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Grace Strom Power
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State of New Jersey
Board of Public Utilities
44 South Clinton Avenue
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Dear Ms. Power:

On behalf of the New Jersey Business & Industry Association, the nation's largest state business association representing over one million jobs, please accept our comments on the 2019 draft Energy Master Plan.

NJBIA is supportive of the goals of the EMP to meet the 80% carbon reduction mandates of the Global Warming Response Act. We are supportive of Governor Murphy's goal of 100% clean energy by 2050, defined as 100% carbon neutral or net zero carbon emissions. However, we believe there are two paths that can be taken in the final EMP and ultimately in its implementation.

One is prohibitively costly, will put our energy supplies at risk, and is not reasonably achievable. The other is based on considerations of cost, availability of resources, and realism. This pragmatic approach does not overemphasize intermittent sources of renewable energy, such as wind and solar. It allows for low carbon sources of power. And it is flexible and adaptable.

We want to ensure that the final EMP adopts the right path.

NJBIA recognizes that defining clean energy as being carbon neutral or net zero emissions is critical to the EMP's success. This definition can allow for the flexibility necessary to ensure that the economy is not disrupted and that cost and reliability issues are addressed. We should not be persuaded by advocates who are ideological, unrealistic, and who do not care at all of the potential consequences of their proposals. It is the BPU and this Administration who have the responsibility to separate the real from the fantasy and to promote an energy system that works for all New Jerseyans.

We believe the EMP should consider the successful pursuit of a clean energy economy to mean one that achieves deep decarbonization of our energy sector in a manner that results in affordable, reliable, and abundant energy supplies. Our goals must be reasonable and achievable. They need to be implemented with the support of the public and business sector, not ones that are implemented despite their objections. If the final EMP does not contain policies which are supported by the public and business community, it will fail, and so will the efforts to address our carbon reduction efforts in a meaningful way.

Energy, in all its various forms and uses, constitute the fundamental building block on the modern economy. Having reliable, abundant, and affordable energy to run our factories, heat and cool our homes, and power our transportation sector has transformed our economy from an animal-powered agrarian economy to the most advanced economic system known to man. It has provided us with the power to create millions of jobs, elevate people out of poverty, and provide a standard of living never before accomplished in human history. It allows for our tax revenues that support the services needed by our residents. We take our energy system for granted because we merely flip on a switch and the lights turn on, we turn the ignition and our cars are powered up, and we turn on the furnace and our homes and offices are heated.

If the draft 2019 Energy Master Plan takes the wrong path, it will be ignoring many of the foundational principals that have resulted in the modern energy supply system and will be basing its direction on numerous policies that are more aspirational than based on facts and experience. That wrong path includes calls to convert our energy supply system to 100% renewable energy supplied by wind and solar.

If the adopted EMP goes in that direction, there will likely be a massive disruption of our energy economy with wide ranging and possibly unknown economic and social impacts. Such a path is unprecedented and not feasible. It would jeopardize our economy and the comfort and very lives of the citizens of New Jersey. A 100% renewable energy path should be rejected outright.

NJBIA believes in the underlying goals of the draft EMP. We recognize the potential risks of climate change and the need to change our use of carbon based fuels to address those risks. We applaud this Administration for tackling these challenging issues and seeking a modern energy future. However, we also recognize the tenets of our energy system - the provision of affordable, abundant, and reliable energy that is always available when needed - are not adequately addressed or considered in the draft EMP, if they are considered at all. Cost and reliability must be the cornerstones of an energy master plan and then we can build from there. This draft EMP fails this essential foundational tenet and must be corrected in the final version.

These comments will address the key issues of cost and reliability and will make specific recommendations on how to transform the electricity sector. We will also address the key issues of building and vehicle electrification as well as distributed energy resources and the future of the energy sector. First, however, we want to address a couple of procedural issues.

EMP and the IEP Process – The draft 2019 Energy Master Plan was formerly released this past June 10 after the establishment of an internal working group and several public hearings held in September and October 2018. On June 14, 2019, the BPU held an invitation-only stakeholder workshop on the Integrated Energy Plan (IEP). The IEP was intended to gather input and to model scenarios to identify the “least cost” means to achieve the EMP’s goals of meeting the carbon reduction goals of the Global Warming Response Act and Governor Murphy’s stated policy of 100% clean energy by 2050. The IEP will be basing its recommendations on modeling various policy options. The IEP’s recommendations may heavily influence the outcome of the final EMP.

The next workshop of the IEP will be on October 16, 2019, one month after the public comment period closes on the EMP. Thus, commenters on the EMP will not have the advantage of knowing what the IEP is recommending as to “least cost” options for the EMP. It will not have the benefit of knowing what impacts there will be to ratepayers, assuming this information is even developed in the IEP process. The public cannot adequately comment on the EMP without the benefit of knowing the outcome of the IEP. We respectfully request that the EMP comment period be extended until a sufficient time after the IEP data is developed and made public.

Without this information, you are asking the public to make comments without the benefit of knowing all the relevant facts. That is unacceptable. We fully recognized that a delay in the end of the EMP comment period may delay the adoption of a final EMP. The EMP has a 30-year horizon by which it seeks to meet its goals. It is seeking the transformation of the provision of electricity, the transportation sector, and the building sector. It will have profound impacts on the State’s economy and its residents. It should not be rushed and should not be adopted until all facts are made known, all scenarios carefully explored, and all comments fully considered.

We would also recommend that the EMP not be adopted in December 2019, as it is currently scheduled. The issues are complex and this short timeframe for adoption is only three months after the comment period will have closed and two months after the last IEP public meeting. , Respectfully, we do not see how the BPU and other staff can adequately read and discern all the comments provided, incorporate the IEP findings, make informed decisions, and produce a worthwhile document. If the Administrative Procedure Act process were applicable, the BPU would be given a full year from proposal to adopt the final EMP. There is a reason why the law allows for that longer time period, it is needed. The EMP seeks to revolutionize the way energy is produced and consumed in New Jersey. BPU should take the appropriate time to get it right. If the intent of the Administration is to have a plan that they intend to implement, then content, not timing, should drive its adoption date.

Key Policies of the EMP – The goals of the Energy Master Plan should be to seek deep decarbonization while ensuring energy remains affordable, abundant, and reliable. In order to do this, the EMP must:

1. Address cost, and especially ratepayer impacts across all sectors. “Least cost” options do not mean they are affordable options.
2. Address reliability of the energy grid and supply needs, as well as the feasibility of any proposals. While it is fine to be aspirational, we should differentiate between what we would like to do and what is feasible to be done.
3. Allow for low-carbon options, including offsets and mitigation. Providing for the continued use of clean natural gas as both a firm source of electric generation and as an optional heating and cooking source for our buildings will help ensure the goals of the EMP can be achieved successfully and will be supported by the public. Energy efficiency should be enhanced beyond existing targets.
4. Provide for flexibility and the ability to change course. The EMP is required to be updated every three years. We should use that opportunity to look at the state of technology and

energy policies and make adjustments. We should not lock ourselves into policies that are both economically destructive and unfeasible.

5. Address nuclear power. While the draft EMP assumes our three current nuclear power plants will be in operation in 2050, the fact of the matter is that all three plants will have their licenses expire well before that date. They will also all be over 70 years old at that point. Will new plants be built? Are the current plants economically viable? It is irresponsible to adopt an EMP that does not discuss these issues and ignores an energy source that produces over 30% of our electricity and over 90% of our carbon free energy.

The draft EMP lays out a basic structure to achieve its carbon reduction goals. It has three pillars. It seeks to have electricity produced from 100% clean energy sources. It then seeks to eliminate carbon emissions from the transportation and building sectors by electrifying all vehicles and buildings. While we believe we can meet our zero net carbon or carbon neutral goals of electricity production, we also recognize there are significant challenges in attempting to electrify buildings. The transportation sector may be easier to move toward electrification, but should allow for low carbon options, especially for our trucking fleet. We will address all three pillars below.

100% Clean Energy: There are many ways to meet the 100% clean energy goals sought by the EMP, as well as the carbon reduction goals of Global Warming Response Act. Some have argued for a rigid policy involving a moratorium on natural gas facilities and hook-ups, a ban on all carbon fuels, and an electrical grid based solely on wind and solar resources. That strategy would fail because it is neither affordable nor feasible. It should be rejected.

A more realistic approach would be to allow firm generation from both nuclear and natural gas resources. It should be flexible to allow for consideration of various technologies, some currently available, some not, such as carbon capture, low carbon fuels, next generation nuclear, mitigation, offsets, energy efficiency, and new technologies or strategies perhaps not yet foreseen.

Why We Should Not Require 100% Renewable Energy – Various commenters and advocates at the draft EMP stakeholder meetings have been calling for 100% renewable energy (RE100) sources as the means to achieve the clean energy goals of the EMP. The draft EMP does not preclude this policy option. It should. No large, complex electrical supply system in the world currently relies on greater than 30% of its power from intermittent sources of wind and solar. There is a good reason for that. Intermittent power is unreliable and at levels above 25% becomes problematic from a reliability perspective and costly as a power source.

New Jersey currently only obtains 5% of its energy from renewables. Solar power provides most of this energy as wind energy is largely still in development. Thus, 95% of the energy produced in New Jersey is from non-renewal sources with over 50% coming from natural gas. That means to achieve RE100 95% of our electric generation would have to shift from nuclear and natural gas to wind and solar over the next 30 years.

Assuming this was even physically possible, the cost would be untenable. Using data developed by the Consumer Energy Alliance, the cost of RE100 in New Jersey would be about \$115 billion (similar numbers are derived from national data and assumptions developed by Wood Mackenzie when extrapolated to New Jersey). This amounts to \$12,900 per person, or \$40,000 per state

household. Cost, however, may be the least of the problems with achieving RE100 or anything remotely close. Evidence has shown that attaining a 25% market penetration for intermittent sources can be done relatively easy, “[b]eyond that point, operational and cost complexities progressively multiply in large part due to the intermittent nature of renewables.” (Deep decarbonisation requires deep pockets, Wood MacKenzie, June 2019)

The largest problem for RE100 is the intermittent nature of wind and solar itself. While this issue is generally understood, when applied to a large, complex power system, there is a need to ensure generation and demand alignment on a second-by-second basis. Experience in other systems with over 20% penetration of wind and solar has shown hourly power generations of between zero and 101%.

No large, complex energy system in the world has more than 30% of its electricity supplied from wind and solar – and there’s a reason for that. The problems with these intermittent sources are becoming obvious around the world, as countries such as Germany and states such as California increase their reliance on intermittent sources of energy.

Recently, the consulting firm McKinsey & Company, studied the German efforts to rely more on solar and wind energy and found that these efforts posed a significant threat to the nation’s economy and energy supplies. (McKinsey & Company, “Transformation of Europe’s power system until 2050”) For three days this past June, the German electricity grid came close to blackouts and significant blackouts are expected to occur in the next few years. Worse, despite electricity prices of over 45% above the European average, Germany has not come close to realizing its carbon reduction goals, has been importing more of its energy, and has begun increased coal production. The German path of unintended consequences should not be our path.

These power variances, in the absence of battery storage (which currently do not exist, is cost prohibitive and technologically impossible to meet demands beyond a few hours) result in overbuilding systems by 100% or more. This creates a hugely underutilized system when power is not being generated or not needed, and creates excess generation when in operation.

Oversupply is a significant issue for a large, complex power system. Even at lower levels of penetration, these systems can experience oversupply resulting in curtailment if storage or transmission to another source is not available. At levels approaching 50% there will be market structure, regulation and policy issues that will need to be remedied to avoid cost impacts.

At higher levels of penetration, challenges associated with intermittent power sources increase nonlinearly. These challenges can be better managed at levels significantly less than RE100. Transmission costs are one of these challenges. Even at RE50, there may be a need to increase long-distance, high-voltage transmission lines from 56% to 105%. Depending on the location of the energy sources, these numbers could increase. (Jenkins et al., “Getting to Zero Carbon Emissions in the Electric Power Sector,” Joule 2018) Siting and NIMBY considerations should not be ignored and may represent significant obstacles to building this infrastructure.

The increased costs associated with higher levels of intermittent sources of renewable power will not be offset by the increasingly lower costs of producing energy from these sources. Any decreases in total power generation costs from wind and solar, the levelized cost of energy

(LCOE), are significantly outweighed by the enhanced costs associated with incorporating intermittent renewable sources into the energy mix.

These costs include not only the cost of building and operating the generation facilities, but also capacity payments, transmission and distribution upgrades, redundant supply, backup power, as well as other costs. In fact, there appears to be an inverse relationship between a decrease in the LCOE of wind and solar and an increase in cost to the ratepayer. (Wood MacKenzie)

As mentioned previously, batteries are not currently an option for the problem of intermittent renewable energy supplies. Current technologies can maintain energy for only a few hours at most and even at that the prices would be exorbitant for the amount of energy needed to be stored. As a practical matter, storage would need to last for days, if not two weeks or more, in order to avoid disruption.

It is also very unlikely for current battery technology, based on lithium, to advance enough to solve this problem. Costs will come down and storage capacity will likely increase, but not to the breakthrough extents needed to make reliance on battery technology warranted. (Mills, “The ‘New Energy Economy’: an Exercise in Magical Thinking”)

A Strategy with the Greatest Chance of Success: For all the reasons described above, the EMP should reject a requirement for all electricity to be produced from intermittent renewable energy sources. Rather, NJBIA believes that our carbon reduction goals can more likely be met, at affordable prices and in a reliable and feasible manner, if we limit intermittent renewable energy sources to a more manageable number, perhaps RE50, and provide the rest of the electric generation through firm sources such as nuclear power and natural gas. The best strategy is one that keeps all options on the table and is flexible enough to move in the right direction as technologies evolve or do not and as new facts and considerations are made known.

We need to allow for low carbon alternatives to reduce our carbon output, as well as techniques such as carbon capture, mitigation, offsets, next generation nuclear, energy efficiency, and evolving and yet unknown technologies. We must not make policy decisions today, such as gas infrastructure or hook-up bans that lock us into a defined path. The best path goes in multiple directions. Rigid thinking will surely lead to poor decisions and ill-fated outcomes. Allowing for more options to solve our energy generation issues will result in a statistically greater chance of being successful in achieving our goals.

We should have both short-term, implementable action items and longer-term aspirational goals. As the EMP is updated every three years, changes to strategies should be made based on current circumstances.

Building Electrification: Twenty-nine percent of our greenhouse gases come from the building sector with approximately 14% from residential buildings, 10% from commercial, and 4% from industrial. While this sector needs to be addressed to meet our carbon reduction goals, the requirement that all buildings be electrified by 2050 ignores feasibility, cost, and public support. This is especially true to the extent the EMP is seeking retrofits of existing buildings to require the installation of electric heat pumps.

Over 75% of our buildings are heated by natural gas, with another 10% heated with oil or propane. Converting this building stock to electric heat pumps, as proposed by the draft EMP, would be a herculean effort and may not even be possible from a workforce and equipment perspective, even in a 30- year horizon.

There are other impediments to the use of electric heat pumps which we are sure other organizations with specific expertise will detail further. Some of the key issues are:

1. *Customer choice* – Customers choose to heat their homes and cook their food on natural gas. For many restaurants and other businesses, there is not an affordable or workable alternative. Prohibiting natural gas may create a backlash that will hamper public support for the larger efforts the EMP is seeking to attain. We note that even among those consumers who have already installed electric heat pumps, 95% have opted to maintain their gas systems for colder winter months and for cooking.
2. *Function* – Electric heat pumps do not work well in cold weather climates such as New Jersey. The air being blown is often cool and thus they do not provide the heat or comfort of carbon based boilers or furnaces.
3. *Cost* – NJBIA has observed studies that the cost to install an electric heat pump is \$3,000 greater than a similar gas-fueled device. We have heard from other groups that the costs are significantly higher. Operating costs are at least \$500 higher on an annual basis and can increase under the energy policies being promoted in the draft EMP.
4. *Vents* – Electric heat pumps only work with properly sized venting systems. In many existing buildings the vents are either too small or do not exist at all. Retrofitting an older home or building to install vents may be prohibitively costly or impossible.
5. *Wiring* – Many older residences have 100 amp or even lower service which cannot support an electrification policy. It can cost several thousand dollars per household to upgrade wiring.

Aside from these practical issues, electrification of the building sector will significantly increase the amount of electricity needed. Some estimates are that generation may need to increase by 100% or more. And unlike electrification of the transportation sector, discussed below, electrification of buildings cannot be ameliorated by load balancing. Because of the need to heat buildings throughout the day, New Jersey will become a winter peaking state. This will cause generation and transmission issues which will also increase costs to consumers.

A better option to mandatory building electrification is to encourage flexibility and support a technology neutral approach as well as the continued promotion of lower carbon options. As technology improves to enhance the efficiency and practicality of electrification systems, installation of these systems can be encouraged without banning any particular option. Dual system use may also be an option for consumers. Energy efficiency programs should also be advanced, perhaps beyond current mandates, to achieve carbon reduction goals. We welcome the opportunity to work with the Board on enhancing our energy efficiency efforts.

The bottom line on building electrification is to allow flexibility and not to lock citizens or businesses into a particular technology or fuel choice. Technology will evolve, efficiency efforts

can be enhanced, and consumers can be better educated. By some estimates, we can achieve 80% reduction in carbon emissions by focusing on emissions, not fuel choices. This applies to the building sector as well.

Transportation: Forty-two percent of the greenhouse gas emissions in New Jersey are attributable to the transportation sector. This includes cars and light duty trucks, as well as mid- and heavy-duty vehicles, off-road vehicles and the ports. Fortunately, efforts to electrify the transportation sector will likely have significant success, largely due to market forces and legal mandates. NJBIA is largely supportive of electrification of the transportation sector.

However, we do not support large subsidies of vehicle charging infrastructure paid for by electricity ratepayers. We do not support use of the Societal Benefit Charge to subsidize the purchase of vehicles. We do, however, support current efforts by the BPU and the Department of Environmental Protection to determine the need for a public subsidy of additional vehicle charging stations, the types of charging that is necessary, and reasonable methods to pay for it.

While electric vehicles may very well be the wave of the future, they are not the only alternative to gasoline and diesel powered internal combustion engines (ICE). The EMP should be supportive, and should not take any efforts to cut off other fuels such as hydrogen in fuel cell vehicles or low carbon fuels, such as compressed natural gas, especially in mid- or heavy-duty trucks and equipment.

It is very likely that significantly higher penetration of light duty EV sales will begin to occur in the next several years as current impediments disappear. Given the movement of technology, there may not be a need for significant government involvement to achieve the goals of significant electrification of this sector by 2050, at least in the light duty vehicle sector.

Electrification of the light duty vehicle sector may have the benefit of load balancing if we take appropriate efforts to incentivize charging at appropriate times of the day. This is referred to as managed charging. According to a report by ChargeVC (Gabel Associates, Inc., “Electric Vehicles in New Jersey – Costs and Benefits”), managed charging can have the economic benefits by shifting loads to off-peak times. Of course these cost savings will be offset by the need of electric utilities to upgrade their transformers and distribution system to accommodate large number of vehicle charging. These additional utility costs, which may run into the billions of dollars, may likely be placed into the rate base which is another reason why we should not place non-necessary expenditures onto the backs of ratepayers.

There are several factors that have prevented a higher penetration of electric vehicles in New Jersey. One is cost. There is currently an approximate \$5,000 cost differential between comparable electric and ICE vehicles. This cost has come down significantly over the last several years and price parity is expected by 2025. Some reports are indicating that price parity may be achieved in the next three years. Once this happens, more consumers, who already benefit from State sales tax benefits, and who will save on fueling costs, will gravitate toward EVs.

Manufacturers and dealers have also not been trying to price or sell electric vehicles beyond their minimal sales because the law has allowed for cars to be sold in California and credits to be gained

in New Jersey (“travel” provision). Because that law also allows manufacturers to obtain the necessary credits by selling cars in California, there was never a need to take action at the manufacturer or dealer level to actually sell cars in New Jersey. (We note that the law only mandates vehicles be delivered to dealers, not that they be sold to the public).

Manufacturers were also able to transfer credits among each other and could “pool” their credits by moving them from one state to another. Credits could also be banked. The “travel” provisions expired in 2017 and the “pooling” provisions will expire in 2021. It is estimated that most banked credits will be used up by 2021. This means that by 2022, most manufacturers will need to actually “sell” EVs at mandated levels to meet the law. So, while sales of EVs have been kept to a minimum because the law allowed for that, the legal landscape will have changed and EVs sales will automatically pick up. There is no additional State action needed.

Range anxiety is also an issue for many drivers. However, current EVs all have ranges of over 200 miles making range anxiety more of an awareness and educational issue than an actual one, at least for local drivers. It is estimated that 90% of all EVs will be charged at night or at work, not at a public charging station. This is actually essential for managed charging which can result in load balancing and lower electricity costs. Still, it is necessary for fast chargers to be available in strategic locations in sufficient quantity where they are available to the traveling public as needed.

The Department of Environmental Protection has provided grants under its “It Pay\$ to Plug In” program. The DEP is using Volkswagen settlement money to support this effort and we would encourage them to use RGGI money as well for this effort. There is no need for additional significant public subsidies of public or private charging stations. Doing so, especially if costs are being put into rate base, will lead to higher electricity costs for residents and businesses and will likely lead to an overbuilt and costly system. If utilities are needed to help build out a public charging system, they should do so using funds such as VW or RGGI, and not rate base revenues.

The private sector will likely meet much of the need for charging. It has done so in the past for ICE vehicles as the market grew. While grants and subsidies may be useful in the early stages as the penetration remains low, we do not need a major investment of public funds to fund this buildout.

As mentioned above, EVs should see significant penetration over the next decade. Fuel cells are also likely to grow as that technology develops. However, for mid- to heavy-duty vehicles, the technology may not be available for practical use. While this may change in the future, we should encourage less carbon intensive fuels to be used such as CNG. Use of low carbon fuels are an answer now to reduce carbon emissions from these vehicles.

NJBIA is also supportive of efforts to electrify or otherwise reduce the carbon output in our ports. RGGI and VW monies are appropriate sources of funding for these efforts. We also recognize that the Port of New Jersey and New York have a detailed plan to reduce carbon in all their facilities and we are supportive of their efforts.

Distributed Energy and Transmission Upgrades: The provisions in the draft EMP on distributed energy and transmission raises more questions than answers. They foresee a transformation of the

energy sector but do not explain how that will happen, how the system would operate, who would pay, how much will it cost, and how it would work in a regional electric grid system? While it is useful to envision a radically different energy future, there is a significant amount of research, technological changes, and stakeholdering that needs to be done before we can even decide if some of these changes are even a good idea. NJBIA has many more questions but we will reserve them for more in-depth conversations.

Conclusion: NJBIA is appreciative of the visionary aspects of the draft EMP, but we are concerned about the reality of ensuring affordable, abundant, and reliable energy. We are concerned that our economy continues to function, that businesses and their jobs remain in the State, and that residents can afford their electric bills. We recommend that the Administration use the 3-year update process of the EMP to implement short-term policies that are achievable and cost effective now, and re-visit more aspirational policies at the next EMP update as more information is gathered, conversations had, and facts become known.

As we seek a clean energy economy, and a reduction in carbon output, we must ensure that all our energy supplies for all our needs remain affordable, abundant, and reliable.