September 16, 2019 **Submitted electronically to: EMP.Comments@bpu.nj.gov**

New Jersey Energy Master Plan Committee
New Jersey Board of Public Utilities

Re: "2019 Draft Energy Master Plan"

Delaware Riverkeeper Network submits these additional comments on the New Jersey Draft Energy Master Plan (EMP) on behalf of our 20,000 members. We also submitted verbal testimony at the first EMP stakeholder meeting on July 17, submitted a written comment requesting that the public comment period be extended, and co-submitted comments as a member of the coordinating committee for EMPOWER NJ. We bring to your attention that we have received notices from members who are using our action alert to submit comments on the EMP that they are having difficulty using the email address on BPU's website that is being used for submission (EMP.Comments@bpu.nj.gov). Apparently, it does not seem to be working when it is cut and pasted as an email address but when clicked on it does work. Some people cannot click a hyperlink due to their email system set-up and must cut and paste. More than one commenter has given up trying to submit her comment. In addition, there is no receipt of acknowledgment from BPU to show that the comments were received, leaving the commenter wondering if they were successfully submitted.

General Comments:

Delaware Riverkeeper Network considers the draft plan to be inadequate to meet the stated goals of Governor Phil Murphy's Administration (100% clean energy sources on or before January 1, 2050. See Executive Order No. 28). We also consider the goals that are presented by the Administration, as expressed in EO 28, and the draft Energy Master Plan to be vastly underachieving towards an effective reduction of greenhouse gases and air pollution and making meaningful progress in combatting global climate change. Our conclusion is based on the scientific evidence that has emerged, some of it after the May 23. 2018 issuance of the Governor's Executive Order.

The facts presented in the most up to date climate change reports set the tipping points for consequential climate change events to occur much sooner than originally forecasted, and the effects of already-occurring climate impacts are more severe than predicted.[1] This, according to recent analyses, is especially true for

[1] USGCRP, 2018: *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II: Report-in-Brief* [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, 186 pp. Retrieved from https://nca2018.globalchange.gov/; and the *Intergovernmental Panel on Climate Change, Summary for Policymakers,*

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New Jersey.[2] Nations have agreed to implement plans to prevent the planet from warming beyond 2 degrees Celsius and, most recently 1.5C. This is necessary to avoid the critical environmental tipping points that will not be able to be undone.

This supports much more aggressive reduction of greenhouse gases in New Jersey than the Draft Energy Master Plan will achieve. Scientists estimate that at least 45% - 50% reduction of greenhouse gases must be achieved by 2030 in order to effectively limit atmospheric warming. "Emissions need to be halved by 2030 to limit warming to 1.5 degrees Celsius but temperatures are on track to reach double that by the end of the century even if countries' current plans are fully implemented, research by scientists shows."[3] The Intergovernmental Panel on Climate Change ("IPCC") report says limiting warming to 1.5C will require reducing greenhouse gases by 45% from 2010 levels by 2030 and that there can be no carbon emissions from energy production by about 2050.[4]

Furthermore, reduction of the emission of hazardous air pollutants, including black carbon, is essential. Hazardous air pollutants from the development and burning of fossil fuels are plaguing the state and the region, especially in locations that do not meet federal standards for air quality and in environmental justice communities that are bearing a disproportionately heavy burden of the pollution generated by dirty energy projects.

A reduction of 45% to 50% of greenhouse gases by 2030 is a meaningful goal to set as a milestone that can be measured and planned for. Without the necessary modeling results from the Integrated Energy Plan that state is conducting as part of the development of an Energy Master Plan, it is not possible to comment in detail on how New Jersey can achieve this. However, it is clear that the state cannot achieve this unless there is a full and immediate moratorium on all new fossil fuel projects in the state in order to stop the downward spiral of the runaway rise in greenhouse gases that is occurring. According to recent tracking greenhouse gas reports, "However, energy-related carbon dioxide emissions were at a record high last year and new renewable power capacity has stalled after years of strong growth. At the same time, methane, a more potent greenhouse gas than carbon dioxide, has risen in recent years due to oil and gas production, including fracking."[5]

Much more is needed because mitigation does not yet approach the scale considered necessary to avoid substantial damages to the economy, environment, and human health over the coming decades.[6] Rising air and water temperatures and changes in precipitation are intensifying droughts, increasing heavy downpours and flooding, reducing snowpack, and causing declines in surface water quality, with varying impacts across

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Revised on January 2019 by the IPCC, Switzerland, ISBN 978-92-9169-151-7, downloaded at: https://www.ipcc.ch/sr15/

[2] https://www.washingtonpost.com/graphics/2019/national/climate-environment/climate-change-america/; and https://njersy.co/329ijr8

[3] https://climateactiontracker.org/publications/warming-projections-global-update-dec-2018/

[4] *Intergovernmental Panel on Climate Change, Summary for Policymakers, Revised on January 2019 by the IPCC, Switzerland, ISBN 978-92-9169-151-7*, downloaded at: https://www.ipcc.ch/sr15/

[5] https://www.insurancejournal.com/news/international/2019/06/19/529839.htm

[6] USGCRP, 2018: *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II: Report-in-Brief* [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, 186 pp. Retrieved from https://nca2018.globalchange.gov/ at 14.

different regions of the country.[4] Changes in temperature and precipitation are increasing air quality and health risks from wildfire and ground-level ozone pollution. These impacts include an increase in heat-related deaths, allergic illnesses like asthma and hay fever, and vector-borne diseases such as Lyme disease from ticks.[7]

As climate changes continue, adverse impacts on culturally significant species and resources are expected to result in negative physical and mental health effects on indigenous people who live off the land.[5] Climate change has already had observable impacts on biodiversity, ecosystems, and the benefits they provide to society. These impacts include the migration of native species to new areas and the spread of invasive species, which will worsen and could affect the ecological balance in the long term.[8] Yields from major U.S. crops are expected to decline as a consequence of increases in temperatures and possibly changes in water availability (drought conditions), soil erosion, and disease and pest outbreaks.[6] Expected increases in the severity and frequency of heavy precipitation events will affect inland infrastructure in every region, including access to roads, the viability of bridges, and the safety of pipelines.

The Fourth National Climate Assessment looks at the Northeast region climate impacts. These are among expected changes in the near term:

- Less distinct seasons with milder winter and earlier spring conditions are already altering ecosystems and environments in ways that adversely impact tourism, farming, forestry, and other economies.[9]
- Warmer ocean temperatures, sea level rise, and ocean acidification threaten ocean habitats, ecosystem services, and livelihoods.[10]
- Major negative impacts on critical infrastructure, urban economies, and nationally significant historic sites are already occurring and will become more common with a changing climate.[10]
- Changing climate threatens the health and well-being of people in the Northeast through more extreme weather, warmer temperatures, degradation of air and water quality, and sea level rise.[10]

Significant reduction in greenhouse gases by 2030 would provide one milestone and many more are needed to achieve 100% clean AND renewable energy, fossil fuel-free, carbon-free, zero carbon, by 2050 at the latest. The Draft Energy Master Plan does not set this needed goal of 100% carbon-free by 2050 but instead sets a "carbon-neutral" goal. Carbon-neutral means no net release of carbon dioxide to the atmosphere through the use of offsets. It assumes that nuclear power is benign, for instance, ignoring the unacceptable environmental, ecological and economic costs of nuclear power generation.

The EU's Guidance Document on Biomass provides guidance about how to calculate emissions from biomass for the purposes of qualifying for carbon-neutral offsets.[11] The concept is that biomass releases carbon dioxide when burned which in turn is taken up by plants so the cycle is supposed to be self-absorbing or "neutral". However, biomass relies on mitigation measures that are not required to be analyzed to prove the purity but are assumed to contribute no carbon. In fact, biomass is not reliably carbon-free and

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[7] *Ibid*. at 15.
[8] *Ibid*. at 16.
[9] *Ibid*. at 116.
[10] *Ibid*. at 117.
[11] Guidance Document, Biomass issues in the EU ETS MRR Guidance Document No. 3, European Commission Directorate-General Climate Action, Updated Version of 27 November 2017. https://ec.europa.eu/clima/sites/clima/files/ets/monitoring/docs/gd3_biomass_issues_en.pdf

its consideration as beneficial does not consider the environmental costs of the materials being used. Scientists are warning, "Burning biomass for energy releases large amounts of carbon into the atmosphere all at once. But depending on the type of tree, forests may take decades or even a century to draw the same amount of carbon back out of the air."[12] Reknown biogeochemist William Schlesinger's commentary on a study published in Science magazine explains why biomass is not carbon neutral and is more than likely a net producer of carbon to the atmosphere.[13] It is a basic timing problem that cannot be remedied because of the urgent need for reducing greenhouse gas emissions now, during the most critical periods when tipping points will be reached. This is reinforced as an important timing issue in regard to New Jersey's planning in light of the Draft Energy Master Plan's 30-year planning horizon.

Included in the biomass list of those that do not need further analysis (there are dozens of others as well but these are only those that are "automatically" considered carbon-neutral[14]:

Group 1 — Plants and parts of plants:

- straw
- hay and grass
- leaves, wood, roots, stumps, bark
- crops, e.g. maize and triticale

Group 2 — Biomass wastes, products and by-products:

- industrial waste wood (waste wood from woodworking and wood-processing operations and waste wood from operations in the wood materials industry)
- used wood (used products made from wood) and products and by-products from wood-processing operations
- wood-based waste from the pulp and paper industries, e.g. black liquor (with only biomass carbon)
- crude tall oil, tall oil and pitch oil from the production of pulp
- forestry residues
- lignin from the processing of plants containing ligno-celluose
- animal, fish and food meal, fat, oil and tallow
- primary residues from food and beverage production
- manure
- agricultural plant residues
- sewage sludge
- biogas produced by digestion, fermentation or gasification of biomass
- harbour sludge and other waterbody sludges and sediments
- landfill gas
- charcoal
- natural rubber or latex

Basically, carbon neutrality will not limit greenhouse gas emissions and cannot be used as a way to achieve the reduction in greenhouse gas emissions that is critical to fighting climate change. It also carries its own unacceptable impacts of environmental degradation in addition to carbon emissions including but not limited to: water depletion; stormwater runoff, erosion and sedimentation; flooding; adverse impact on

[12] https://www.scientificamerican.com/article/congress-says-biomass-is-carbon-neutral-but-scientists-disagree/
[13] https://science.sciencemag.org/content/359/6382/1328?rss=1
[14] https://www.betalabservices.com/renewable-carbon/carbon-neutral-co2.html

groundwater and surface water quality; soil loss and soil mantle destruction; air pollution; stream, river and waterway degradation from a cascade of impacts related to land use changes; habitat loss and species destruction; forest fragmentation and ecosystem disruption and loss; wetlands destruction; transfer and spread of toxic and hazardous materials through air, water and other environmental media; and the perpetuation of resource depletion that is not sustainable and, in many cases, not renewable due to loss of natural systems that can never be duplicated or replaced a therefore are not truly mitigatable.

New Jersey must actually limit carbon and other greenhouse gases by putting a moratorium on all new fossil fuel projects in the state. A stop on new projects that rely on, burn, or engender or facilitate fossil fuel development is reliable, stops the downward spiral, and is real, not achieved on paper by accepting environmentally destructive sources of energy as carbon-neutral by a leap of faith that declares them by fiat.

Another major failing of the Draft Energy Master Plan is the misunderstanding of the potency of methane as a greenhouse gas. This has led to an inaccurate assessment of the impacts of natural gas projects. The estimate used by the U.S. Environmental Protection Agency (EPA) and some others, including the Draft Energy Master Plan, of methane's global warming potential is flawed. A major error is the consideration of methane's greenhouse gas warming effects on a 100-year time scale instead of a 20-year period. The full life cycle of natural gas development was also not considered, skewing the footprint of its development to look less harmful than it is. These mistakes allow New Jersey to remain in reliance on natural gas based on wrong assumptions of its effect on atmospheric warming. Natural gas will, in reality, continue to release greenhouse gas that will contribute to atmospheric warming, compounding climate change. This simply cannot be allowed and the mistake must be corrected.

The composition of natural gas is about 95% methane. Methane leaks or is vented or flared at all stages of the natural gas process (extraction/production, gathering, processing, transmission, storage, local distribution and consumption). Methane is 86 times more efficient than CO2 at trapping heat over a 20-year period and 34 times more efficient over a 100-year period.[15] To achieve accuracy in calculating the effect of methane on heating the atmosphere and subsequently feeding climate change, it is essential to consider the greenhouse gas impacts from methane from a full life cycle perspective.

Atmospheric methane levels rose steadily during the last few decades of the 20th century before leveling off for the first decade of the 21st century.[16] Since 2008, however, methane concentrations have again been rising rapidly. This increase, if it continues in coming decades, will significantly increase global warming and undercut efforts to reach the COP21 target of < 2 degrees C above the pre-industrial baseline by 2021.[17] Limiting warming to 1.5C will be even more difficult, if not impossible.

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[15] Myhre, G. et al. 2013. Anthropogenic and Natural Radiative Forcing. In: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Stocker, T.F., D. Quin, G.K. Plattner, M.Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex, and P.M. Midglet (eds). Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. and https://en.wikipedia.org/wiki/Global_warming_potential

[16] Howarth, R. (2019). Ideas and perspectives: is shale gas a major driver of recent increase in global atmospheric methane? *Biogeosciences* (16), 3033-3046. Retrieved from https://www.biogeosciences.net/16/3033/2019/bg-16-3033-2019.pdf

[17] Ibid.

30% to 60% of the global increase in atmospheric methane between 2010 and 2014 was due to emissions in the lower 48 U.S. states and 63% of the increase in gas production over the past decade has been from shale gas.[18] Natural gas systems emit more anthropogenic methane than any other source in the United States, and are the third highest source for carbon dioxide emissions nationally.[19] Natural gas, considered "clean" or a "bridge fuel" is, in fact, a bigger problem than other fossil fuels due to uncontrolled and uncontrollable leaks, intentional flaring and venting. "Methane is far more potent than carbon dioxide in contributing to climate change. That makes it particularly harmful to the environment when it is discharged into the atmosphere. In the U.S. alone, the methane that leaks or is released from oil and gas operations annually is equivalent to the greenhouse gas emissions from more than 69 million cars, according to a Wall Street Journal analysis using conversion formulas from the Environmental Protection Agency and emissions estimates for 2015 published last year in the journal Science."[20]

Overall, the impact of methane leakage from natural gas systems is systematically underestimated and imprecisely characterized[21], which ultimately affects the analyses of the volume and sources of greenhouse gas emissions and can lead to ineffective planning for how to reduce our greenhouse gas footprint. According to a recent study, one underestimated and poorly tracked source of leakage, in addition to gas-fired power plants, is industrial manufacturing of such materials as plastics, fertilizer, aluminum, steel, and cement.[22]

Estimating and subsequently controlling methane leakage presents huge challenges that are not easily met. For instance, natural gas system leakage from plastics manufacturing emits a larger volume by far than any other use, including electricity generation, due to the unavoidable action of heating the gas in the manufacturing process.[23] In addition, uncontrolled leakage and venting during the extraction of fracked gas is largely unavoidable and leakage from orphan and abandoned wells is intractable.

A recent study on the emissions from natural gas systems increases the full lifecycle rate from somewhere in the 2.6-3.5% range to 4.1%.[24] 2.5% of the emissions are from transportation, storage, and distribution and 1.6% from production, gathering, and processing.[25] Add this to the carbon emissions from combustion when gas is burned results in natural gas greenhouse gas emissions surpassing all other fossil fuels. Natural gas is simply not capable of serving as a beneficial "bridge fuel" due to these emissions and the powerful effect they have on atmospheric warming. There is no advantage to substitute natural gas for other fossil fuels if the goal is to reduce greenhouse gas emissions and climate change; natural gas actually has greater effect at speeding up atmospheric warming at this moment in time, the time when it is most urgent to

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[18] Dr. Robert Howarth, Cornell University, https://www.youtube.com/watch?v=1NPuYr1LGMI

[19] EPA 2016.Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2014. https://www.epa.gov/ghgemissions/us-greenhouse-gas-inventory-report-1990-2014

[20] Wall Street Journal, *The Leaks That Threaten the Clean Image of Natural Gas*, https://www.wsj.com/articles/the-leaks-that-threaten-the-clean-image-of-natural-gas-11565280375

[21] Grubert, G.A., & Brandt, A.R. (2019). Three considerations for modeling natural gas system methane emissions in life cycle assessment. *Journal of Cleaner Production*, Volume 222, Pages 760-767. Retrieved from https://smartech.gatech.edu/bitstream/handle/1853/60937/author_preprint_-_grubert_brandt_methane_leakage_in_lca.pdf?sequence=2&isAllowed=y

[22] Ibid. p. 7-8.

[23] Ibid. p. 8.

[24] Dr. Robert Howarth, Cornell University, https://www.youtube.com/watch?v=1NPuYr1LGMI

[25] Ibid.

substantially reduce these emissions to meet the 2 degrees C. COP21 warming limit or the 1.5C limit, more recently considered essential.

According to a recent article in VOX.com: "Methane doesn't stay in the atmosphere as long as CO2 and is reabsorbed into terrestrial cycles via chemical reactions within 12 years or so. But, while it's up there, it's much more potent, trapping heat at roughly 84 times the rate of CO2. Scientists estimate that around 25 percent of current global warming traces to methane."[26]

Dr. Robert Howarth's recent analysis of methane and its composition offers new evidence that shows why lighter methane is being detected in the atmosphere today, which has led some to wrongly assume that biogenic sources, not oil and gas development methane release, are the culprit. According to the report, "The methane in shale gas is somewhat depleted in ^{13}C relative to conventional natural gas. Correcting earlier analyses for this difference, we conclude that shale-gas production in North America over the past decade may have contributed more than half of all of the increased emissions from fossil fuels globally and approximately one-third of the total increased emissions from all sources globally over the past decade."[27]

The alarming findings in Dr. Howarth's paper contribute to the conclusion that natural gas development cannot be a solution, even a temporary one, to reducing greenhouse gas emissions because methane is actually worse than the other fossil fuel sources it is replacing and its use releases methane that is feeding global climate change. The time scale we must act within is the 20-year time frame due to the tipping points that will be reached within this period. Action to combat climate change is urgently needed and cannot be delayed by filling in with natural gas, a gross and potent contributor to greenhouse gas emissions. New Jersey's plan must reflect this reality to be effective, to make New Jersey part of the solution rather than part of the climate crisis problem.

A Cornell University study shows[28] the greenhouse gas potency of natural gas is greater than coal or oil. The fracked gas projects that New Jersey is considering or is building today primarily rely on Marcellus Shale gas and will spur more gas development in our next door state, Pennsylvania. Pennsylvania is the second largest producing state of dry natural gas in the nation (next to Texas), according to the Energy Information Administration.[29] These emissions must be considered cradle to grave, in full life cycle, if the emissions and their impacts are to be accurately assessed.

Scientists predict at least another 50,000 wells will be drilled in the Marcellus Shale in Pennsylvania at build-out; more than 10,000 have already been drilled.[30] If development of natural gas continues to increase at its current rate in Pennsylvania's Marcellus Shale, demand created by the industry will increase, resulting in an additional 1600 to 2000 new fracked gas wells each year, at the least. That will cause natural gas production to nearly double by about 2030, at least tripling Pennsylvania's contribution to greenhouse gas

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[26] https://www.vox.com/energy-and-environment/2019/8/15/20805136/climate-change-fracking-methane-emissions
[27] Howarth, R. W.: Ideas and perspectives: is shale gas a major driver of recent increase in global atmospheric methane?, Biogeosciences, 16, 3033–3046, https://doi.org/10.5194/bg-16-3033-2019, 2019.
[28] http://news.cornell.edu/stories/2011/04/fracking-leaks-may-make-gas-dirtier-coal
[29] https://www.eia.gov/tools/faqs/faq.php?id=46&t=8
[30] Lars Hanson, Steven Habicht, and Paul Faeth, "Potential Environmental Impacts of Full-development of the Marcellus Shale in Pennsylvania", September 2016.
https://www.delawareriverkeeper.org/sites/default/files/MarcellusPA_FullReport.pdf

emissions from shale gas (relative to 2012 levels).[31] The effect is regional and global. New Jersey cannot ignore its role in this life cycle of methane and cannot "disown" the full effects of the gas for which it creates a demand, whether in consumption (end use) or in its part of the midstream and market system.

Methane's impact on atmospheric warming is much shorter and simpler than carbon, as explained in the VOX.com article: "Reduced emissions [of methane] have an almost immediate climate impact. It's a short-term climate lever, and if the countries of the world are going to hold rising temperatures to the United Nations' target of "well below" 2 degrees Celsius above the preindustrial baseline, they're going to need all the short-term climate levers they can get."[32]

Delaware Riverkeeper Network considers the lack of the modeling results from the Integrated Energy Plan to be a fatal flaw of the draft. It seems the draft was prematurely issued since the detail needed to comment on the measurable milestones in the plan is not available. A year-by-year schedule of the actions being taken and the measurement of these actions in terms of real reductions in climate change drivers is necessary. BPU and the State of New Jersey must illustrate and verify how the tasks that must be achieved to limit atmospheric warming and climate change impacts will be carried out. The Integrated Energy Plan should be made available for robust public review and comment when it is completed.

According to Dr. Howarth of Cornell University, the planet is going to continue to warm to 1.5 degrees C in 12 years and to 2 degrees C in 35 years or less unless we substantially cut methane emissions.[33] He points out that the planet responds much faster to methane than carbon dioxide. There is already so much carbon in the atmosphere that the ONLY hope of meeting global climate targets is to address methane because that can quickly reduce greenhouse gases and slow the warming of the atmosphere.[34]

In closing, the Draft Master Plan must embrace this reality to develop a plan that reduces greenhouse gases in real numbers with a goal of 45-50% reduction by 2030, achieves those reductions swiftly with measurable year-by-year milestones, and accurately measures the greenhouse gas effects of methane and other greenhouse gases as well as carbon. The goal must make clean air and water and a healthy environment the priority for the most vulnerable and burdened communities in the state and make every decision by taking into account the already heavy pollution loads from dirty energy that these communities are carrying. The goal must be carbon-free by at least 2050 and, with the best planning, investments, and aggressive implementation of renewable and clean energy sources, set a goal to achieve 100% carbon free energy in New Jersey even earlier.

Thank you for the opportunity to comment on this critically important plan.

Respectfully submitted,

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[31] PSE Healthy Energy, "Lifecycle Greenhouse Gas Emissions Associated With Projected Future Marcellus Development", January 2017. http://www.delawareriverkeeper.org/sites/default/files/DRN_MarcellusBuildOut_18Jan2017%282%29.pdf

[32] https://www.vox.com/energy-and-environment/2019/8/15/20805136/climate-change-fracking-methane-emissions

[33] Dr. Robert Howarth, Cornell University, "COP21 Reflections on the Historic Paris Climate Agreement", http://events.cornell.edu/event/cop21_reflections_on_the_historic_climate_agreement

[34] Ibid.

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