by mid-century to manage climate change. Note "negative emissions" are required after mid-century. Source: see footnote 6.

Every molecule of carbon dioxide put in the atmosphere today will continue to warm the earth for centuries. So every molecule we emit today matters - essentially forever. And because carbon simply accumulates in the atmosphere, accelerating warming, the only way to avoid the worst climate change scenarios is, ultimately, to avoid emitting carbon altogether: We need a zero carbon energy system by 2050 or soon after and maximum feasible reductions possible until then.[7] It is likely that a combination of resources will achieve the needed targets faster than just a select few.

And, third, cost matters. While climate change is important, its remedies cannot come at any cost..

Dozens of recent studies have shown that, ***in achieving a very low carbon power grid, maintaining a diversity of zero and low carbon sources, especially those that are "dispatchable" or "firm," available 24/7, results in significantly lower***

[7] See Rockström, Johan, et al. "A roadmap for rapid decarbonization." *Science* 355.6331 (2017): 1269-1271.

costs than just allowing on renewable energy such as wind and solar.[8] As I'll explain further in a minute, this is because of the seasonal nature of wind and solar output, which makes gap-filling through energy storage or back-up generation a very expensive proposition.

We have an abundance of potential technology options available now and likely to be available in the future to meet the goal of zero carbon emissions on the New Orleans power grid. Solar and wind energy costs have come down substantially in recent years. Energy storage that can balance variability of solar and wind has also dropped in price. New Orleans is blessed to be part of a region with abundant solar resources. Technologies are in place today, and more are coming forward, which can utilize natural gas for power generation without carbon dioxide emissions to the atmosphere, utilizing carbon capture and sequestration.[9] In addition, we have both existing nuclear energy plants, which today provide nearly all of New Orleans' carbon free electricity today, and the potential for future nuclear plants which may be less expensive and even safer than today's technology.[10] There may be the opportunity for advanced geothermal power using injection of water into deep hot rock formations, which could provide on-demand steam to generate electricity.[11] And a good deal of attention is going to electricity systems that allow combustion of zero-carbon fuels such as hydrogen or ammonia derived from electrolysis from zero carbon energy, steam reforming of natural gas combined with carbon capture, or nuclear energy.[12]

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[8] See Jenkins, Jesse D., and Samuel Thernstrom. "Deep Decarbonization of the Electric Power Sector Insights from Recent Literature." *Energy Innovation Reform Project* (2017);
Sepulveda, Nestor A., et al. "The role of firm low-carbon electricity resources in deep decarbonization of power generation." *Joule* 2.11 (2018): 2403-2420;

[9] See R. Service, "Goodbye smokestacks: startup invents zero emissions fossil power," *Science,* May 24, 2017, https://www.sciencemag.org/news/2017/05/goodbye-smokestacks-startup-invents-zero-emission-fossil-fuel-power

[10] See Clean Air Task Force, "Advanced Nuclear Energy: Need, Characteristics, Projected Costs, and Opportunities" (April 2018), https://www.catf.us/resource/ane-need-characteristics-project-costs/

[11] See https://www.energy.gov/eere/geothermal/how-enhanced-geothermal-system-works and https://www.hotrockhero.org

[12] See Clean Air Task Force, "Fuels Without Carbon: Prospects and the Pathway Forward for Zero-Carbon Hydrogen and Ammonia Fuels" (December 2018) https://www.catf.us/resource/fuels-without-carbon/

If we keep all of our options and work to make them even more viable, we stand a good chance of meeting a mid-century zero carbon target. Nations and regions such as Sweden, France, Ontario, and Brazil have already achieved very low electricity carbon emission rates through use of some of these technologies, chiefly hydroelectric, wind and nuclear energy.

Why favor diversity: a New Orleans example

Here I want to focus specifically on the importance of keeping the door open for "firm" zero carbon energy sources to play a significant role in New Orleans' electric system as part of the design of a zero-carbon electricity standard. Firm sources are those that are available on demand and are not dependent on weather.

It may be technically possible, as some have argued,[13] to power New Orleans' electric grid entirely or almost entirely, on renewables such as solar and wind energy. However, the evidence suggests this would be a highly risky path to mandate today.

Above all is the issue of cost. As alluded to earlier, a recent review of 40 studies concluded that combining wind and sun with firm energy, rather than relying exclusively or overwhelmingly on wind and sun, would substantially reduce the cost of deeply reducing carbon emissions in the electricity sector.[14] A more recent detailed analysis of the role of firm energy in a Northeast US system found a dramatic cost difference between electric systems driven by wind and sun, and systems with substantial amounts of firm zero carbon energy in the mix.[15] Other non-cost risks attach to a wind- and sun-dominated strategy, which I will address later. But let's now focus on cost, using New Orleans and California as well as some national data to illustrate.

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[13] Jacobson, Mark Z., et al. "100% clean and renewable wind, water, and sunlight (WWS) all-sector energy roadmaps for the 50 United States." *Energy & Environmental Science* 8.7 (2015): 2093-2117.
[14] Jenkins, Jesse D., Max Luke, and Samuel Thernstrom. "Getting to Zero Carbon Emissions in the Electric Power Sector." *Joule* 2.12 (2018): 2498-2510. (Link here)
[15] Sepulveda, Nestor A., et al. "The role of firm low-carbon electricity resources in deep decarbonization of power generation." *Joule* 2.11 (2018): 2403-2420. ("Across all cases, the least-cost strategy to decarbonize electricity includes one or more firm low-carbon resources. Without these resources, electricity costs rise rapidly as CO_2 limits approach zero. Batteries and demand flexibility do not substitute for firm resources. Improving the capabilities and spurring adoption of firm low-carbon technologies are key research and policy goals.") (Link here).

It is commonplace to say that "the wind doesn't always blow and the sun doesn't always shine." But this statement does not capture the real challenge of a wind- and sun-dominated electric system. Wind and sun don't just vary on ***daily*** cycles; they vary substantially over ***weekly*** and ***monthly*** periods.

Let's first take the example of solar energy – where most of the focus of discussion has been in New Orleans.[16] As shown below in Figure 2, solar energy[17] shows a seasonal pattern of production – with production noticeably lower in the fall and winter months.

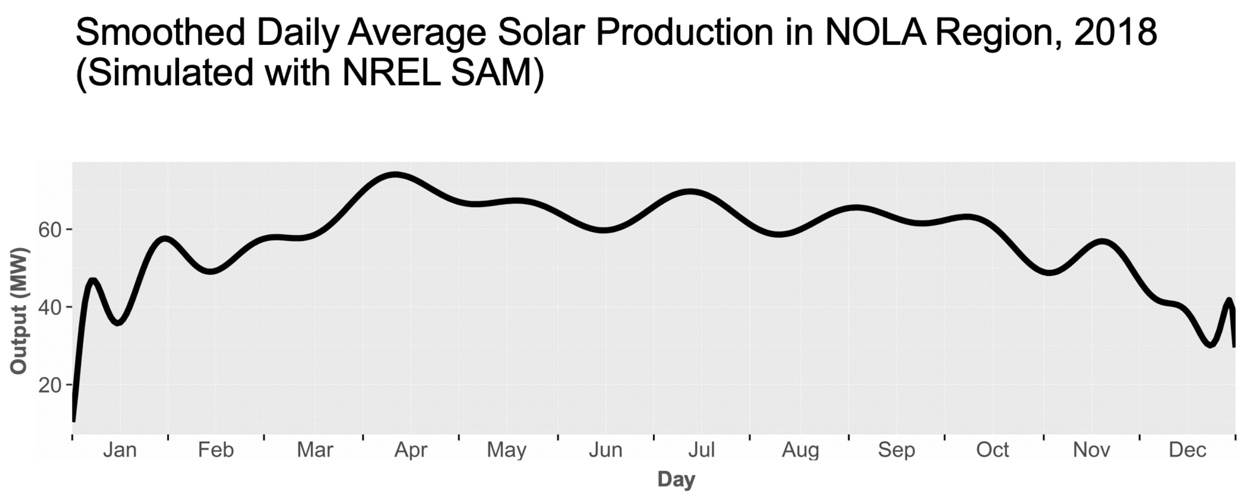


Figure 2: Monthly variance of centralized solar PV output in New Orleans, assuming 100 MW of installed capacity. Source: CATF, from data sources disvussed in Appendix 1.

Let's now look at the seasonal demand of the City. Shown in Figure 3 below:

[16] As noted below, the wind resource in the region is generally inferior to solar and, and, as part of a 100% variable renewable energy scenario, could make the daunting numbers for solar, described below, even worse.
[17] Here we discuss the production pattern for centralized solar PV but the results would be the same for rooftop PV.

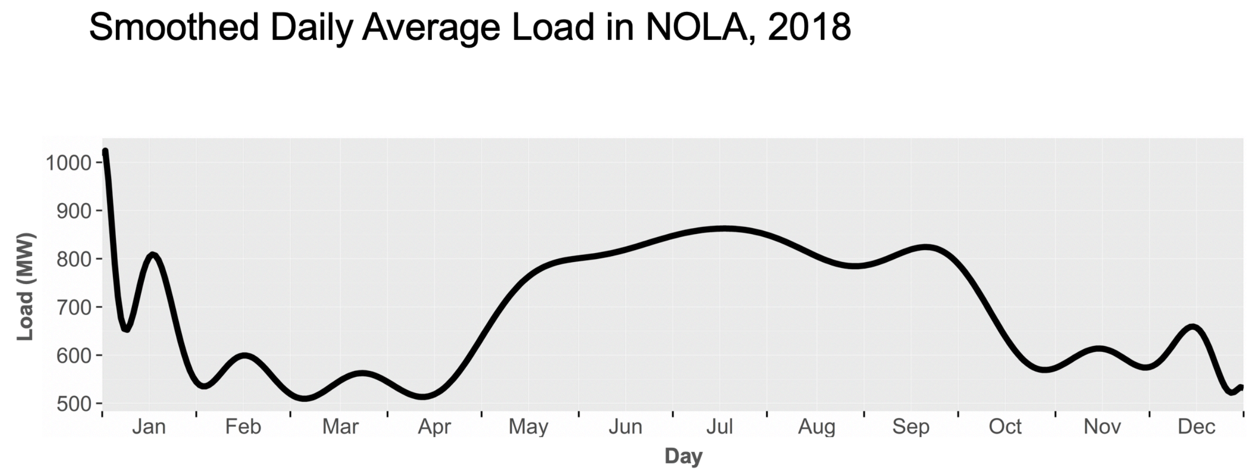


Figure 3: Average daily electric demand, smoothed by week. Source: CATF from data sources in Appendix 1.

At first blush, there would appear to be good correlation between solar availability and City demand. But what happens when we contract for enough solar to cover 100% of the City's annual electric demand? This is shown in Figure 4 below, where we overlay NOLA demand and solar supply. We see there are some significant mismatches: overproduction in the Spring, and significant deficits in the Spring, as well as in June and August and September.

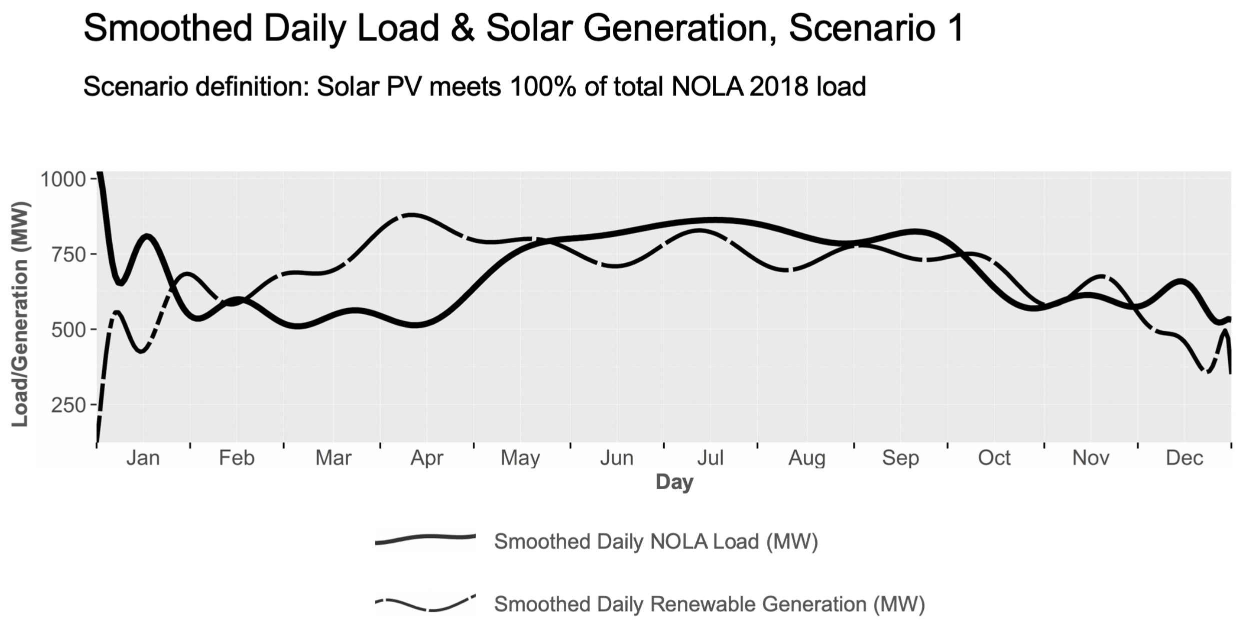


Figure 4: NOLA load (heavy black line) versus solar production (dotted line) assuming solar meets 100% of annual production. Source: CATF from data sources in Appendix 1.

What about storage?

In theory, we could use energy storage to harvest surpluses and use them in deficit periods. But this is where cost comes in. The sheer amount of storage that must be built to capture maximum surplus, and then used at a fraction of its capacity, becomes cost prohibitive, even at very low storage costs.

In the case of a 100% solar commitment to meet NOLA's load, we would need 460,000 MWH of storage. Storing that energy will first of all incur a very large capital expense. The US Department of Energy estimates the current cost of grid scale energy storage to be just under $500/kwh of capacity.[18] Let's assume we drop that cost by 80% to $100/kwh. The total cost of such a battery storage system would be ***$46 billion, or roughly eighty times the City's annual electric bill of $570 million.*** This excludes, of course, the cost of the solar energy installations and associated transmission and distribution infrastructure. Even if storage costs were to drop by fifty times to $10/kwh, a target which has not been demonstrated to be feasible, the storage costs of such an all-

[18] US EIA, "U.S. Battery Storage Market Trends "(May 2018) https://www.eia.gov/analysis/studies/electricity/batterystorage/pdf/battery_storage.pdf

solar system would be $4.6 Billion, or eight times the city's total annual electric costs – again, without counting the cost of the solar installations themelves.

Nor is the situation improved by mixing solar with wind energy. Figure 5 below shows the load and production patterns of a system which includes onshore and offshore wind as well as solar, in a manner that minimizes seasonal imbalances. The figure shows even greater surpluses and deficits, which would require 960,000 MWH of storage capacity – at cost of $96 Billion.

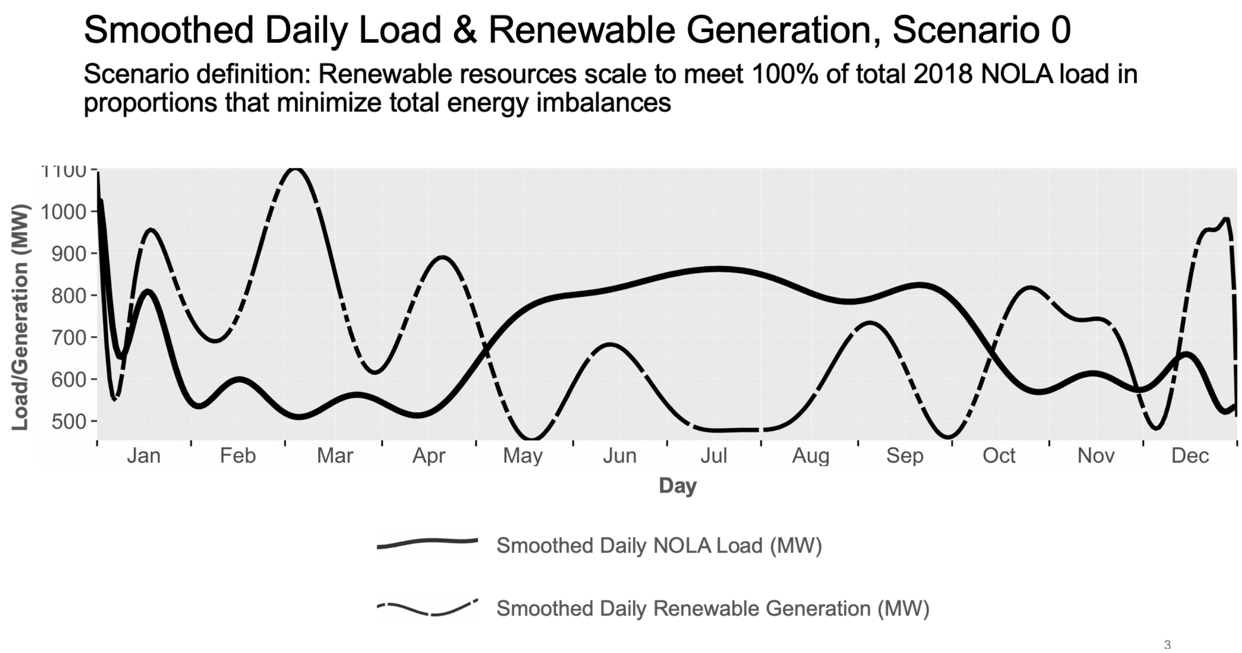


Figure 5: NOLA load (heavy black line) versus optimized solar and wind production (dotted line) assuming solar and wind meet 100% of annual production. Source: CATF from sources in Appendix 1.

But just to cite these astronomical storage costs in some way understates the problem, because this storage capacity would be used at a very low rate – just a few percent of capacity in an average year. That is because only a small amount of the storage capacity would be used regularly to balance daily variations in solar output. Most of the storage capacity would need to be built to store peak seasonal surplus and thus only cycle seasonally. That means large capacity divided by little use, resulting in very large per unit costs for stored energy.

An analysis of a similar surplus and deficit problem in California, depicted in Figure 6 below, shows that the escalating costs of storage per unit output required, as wind and sun percentages become higher, drive very large system cost increases of roughly tenfold as wind and sun go from 50% of total supply to 80%, and roughly thirty-fold as wind and sun provide all system energy.

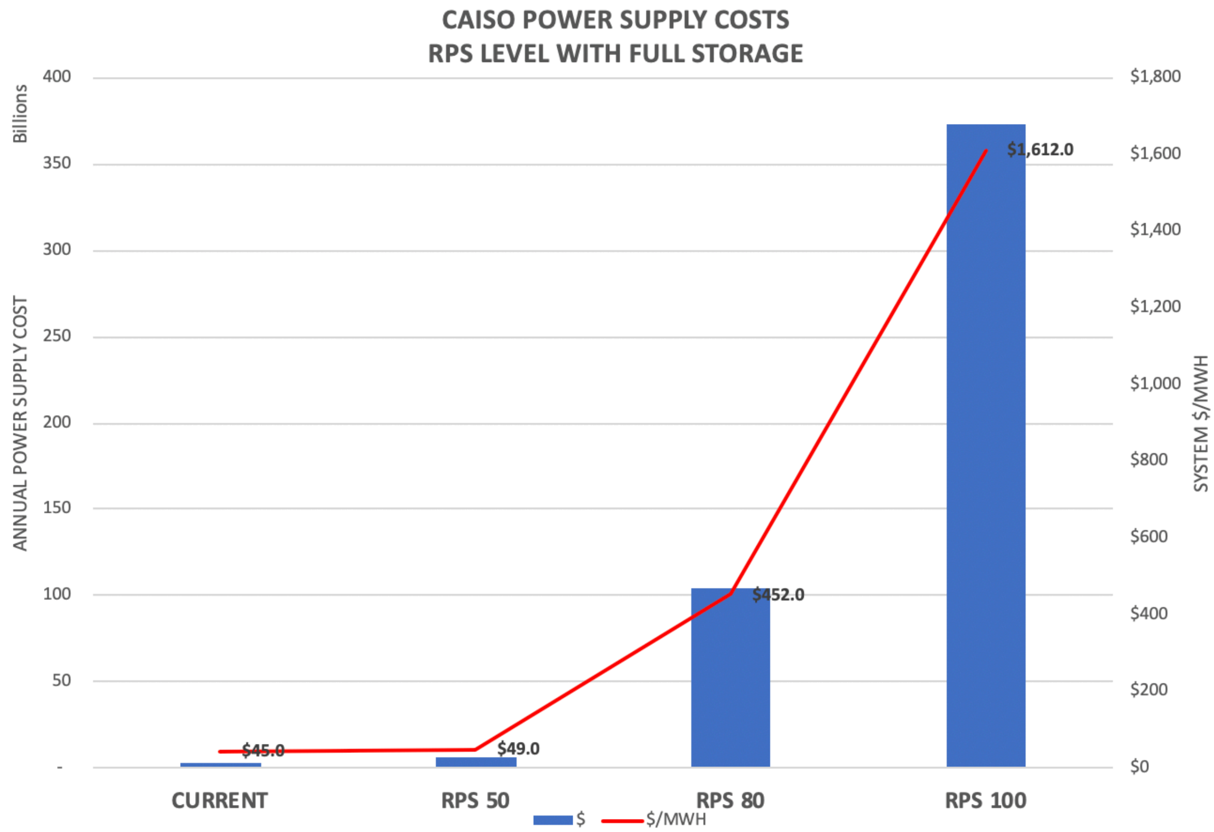
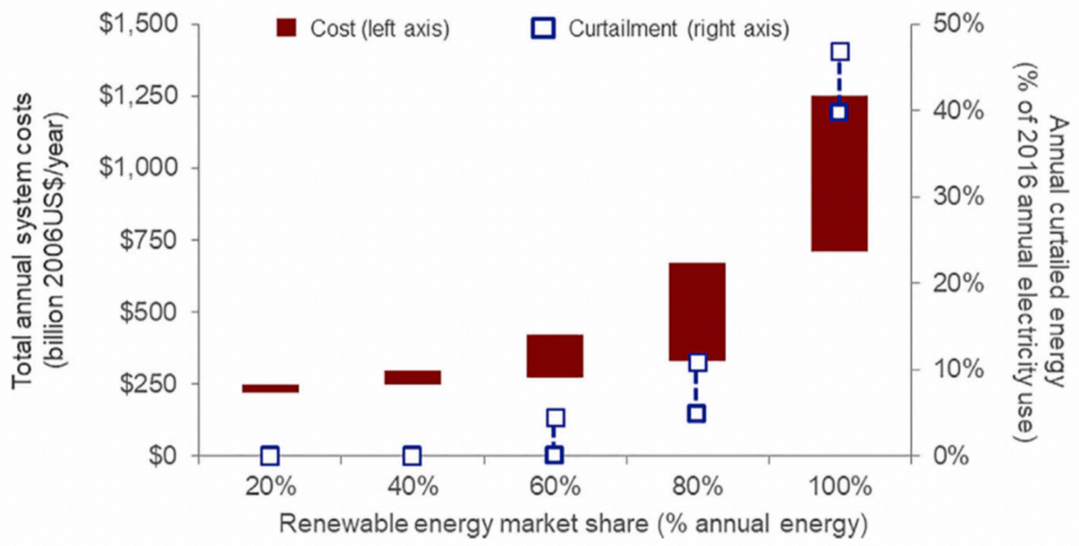


Figure 6. Source: Clean Air Task Force calculated from California Independent System Operator data

A similar cost escalation pattern has been seen in national studies, such as a recent one conducted by National Renewable Energy Laboratory analyst Bethany Frew, which assumed a transcontinental electric grid and optimal demand response mechanisms (see Figure 7 below):



Jenkins et al., Getting to Zero Carbon Emissions in the Electric Power Sector, Joule (2018), https://doi.org/ 10.1016/j.joule.2018.11.013, adapted from Frew, Bethany A., Jacobson, M. et al. "Flexibility mechanisms and pathways to a highly renewable US electricity future." *Energy* 101 (2016): 65-78.

Figure 7

Keeping options open

None of this is to gainsay a substantial role in the future for solar and perhaps wind energy in cost-effectively achieving a zero-carbon electricity supply for New Orleans. And it is always possible that technological breakthroughs could occur that would make it possible to increase the percentage of economically affordable wind and solar to very high levels, such as near-zero cost electricity storage.[19] But at this stage CATF believes

[19] It is sometimes argued that "demand response," that is, the ability to curtail customer load, will alleviate the surplus and deficit problems outlined in this testimony. But these agreements are generally understood to require interruptions for a few hours a few times a year. By contrast, as Figures 4 ad 5 demonstrates, 100% wind and solar scenarios produce power deficits equal to 25% or more of peak demand ***over weeks and months***. It is not likely that New Orleans businesses, industries and consumers would effectively agree to seasonal curtailments, or that this would be good for the New Orleans economy if they did.

It also may be argued that interconnection of New Orleans to other control areas will alleviate the surplus and deficit problem. While greater interconnections can help at the margins, we must assume that other regions will be pursuing similar levels of decarbonization and are likely to adopt similar levels of variable energy. And wind and solar tends to be highly correlated on a daily and weekly across the nation. As a it would be bad public policy to ***assume*** such breakthroughs will occur in time to make a difference.

The unavoidable fact is that there are real risks with all single technological pathways to zero carbon. Nuclear energy, while comprising the vast majority of the nation's zero carbon energy today, has recently experienced cost overruns in the building of new first of a kind U.S. plants, and continues to face public concern around waste disposal and safety. The use of natural gas with carbon capture and storage to generate power, although based on well-demonstrated technologies, will likely face challenges from those opposed to the use of any fossil fuels as a matter of principle. And a large build-out of wind and solar energy capacity, along the substantial increase in transmission capacity that would be necessary to serve a wind- and sun-dominated system, may well face substantial and well organized opposition which has already emerged around relatively small scale proposals. Hard trade-offs may be required.

Conclusion

There is no more pressing environmental issue today than managing earth's climate. That will require a drastic reduction in carbon emissions within a few short decades. The power sector will play a significant role in that effort. New Orleans can help lead the way by focusing on policies that speed maximum reduction in carbon at the lowest cost. No one knows yet what an economically and practically feasible zero carbon grid in 2050 will look like in New Orleans. Precisely because of that fact, CATF urges you to follow the examples of some of the nation's leading environmentally progressive states such as California, Colorado and New Mexico and ***enact a zero carbon clean energy target for midcentury***, allowing many technology paths to remain open to offer the greatest chance of success.

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result, even with seamless national interconnection, as is assumed in the study referenced in Figure 7, substantial surplus and deficit problems are experienced at very high levels of wind and solar, with the resulting cost impacts shown in the figure.

Appendix 1: Methodology for Figures in Testimony

We obtained hourly electrical load data for New Orleans for the year 2018, from Entergy. We simulated hourly electricity generation data for wind (onshore and offshore) and solar photovoltaic units using National Renewable Energy Laboratory (NREL) System Advisor Model (SAM)[20] in the following manner:

- For onshore wind, we simulated wind farms of 30 MW each in central locations in each of four states: Louisiana, Arkansas, Mississippi, and Alabama. None of the four states have significant capacities of installed wind so 30 MW was chosen arbitrarily.

- For offshore wind, we simulated a single wind farm in the Gulf of Mexico 50 miles from New Orleans.[21] While no such offshore windfarm is planned, we selected such a location as a plausible future location of offshore wind development, should such development occur. We simulated an offshore wind farm with a 30 MW capacity.

- For solar photovoltaic, we simulated solar arrays in central locations of each of four states: Louisiana, Arkansas, Mississippi, and Alabama. The simulated solar arrays' capacities are the same capacities of the total installed solar photovoltaics in each state in 2017. Such values were obtained from the U.S. Energy Information Administration.

We loaded the hourly data into R programming language. We developed two hypothetical scenarios where renewable energy meets 100 percent of New Orleans' total annual 2018 load. Our scenarios are:

1. Optimized scenario ("Scenario 0"): onshore wind, offshore wind, and solar photovoltaics scale to meet 100% of total 2018 NOLA load in proportions that minimize total energy imbalances

2. Solar only ("Scenario 1"): solar photovoltaics meet 100% of total NOLA 2018 load

In each scenario, we scale renewable energy generation so total annual renewable energy generation exactly meets total annual NOLA load. Hourly wind and solar generation scale in proportion to their hourly output in 2018. For example, if in a given

[20] https://sam.nrel.gov/
[21] https://www.equinor.com/en/what-we-do/empirewind.html

scenario wind meets a total demand of 10 MWh in two hours, and its actual generation in NOLA during those two hours were 1 MWh and 3 MWh, its generation in the two scenario hours are 2.5 MWh and 7.5 MWh. In other words, for each scenario and each hour *h*, renewable energy output equals actual output of the renewable resource in hour *h*, times the ratio of the total annual demand and total annual actual renewable energy output.

We use R programming language, and a related programming package “ggplot2,” to create heat maps that show the percent of NOLA load met by renewable resources in each hour of every day of 2018, in each 100 percent renewable energy scenario. We also use R and ggplot2 to plot time series’ of daily average NOLA loads and renewable energy output in each 100 percent renewable energy scenario. Additionally, we use R and ggplot2 to plot time series’ of smoothed daily average NOLA loads and renewable energy output in each 100 percent renewable energy scenario. We smooth daily average time series’ with least squares smoothing (i.e., fitting polynomials to daily average time series’). Smoothed time series’ conceal more drastic variation in daily and hourly time series’. Finally, we plot daily average energy surpluses and deficits in each scenario.

THIRD WAY

Attachment C
CNO UD-19-01
June 3, 2019

May 30, 2019

The Honorable Helen Moreno
New Orleans City Council
City Hall, Room 2W40
1300 Perdido Street
New Orleans, LA 70112

Dear President Moreno:

As head of a policy and advocacy program dedicated to fighting climate change, I applaud you and your fellow members of the Council of the City of New Orleans for developing plans to reduce the City's carbon footprint, and appreciate the opportunity to provide comment on how to structure a requirement to address emissions from the power sector. Most importantly, I would urge the Council to design regulations that, instead of promoting a narrow set of favored technologies, allow for the use of whatever combination of energy resources will create the most rapid transition to a carbon-free grid.

As we learned from last year's report from the United Nations Intergovernmental Panel on Climate Change, (IPCC) the world has very little time to drastically reduce greenhouse emissions if we are to avoid the most devastating impacts of climate change. This demands that every country, state, and city take action – now – to reduce its carbon pollution in every sector as fast, affordably, and holistically as possible.

Renewable resources are a critical piece of the larger climate solution, and we must support their continued growth. However, analysis from leading climate experts, academics, and advocates overwhelmingly indicates that additional tools beyond renewables will be needed to hit our aggressive emissions targets. This is supported by the IPCC itself, as well as the Obama Administration's Mid-Century Strategy, the Union of Concerned Scientists, The Nature Conservancy, World Resources Institute, and countless other authorities on the subject.

The Council's Renewable Portfolio Standard (RPS) resolution accurately asserts that over half the states in the U.S. mandate that a certain amount of power sales come from renewable resources. What it does not mention is the intentional and important shift away from restrictive renewables mandates and toward more inclusive Clean Energy Standards (CES).

States that are making the most ambitious commitments to fight climate change are taking portfolio standards to the next level and enlisting the help of a wider variety of clean energy solutions to cut power sector emissions deeper and more rapidly. Massachusetts, New York, and California were among the first states to allow some amount of non-renewable, low-carbon resources like nuclear energy or carbon capture to meet overall grid decarbonization efforts. Within just the past three months, Nevada, New Mexico, Washington, and Colorado all followed suit. Today, one in five Americans lives in a state with a 100% *clean* energy mandate. While the details of their individual CES designs vary, many of these states require renewables to generate some portion of total power sales, but set a more inclusive requirement that the remaining amount of power generation come from "clean", "carbon-free", or "zero-carbon" resources without specifying a technology.

The Council's resolution is also right to raise the topic of cost. Limiting the added expense that is borne by consumers is important for protecting vulnerable communities, promoting equitable solutions, and ensuring the political viability of ambitious climate policy. As Third Way explained in a recent report, adopting more technology-inclusive clean energy standards instead of restrictive renewables mandates, allows emissions goals to be achieved more rapidly *and* at a lower cost.[1]

The cost-effectiveness of clean energy standards is supported by a substantial amount of research from reputable government and academic institutions.[2] A recent analysis from the Massachusetts Institute of Technology looked at roughly 1,000 different scenarios of how to completely eliminate carbon from an electric grid. The study found overwhelming evidence that including some amount of "firm" carbon-free resources like nuclear, geothermal, natural gas with carbon capture and sequestration, biogas, etc. that operate on a more continual basis can significantly lower the cost of the transition—saving as much as 62% compared to a system based entirely on "variable" renewables like wind and solar paired with a variety of storage options.[3] If New Orleans can eliminate carbon from the grid at lower cost, that would enable more investment in other infrastructure, energy use, and mitigation programs that will help New Orleans tackle its climate goals rapidly and equitably.

In addition to making the transition to zero-carbon faster and more affordable, this technology-inclusive approach is a better way to foster innovation in clean energy. We can not be certain of what new tools might be developed in the coming decades to generate power with no emissions or even "negative emissions", as the IPCC and others say will be needed. Nor can we be certain of which existing tools might become more accessible thanks to cost reductions or performance improvements. But we *can* be certain that New Orleans will not be the place where pioneers in these clean energy fields choose to research, develop, or demonstrate their technologies if local energy policies exclude them from incentives or restrict their access to the market. By making power sector mandates less proscriptive, the Council can achieve its emissions goals while giving New Orleans an opportunity to be a hub for unique, next-generation renewables; carbon capture, use, and storage; advanced nuclear; and other cutting-edge clean energy technologies.

Finally, I would like to suggest that New Orleans explore an emerging and incredibly important topic in grid decarbonization—matching power availability to the time of use. As noted in the Council's resolution, the use of tradable renewable electricity credits (RECs) or any similar credit for carbon-free power can often result in a city like New Orleans purchasing power (or just the carbon-free value of that power) from a facility that is far away geographically from the people in New Orleans who would theoretically use it. Similarly, it allows for purchase of power that may or may not be generated when people in New Orleans need it.

For instance, the utility in New Orleans could theoretically buy enough credits from two afternoons of solar generation at facilities in New Mexico to equal the amount of power that their customers in New Orleans will use day and night for a full week. The problem here is, New Orleanians may be *virtually* using solar power, but they are *actually* using more-polluting forms of energy to keep the lights on. This will become a greater and greater problem as more of the country relies on variable renewable resources for higher percentages of their power needs. Carbon-free power doesn't necessarily have to be generated from a source right next door to the user. If we plan to get to an entirely carbon-free grid, however, it does need to be generated or otherwise available whenever users need it.

As previously discussed, "firm" or "dispatchable" sources of carbon-free power are available to help solve this problem. But because portfolio standards reward clean power no matter when it is generated, there is no added incentive to deploy these dispatchable technologies that will help fill the gaps on the grid. New Orleans has an opportunity to lead the way in resolving this challenge, by exploring mechanisms within its portfolio standard to help monitor the time of generation of power receiving credits, comparing that to the time of power use by New Orleanians, and incentivizing resources that generate clean power at times when clean energy supply does not already match power demand. Google, which had already reached its 100% renewable power purchasing goal, acknowledged this additional challenge and the need for solutions in a paper last year.[4] This issue is ripe for a forward-thinking city like New Orleans to tackle.

The actions taken by leaders like New Orleans are incredibly important to accelerating climate solutions and setting an example for others to follow. For this reason, the Council should be commended for initiating this conversation and allowing for a thoughtful process of stakeholder input in order to create the most effective policy possible. The overwhelming scientific evidence would indicate that such a policy would allow New Orleans to take advantage of the widest array of tools to cut emissions more rapidly, affordably, and comprehensively.

My colleagues and I thank you, and stand ready to assist you in this process however we can.

Sincerely,

Josh Freed
Senior Vice President for Clean Energy

cc: The Hon. Jay H. Banks
The Hon. Jared C. Brossett
The Hon. Joseph I. Giarrusso III
The Hon. Cyndi Nguyen
The Hon. Kristin Gisleson Palmer
The Hon. Jason Rogers Williams

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[1] Ryan Fitzpatrick, Jameson McBride, Jessica Lovering, Josh Freed, Ted Nordhaus, “Clean Energy Standards: How More States Can Become Climate Leaders,” Third Way, June 27, 2018. Available at: https://www.thirdway.org/report/clean-energy-standards-how-more-states-can-become-climate-leaders.

[2] Jesse D. Jenkins, Sam Thernstrom, “Deep Decarbonization of the Electric Power Sector Insights from Recent Literature,” Energy Innovation Reform Project, March 2017. Available at: https://www.innovationreform.org/2017/03/01/eirp-deep-decarbonization-literature-review/eirp-deep-decarb-lit-review-jenkins-thernstrom-march-2017/.

[3] Nestor A. Sepulveda, Jesse D. Jenkins, Fernando J. de Sisternes, Richard K. Lester, “The Role of Firm Low-Carbon Electricity Resources in Deep Decarbonization of Power Generation,” *Joule*, September 06, 2018. Available at: https://doi.org/10.1016/j.joule.2018.08.006.

[4] Michael Terrell, “The Internet is 24x7. Carbon-free energy should be too.” *The Keyword*, October 10, 2018. Available at: https://www.blog.google/outreach-initiatives/sustainability/internet-24x7-carbon-free-energy-should-be-too/.

Ms. Lora W. Johnson, CMC, LMMC
Clerk of Council
Council of the City of New Orleans
Room 1E09, City Hall
1300 Perdido Street
New Orleans, LA 70112

CC:

Honorable Jason Rogers Williams
President and Councilmember-At-Large

Honorable Helena Moreno
Councilmember-At-Large

Honorable Joseph I. Giarrusso
Councilmember, District A

Honorable Jay H. Banks
Councilmember, District B

Honorable Kristin Gisleson Palmer
Councilmember, District C

Honorable Jared C. Brossett
Councilmember, District D

Honorable Cyndi Nguyen
Councilmember, District E

To the members of the New Orleans City Council:

We are writing to you as scientists, environmentalists, and advocates of clean energy to urge you to include nuclear energy in New Orleans's clean energy standard.

Your effort to secure clean electricity supply for your city is admirable and necessary, because clean electricity is the backbone of any real attempt to decarbonize our society while retaining a good quality of life for all citizens. And your willingness to consider the inclusion of clean, reliable nuclear energy is an act of leadership.

Wherever clean electricity policy excludes nuclear power, nuclear plants are threatened with closure and in many cases are lost completely.

Nuclear is 17 percent of Louisiana's total electricity supply and 94 percent of its zero-emitting electricity.[1] But nuclear's importance to the city of New Orleans is more than twice that of the state as a whole, and the city receives power from several nuclear plants including Louisiana's River Bend and Waterford. The remainder is largely from fossil fuels, namely natural gas. The use of nuclear power helps Louisiana as a state achieve the lowest electricity prices in the United States, and helps to place New Orleans among the cheapest and cleanest cities for electricity in the country.

Excluding emission-free nuclear from any clean energy or renewable energy standard would be unfair and risk the premature retirement of nuclear plants and their replacement with fossil fuels. Nuclear plants around the country with very strong economic performance have been threatened with closure when excluded from RPSs, because utilities are forced to choose between investment in the specific power sources allowed in the RPS and upgrades and refurbishments of their nuclear plants that suddenly struggle to get enough customers for their reliable power.

Last year, just two of the nuclear plants that serve New Orleans, River Bend and Waterford, displaced the equivalent emissions of taking 1.5 million cars off the road.[2] Although just some of this power is going to New Orleans, New Orleans is a key customer whose use of power from these plants as well as from Grand Gulf in Mississippi will be vital to their long-term survival, and even expansion, as citizens demand more clean power.

Renewables are insufficient to deal with climate change. Carbon emissions from electricity production rose one percent last year in the U.S. despite a 24 percent increase in solar generation, an eight percent increase in wind generation, and a five percent decline in coal power generation.[3]

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[1] U.S. Energy Information Administration. 2019. Electricity data browser. https://www.eia.gov/electricity/data/browser/

[2] The U.S. EPA finds that the average light vehicle emits 4.7 tonnes of CO_2 per year. If the 17.3 terawatt-hours of nuclear generation from River Bend and Waterford were replaced by baseload natural gas generation at 407 grams of CO_2 per kilowatt-hour, this represents 1,503,000 cars by quantity of carbon that would be emitted.

[3] Change in electricity generation between 2017 and 2018 from: U.S. Energy Information Administration. 2019. Electricity data browser. https://www.eia.gov/electricity/data/browser/.

Natural gas is still overwhelmingly the replacement fuel when electricity from nuclear or coal plants decline. Over half of the increase in US electricity emissions last year would have been avoided had recent nuclear plant closings not taken place.[4]

However, should nuclear be included in your RPS, it would provide a justification to invest in power plant uprates that have been proven successful around the world in getting even more clean energy out of existing nuclear facilities. When nuclear plants are excluded from RPS mandates, not only are the facilities put at risk but future uprates are almost always shelved. At this moment, America's national labs are working with nuclear fuel manufacturers to design advanced fuel that will help increase uptime and make even more energy out of existing plants like River Bend, Grand Gulf, and Waterford. To take advantage of these innovations, any nuclear plants serving New Orleans need to be included in climate planning.

Just as the impacts of climate change will fall most heavily on our young people and their children, they will need us to pass down these nuclear plants still operating and in good condition. With proper investment and inclusion in climate planning, plants like River Bend, Grand Gulf, and Waterford can run for 60 or 80 years and perhaps longer.

We urge you to include nuclear in the proposed Renewable Portfolio Standard. As members of the city council you all play a vital role in deciding the future of clean energy that powers your city. Nuclear's current and future carbon-emission-free energy is critical in the fight against climate change.

Sincerely,

Dr. James Hansen, Climate Scientist, Earth Institute, Columbia University

Michael Shellenberger, Time Magazine "Hero of the Environment," President of Environmental Progress

Steven Pinker, Harvard University, author of *Better Angels of Our Nature*

Mark Lynas, Author, The God Species, Six Degrees

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[4] Change in electricity sector emissions estimated using standard emission factors for coal, natural gas, petroleum products, and biomass combustion. Nuclear plants lost since 2013 include Vermont Yankee, San Onofre, Crystal River, Kewaunee, Fort Calhoun, and Oyster River, representing 39.2 terawatt-hours of electricity, if plants operated with a capacity factor of 85%, that could have displaced coal generation emitting 37 million metric tonnes (MMT), or 54 percent of the estimated 68 MMT emissions increase between 2017 and 2018.

Robert Stone, filmmaker, "Pandora's Promise"

Jeff Terry, Professor of Physics, Illinois Institute of Technology

Alan Medsker, Coordinator, Environmental Progress - Illinois

Richard Rhodes, Pulitzer Prize recipient, author of *Nuclear Renewal* and *The Making of the Atomic Bomb*

Joe Lassiter, Professor, Harvard Business School

Andrew Klein, President, American Nuclear Society

Martin Lewis, Department of History, Stanford University

Michelle Marvier, Santa Clara University

Barrett Walker, Alex C. Walker Foundation

Edison Electric
INSTITUTE

Power by Association

May 28, 2019

Ms. Lora W. Johnson, CMC, LMMC
Clerk of Council
Council of the City of New Orleans
Room 1E09, City Hall
1300 Perdido Street
New Orleans, LA 70112

Dear Ms. Johnson:

The Edison Electric Institute (EEI) appreciates the opportunity to provide a national viewpoint regarding Docket. No. UD-19-01, *In Re: Resolution and Order Establishing a Docket and Opening a Rulemaking to Establish Renewable Portfolio Standards* (RPS Proposal or Proposal).

EEI is the association that represents all U.S. investor-owned electric companies. Our members provide electricity for more than 220 million Americans, and operate in all 50 states and the District of Columbia. As a whole, the electric power industry supports more than 7 million jobs in communities across the United States. In New Orleans, EEI member Entergy's subsidiary Entergy New Orleans provides electric service for the city.

EEI submits this letter to provide the Council information about the efforts being made nationwide by electric companies to lead a clean energy transition that benefits our customers, the economy, and the environment, while keeping electricity affordable and reliable. This profound, long-term transformation in how electricity is generated, delivered, and used is being driven by a wide range of factors, including: declining costs for natural gas and renewable energy resources, technological improvements, changing customer expectations, various federal and state regulations and policies, and the growth of distributed energy resources. EEI's member companies support policies at the federal, state, and local levels that provide regulatory certainty for the investments needed to provide reliable, affordable, secure, and clean energy to all customers.

Each year, EEI's member companies invest more than $100 billion to make the energy grid stronger, smarter, cleaner, more dynamic, and more secure. Electric companies also are investing in energy efficiency and demand response programs and are providing customers the energy solutions they want, while partnering with leading technology companies and start-ups to find innovative customer solutions. Our industry also supports increased research and development funding and support for the range of technologies needed to achieve clean energy goals, including energy efficiency, energy storage, renewables, existing and next-generation nuclear, other carbon-free technologies, and carbon capture utilization and storage.

The mix of resources used to generate electricity in the United States has changed dramatically over the last decade and is increasingly clean. Natural gas surpassed coal as the main source of electricity generation in the U.S. for the third year in a row in 2018, with natural gas-based generation powering 34 percent of the country's electricity, compared to coal-based generation at 28 percent.[1] Since 2005, coal generation has dropped almost in half. Today, more than one-third of U.S. electricity comes from carbon-free energy sources, including nuclear energy, hydropower, and other renewables.[2] Nuclear energy remains the largest source of carbon-free electricity: currently, 98 reactors in 30 states produce nearly 20 percent of our nation's electricity and more than 50 percent of our carbon-free electricity. Furthermore, since 2014, more than half of the industry's investments in new electricity generation have been in wind and solar energy resources. And the use of renewable energy to generate electricity is projected to almost quadruple by 2040.[3]

As electric companies continue to transition their generating fleets, their emissions are dropping significantly. According to the U.S. Department of Energy's Energy Information Administration (EIA), as of the end of 2018, power sector carbon dioxide (CO_2) emissions were 27 percent below 2005 levels, nearly the lowest level in 30 years.[4] Investor-owned electric companies alone have reduced their CO_2 emissions approximately 37 percent below 2005 levels as of the end of 2018.[5]

Today, the transportation sector is the leading domestic source of CO_2 emissions and has been since 2016. That trend continued in 2017, with the transportation sector emitting 37 percent of U.S. CO_2 emissions, while the power sector emitted 34 percent.[6] The impressive reduction trends in the electric power sector are expected to continue, as nearly three dozen EEI member companies, including Entergy, have announced long-term CO_2 reduction goals.[7]

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[1] *See* Department of Energy, Energy Information Administration (EIA), *Monthly Energy Review, April 2019,* Table 7.2b, (https://www.eia.gov/totalenergy/data/browser/xls.php?tbl=T07.02B&freq=m).

[2] *See id.*

[3] *See* EIA, *Today in Energy, Nearly half of utility-scale capacity installed in 2017 came from renewables* (Jan. 10, 2018), https://www.eia.gov/todayinenergy/detail.php?id=34472.

[4] *See* EIA, *Monthly Energy Review* (Feb. 2019), at Table 12.6, https://www.eia.gov/totalenergy/data/monthly/pdf/mer.pdf.

[5] Based on an EEI analysis of CO_2 emissions data from ABB Velocity Suite.

[6] *See* EIA, n.11, *supra*, at Tables 12.1, 12.5, and 12.6.

[7] *See* Appendix A.

As the Council notes in its Resolution and Order, one of the drivers for this proceeding is that "the Council has repeatedly expressed support for the efficient use of clean sustainable technology to improve the quality of life for our citizens and businesses." *See* Proposal at 1. The most effective way for the Council to achieve this goal is to reduce the amount of greenhouse gases that are produced from generating electricity. Carbon-free generation from renewables is an important tool to help attain this goal, as is the carbon-free generation from nuclear energy. It will take a variety of carbon-free generating resources to help the Council achieve its goal, and the Council should allow all types of carbon-free resources to participate in its program.

The Council also should recognize the role that a balanced and diverse energy mix that includes nuclear, hydropower, demand side management, and other forms of clean energy can play in helping the industry achieve these significant reductions. Allowing electric companies to utilize a broad mix of energy resources—as opposed to being limited to only a few options—helps keep electricity prices low, maintains grid stability, and allows for companies to meet clean energy goals to the benefit of all customers.

Broadly defining what technologies can meet a clean or renewable energy standard can help facilitate the Council's objectives: as noted above, nuclear energy plays a key role in the ongoing transition of the power sector. Nuclear energy provides carbon-free 24/7 energy that is vital to maintaining system stability. Keeping our existing nuclear fleet online and viable is critical for providing cost-effective, reliable, and carbon-free energy to help our companies, their states, and local communities meet their clean energy goals.

As the Council moves forward with its proceeding, we hope this information on the nationwide efforts of the electric sector to deliver clean energy to our communities is helpful. Further, as the Council considers the comments from stakeholders in the rulemaking process, it should strongly consider the role that Entergy New Orleans' existing nuclear capacity can play in helping to deliver on the Council's clean energy goals. Any decision in this proceeding should value all forms of carbon-free generation equitably, regardless of their source.

Should you have any questions, please contact Adam Benshoff (abenshoff@eei.org, 202-508-5019), Eric Holdsworth (eholdsworth@eei.org, 202-508-5103), or Alex Bond (abond@eei.org, 202-508-5523).

Sincerely,

Thomas R. Kuhn
President

cc: Ms. Erin Spears, Chief Council Utility Regulatory Office

High Level Overview of Renewable Technologies

1. Anaerobic Digestion

- **Advantages**
  - Reduces methane and other emissions from agricultural operations and waste streams
  - Mature technology with well-known construction and O&M costs
  - Suitable for a baseload generation supply role

- **Disadvantages**
  - High construction and O&M costs
  - Very small-scale projects (typically < 1 MW)
  - Waste stream may require pre-treatment
  - Pollution abatement technology requirements and related costs
  - More suitable in rural areas with sufficiently large agricultural operations

- **Relative Feasibility for ENO**
  - Technically feasible, but challenging from a cost-effectiveness standpoint; negligible value with respect to producing clean energy given scale

2. Biomass

- **Advantages**
  - Abundant fuel supply depending on location
  - Suitable for a baseload generation supply role

- **Disadvantages**
  - High upfront construction costs and O&M costs
  - Fuel supply transportation (by truck) often tied to volatile diesel prices
  - Questions have arisen regarding carbon neutrality/reduction benefits

- **Relative Feasibility for ENO**
  - Technically feasible in Louisiana, but not cost-effective; many biomass projects in the Southeastern U.S. have been shuttered due to lack of cost-effectiveness

3. **Combined Heat & Power ("CHP" or "Cogeneration")**

- **Advantages**
  - May be more efficient overall and cost-effective for the facility than using fossil fuel (or waste gas) to produce electricity, steam, and hot/chilled water for commercial & industrial applications
  - Relatively scalable suite of CHP technologies available
  - Suitable for a baseload generation supply role

- **Disadvantages**
  - If using fossil fuels such as natural gas, defeats the purpose of fostering clean energy investments
  - High construction and O&M costs, particularly for smaller-scale projects
  - Economics must factor in back-up power/steam supply and related costs
  - May require facility owner/operator to retain additional personnel and skillsets to operate and maintain equipment
  - Depending on fuel source, pollution abatement technology requirements and related costs

- **Relative Feasibility for ENO**
  - ENO opposes inclusion unless fueled by renewable fuel source

4. **Fuel Cells Using Non-Renewable Fuels**

- **Advantages**
  - Quiet; less harmful byproducts of fuel combustion
  - Scalable for very small commercial applications (100 kW and up range)
  - Suitable for a baseload generation supply role

- **Disadvantages**
  - If using fossil fuels such as natural gas, defeats the purpose of fostering clean energy investments
  - Very high construction and O&M costs
  - Technology is not yet mature; existing manufacturers continue to lose money

- **Relative Feasibility for ENO**
  - ENO opposes inclusion unless fueled by renewable fuel source; if located behind a customer's electric meter, raises several potential concerns about unintended and unforeseen consequences that need to be thoroughly considered

5. Fuel Cells Using Renewable Fuels

- **Advantages**
  - See above

- **Disadvantages**
  - Very high construction and O&M costs
  - Technology is not yet mature; existing manufacturers continue to lose money
  - If not serving new electric load, potential shift of fixed infrastructure costs to other utility customers

- **Relative Feasibility for ENO**
  - Technically feasible, but very challenging from a cost-effectiveness standpoint; negligible value with respect to producing clean energy given scale

6. Geothermal Electric

- **Advantages**
  - Utilizes a natural source of heat
  - Minimal above-ground infrastructure footprint
  - Suitable for a baseload generation supply role
  - Mature technology with known construction and O&M costs

- **Disadvantages**
  - Requires suitable geography; virtually all geothermal electric generation facilities are located in a few Western U.S. states (CA, NV, etc.)
  - Smaller scale

- **Relative Feasibility for ENO**
  - While technically feasible, not suitable or cost-effective for Louisiana given geography requirements

7. Geothermal Heat Pumps

- **Advantages**
  - May be combined with other technologies like solar PV

- **Disadvantages**
  - No production of electricity
  - Very small scale (typically residential); not grid-connected
  - More costly than traditional residential- and commercial-scale heating, ventilation, and air conditioning ("HVAC") systems
  - Installation is highlight disruptive to the landscape and may not be feasible in areas with a higher water table such as Louisiana

- **Relative Feasibility for ENO**
  - Negligible value with respect to producing clean energy given scale

8. Hydroelectric

- **Advantages**
  - Well-established technology
  - Suitable for load-following role depending on location and certain factors

- **Disadvantages**
  - Requires suitable geography although low-head hydro projects do exist including further up the Mississippi River
  - Very lengthy permitting process involving FERC and other local, state, and federal agencies
  - High upfront construction costs

- **Relative Feasibility for ENO**
  - Existing legacy owned and purchased hydro resources should count, but no meaningful opportunity to increase supply within ENO's footprint

9. Landfill Gas

- **Advantages**
  - Reduces methane generation from landfills (after closure)
  - Mature technology with well-known construction and O&M costs
  - Suitable for a baseload generation supply role

- **Disadvantages**
  - High construction and O&M costs
  - Small scale projects (typically < 10 MW)
  - Requires access to a suitable, closed landfill
  - Pollution abatement technology requirements and related costs
  - Potential opposition depending on proximity to nearby residents and businesses

- **Relative Feasibility for ENO**
  - Technically feasible, but challenging from a cost-effectiveness standpoint; stakeholder opposition may occur due to environmental concerns

10. Municipal Solid Waste

- **Advantages**
  - Decreases volume of solid waste destined for landfills
  - Reduces methane generation from landfills (after closure)
  - Suitable for a baseload generation supply role

- **Disadvantages**
  - High construction and O&M costs
  - Pollution abatement technology requirements and related costs
  - Competition with existing landfills
  - Public opposition to waste-to-energy technologies like incineration because of concerns regarding noise, traffic congestion, pollution, and local air quality

- **Relative Feasibility for ENO**
  - Technically feasible, but challenging from a cost-effectiveness standpoint; strong stakeholder opposition should be expected due to environmental concerns

11. Off-shore Wind

- **Advantages**
  - Higher capacity factors than onshore wind; average wind speeds are higher and direction can be more consistent
  - Less visual impact depending on distance to shore
  - Fewer physical restrictions than on-shore wind

- **Disadvantages**
  - Very expensive to construct and operate given harsh marine environment
  - Cost of marine transmission is much greater than onshore cost
  - Wear-and-tear from wind, waves, and saltwater; high O&M costs
  - Hurricane risk; unclear if insurance would be available/reasonable cost
  - Potential conflicts with maritime shipping and related matters like commercial and recreational fishing
  - Negative impacts on wildlife, particularly migratory birds and bats

- **Relative Feasibility for ENO**
  - Not realistic or remotely cost-effective in Louisiana given current technology, installed costs, and O&M costs

12. On-shore Wind

- **Advantages**
  - Mature technology with well-known costs and operational performance
  - Can be cost-effective with availability of federal Production Tax Credit ("PTC"), which is phasing out

- **Disadvantages**
  - Requires suitable rural geography with higher average wind speeds
  - Intermittent – only generates when wind is blowing at sufficient strength
  - Concerns related to visual and noise pollution
  - Negative impacts on wildlife, particularly migratory birds and bats

- **Relative Feasibility for ENO**
  - Not realistic, nor cost-effective in Louisiana given current technology and costs
  - Transmission from windier areas (TX, OK, KS, etc.) is a possible option, but very challenging to manage transmission congestion and related costs/risks

13. <u>Solar Photovoltaics ("PV")</u>

- **Advantages**
  - Most scalable renewable generation technology available; suitable for rooftops to large, utility-scale solar PV farms
  - Low operation & maintenance ("O&M") costs; typically requires only periodic inspection, preventative maintenance, and cleaning
  - Availability of federal Investment Tax Credit ("ITC") reduces costs

- **Disadvantages**
  - High initial cost for purchasing solar PV system
  - Weather-dependent / intermittent
  - Requires significant suitable space (typically 5 to 10 acres per MW_{DC}), which leads to difficulties siting larger-scale projects in densely-populated urban/suburban areas such as the City of New Orleans

- **Relative Feasibility for ENO**
  - Most realistic and cost-effective renewable resource for ENO's footprint as well as the wider region

14. <u>Solar Space Heating</u>

- **Advantages**
  - May be combined with other technologies like solar PV
  - Minimal O&M costs

- **Disadvantages**
  - No production of electricity
  - Very small scale (typically residential); not grid-connected
  - Supplement other forms of space heating (electric/natural gas-fired)

- **Relative Feasibility for ENO**
  - Negligible value with respect to producing clean energy given scale

15. Solar Thermal Electric

- **Advantages**
  - Depending on design, it is possible to achieve higher capacity factors than normal solar PV systems

- **Disadvantages**
  - High installation costs and O&M costs
  - May require fossil fuel for start-up (depending on design)
  - Negative impacts on wildlife, particularly migratory birds

- **Relative Feasibility for ENO**
  - While technically feasible, not as cost-effective for Louisiana relative to solar PV

16. Solar Thermal Process Heat

- **Advantages**
  - May reduce emissions relative to using fossil fuel or waste gas for process heat

- **Disadvantages**
  - No production of electricity
  - High installation costs
  - Not suitable for higher pressure applications
  - Intermittency requires fossil fuel for back-up supply

- **Relative Feasibility for ENO**
  - Negligible value with respect to producing clean energy given scale

17. Solar Water Heating

- **Advantages**
  - May be cost-effective relative to electric/natural gas-fired water heating
  - Minimal O&M costs

- **Disadvantages**
  - No production of electricity
  - Very small scale (typically residential); not grid-connected
  - May require electric/natural gas-fired water heating for back-up supply

- **Relative Feasibility for ENO**
  - Negligible value with respect to producing clean energy given scale