Michigan Council on Climate Solutions: Energy Production, Transmission, Distribution, and Storage Workgroup Recommendations

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Background

GREENHOUSE GAS (GHG) EMISSIONS CONTEXT

Governor Whitmer's Executive Directive on climate (ED 2020-182[1]) along with (ED 2020-10[2]) establishes the structure of the Council on Climate Solutions ("Council"), tasked with acting in an advisory capacity to the governor and EGLE in formulating and overseeing the implementation of the MI Healthy Climate Plan, which will serve as the action plan for Michigan to reduce GHG emissions 28% below the 2005 levels by 2025, achieve economy-wide carbon neutrality by 2050, and net negative GHG emissions thereafter. In order to work towards developing these goals, it is important to understand Michigan's baseline GHG levels. The following chart shows Michigan emissions level per energy sector, comparing 2005 to 2018 (the most recent complete data set by the U.S. Energy Information Administration).[3]

Figure 1: 2015 and 2018 Michigan Emissions Level Per Energy Sector

Michigan Carbon Emissions 2005 (million metric tons)	Residential Sector	Commercial Sector	Industrial Sector	Transportation Sector	Electric Power Sector	All Sectors
Coal	0.0	0.3	7.3	0.0	67.8	75.4
Petroleum Products	4.6	0.9	5.8	53.8	0.8	65.9
Natural Gas	19.3	9.4	12.0	1.5	7.0	49.2
Total	23.9	10.6	25.1	55.3	75.6	190.5

Michigan Carbon Emissions 2018 (million metric tons)	Residential Sector	Commercial Sector	Industrial Sector	Transportation Sector	Electric Power Sector	All Sectors
Coal	0.0	0.0	5.0	0.0	43.2	48.2
Petroleum Products	2.8	1.5	4.0	52.3	1.6	62.3
Natural Gas	18.2	10.0	10.1	1.2	14.1	53.6
Total	21.0	11.5	19.2	53.5	58.9	164.1

Note: Further analysis by 5 Lakes Energy of how the power sector could meet these targets is described in the Appendix.

As Figure 1 shows, carbon dioxide emissions have decreased from 2005 to 2018, including a significant decrease in emissions from electric power generation. Meanwhile, on-site natural gas combustion continues to be the primary source of emissions from the residential, commercial, and industrial sectors. As described below, the Energy Production, Transmission, Distribution, and Storage ("EPTDS") Workgroup scope covered both the electric power system and the natural gas system, giving it broad responsibility for identifying actions to reduce emissions from multiple sectors.

[1] Whitmer - Council on Climate Solutions michigan.gov)

[2] Whitmer - Executive Directive 2020 - 10 (michigan.gov)

[3] State Energy Profile Data (eia.gov)

PROCESS OVERVIEW

Over the past six months, the EPTDS Workgroup hosted a series of 13 stakeholder meetings engaging with approximately 150 stakeholders in total, averaging 87 stakeholders per meeting. Our workgroup heard from experts across the industry including 29 external speakers, coordinated subgroup discussions, and incorporated feedback towards the development of these recommendations. This Workgroup primarily focused on analyzing decarbonization of the power sector, consisting of the electricity and natural gas industry in Michigan, with a lesser focus on end-uses and did not discuss extraction issues around oil and petroleum, nor transportation fuels, understanding those were better dealt with in other Council on Climate Solutions Workgroups.

The co-chairs of the EPTDS Workgroup were Douglas Jester, Managing Partner of 5 Lakes Energy and Katherine Peretick, Commissioner on the Michigan Public Service Commission (MPSC). The planning team included Jill Rusnak and Sarah Mullkoff of the MPSC, and Trevor Drake of the Great Plains Institute.

The process framework for the EPTDS Workgroup consisted of three phases:

- Phase One included presentations by major stakeholders and external experts to build the group's understanding of the current state of the energy system in Michigan and opportunities and challenges for reducing emissions;
- Phase Two divided the stakeholders into eight subgroups, each with a unique focus area, to develop and deliberate recommendations informed by the previous meetings as well as by a stakeholder survey;
- Phase Three provided an opportunity to review the subgroup recommendations, resolve differences, and package the list of consolidated recommendations for presentation to the Council on Climate Solutions.

Across all phases, stakeholders were invited to provide feedback in written form, live, and through survey responses, which were incorporated into the final recommendations.

RECOMMENDATION DEVELOPMENT

During Phase Two, the Workgroup broke up into eight subgroups to develop draft recommendations in response to the following topics, assumptions, and questions that were developed by the co-chairs. These topics were shaped by the interest indicated in a stakeholder survey following the Phase One level-setting presentations, which collected stakeholders' interest and expertise in a variety of topics within the broad framework of energy production, transmission, distribution, and storage. The eight subgroups established for the generation of recommendations were as follows:

- **Electric IRP Guidelines:** In order to achieve economy-wide net zero emission by 2050 and necessary interim targets, what integrated resource planning guidelines for electric utilities should be adopted by the MPSC? This should include transmission planning as well as traditional resource planning.

- **Siting Renewables and Storage – Utility Scale:** Based on current and authoritatively projected costs, a very low carbon power system will include very high penetration of renewable generation and significant energy storage. Where should this renewable generation be located and what policies are needed to site sufficient renewables? Where should energy storage be located, both geographically and within the grid? This workgroup will address the relative roles of behind-the-meter resources, distributed front-of-meter resources, and large centralized resources as well as urban and rural location and underlying land uses.
- **Siting Renewables and Storage – Distributed Generation Scale** (same framing as previous).
- **Demand Flexibility, Distributed Energy Resources (DERs)s, and Grid Modernization:** Based on current and authoritatively projected costs, a very low carbon power system will include very high penetration of renewable generation. Such a power system will require new approaches to achieving load balance while reliably meeting customer needs for energy services. What are the roles of demand scheduling and of flexible demand, distributed generation, vehicle to grid, residential energy storage, microgrids, and other grid modernization methods, and what policies should be followed to better align demand and supply?
- **Transmission and Storage Load Balancing:** Based on current and authoritatively projected costs, a very low carbon power system will include very high penetration of renewable generation. Such a power system will require new approaches to achieving load balance while reliably meeting customer needs for energy services. What are the roles for transmission, seasonal storage, and distributed storage? What policy and regulation changes are required to enable this?
- **Preparing for and Advancing Electrification:** Assume that electrification of both transportation and heating is necessary to achieve economy-wide net zero GHG emissions. What electric utility actions are necessary or desirable to accommodate the resulting electricity use and to encourage electrification? What changes are required by transmission owners and operators? What changes need to be implemented by the energy markets (MISO and PJM)?
- **Natural Gas – Decarbonized Gaseous Fuels:** Assume that gas utilities will continue to function largely as they do, but that energy efficiency, renewable natural gas, hydrogen, etc. will be maximally used to minimize GHG emissions from users of natural gas. How much reduction in GHG emissions can we expect and through what combination of policies? What policies should be pursued to reduce methane emissions and leaks from any and all sources?
- **Natural Gas – Winding Down the Gas System:** Assume that sufficient GHG emissions reductions will require substantial electrification of building heating. By what strategies and policies could we reduce or even eliminate the gas distribution system? What policies should be followed to deal with stranded costs?

These eight subgroups met at least on a bi-weekly basis, some more often, to develop GHG reduction recommendations withing their individual framing. Importantly, while the subgroups were asked to develop recommendations, they were not asked to achieve consensus on the recommendations.

These eight subgroups ultimately developed a total of 73 independent recommendations. Of those, the co-chairs and planning team combined and identified key themes among these independent recommendations, grouping them together under five overarching recommendations, which are discussed further in subsequent pages of this document:

1. Implement holistic and integrated energy system planning
2. Enable behind-the-meter resources
3. Explore innovative rate designs
4. Facilitate siting of necessary energy infrastructure
5. Evaluate gas system regulatory and policy options

Context for the Recommendations

As noted above, this workgroup was tasked with exploring recommendations for decarbonizing not only electricity supply, but also natural gas supplied to buildings and industry. On the gas side, there was a common assumption that to achieve significant greenhouse gas reductions, one or both of the following would need to become true: the gas system would need to be shrunk in favor of electrification, and/or the gas being delivered through the system would need to switch to forms of net zero emissions gaseous fuels. As described above, the workgroup considered both of these pathways. The recommendations below reflect how we can appropriately handle the transition and substantial changes that come with decarbonization of natural gas usage.

On the electric side, the Workgroup's recommendations primarily look toward regulatory and policy mechanisms that encourage utilities to decarbonize as opposed to focusing on end-users' options, which will be covered in-depth in the Buildings and Housing, Energy Intensive Industries, and the Transportation Workgroups. The recommendations from our EPTDS Workgroup largely promote a swift transition to electrification, which also requires a thoughtful transition that is considerate of societal impacts and a holistic perspective on long-range planning. For both natural gas and electricity planning, it was also understood that Michigan's utilities must maintain the fundamental function and obligation to serve customers and preserve reliability standards during an environment of ever-changing and increased severe climate-induced weather events.

It is important to note that while several of the proposed solutions point toward direct actions that the Michigan Public Service Commission (MPSC) should take, neither the co-chairs, planning team, nor the MPSC necessarily endorse all of these concepts. Rather, this Workgroup merely presents the recommendations as an output of the stakeholder effort. The co-chairs of this workgroup viewed their job as facilitators of a stakeholder process, rather than authors of recommendations. The co-chairs worked to set the appropriate discussions, themes, and topics for deliberation, but generally did not participate in the deliberations, decision making, or authorship of recommendations outside of the administrative process. Accordingly, this submission of recommendations to the Council on Climate Solutions does not constitute an endorsement or approval on behalf of the co-chairs, planning team, or their respective organizations.

SOCIETAL IMPACTS AND IMPLICATIONS

Each of the templates developed for the 73 independent recommendations took a deliberate look at societal impacts of achieving its goal, including impacts on equity, environmental justice (EJ), labor, and workforce development. Decarbonizing Michigan's electricity and natural gas systems undoubtedly will have enormous environmental benefits, due to the direct carbon mitigation of fossil fuels. Attention to how to address the transition to a decarbonized energy system in an equitable way-- that which does not solely benefit affluent communities while leaving vulnerable and low-income communities behind -- has been paramount to the workgroup discussions.

To support workgroup discussions, the Workgroup invited Michigan's Environmental Justice Public Advocate to present to the group multiple times, providing foundational definitions of environmental justice[4], and spending time educating on what is meant by equitable treatment and meaningful involvement. Furthermore, the Workgroup invited members of the Council on Climate Solutions Brain Trust to evaluate the group's preliminary recommendations in the middle of our process. The group made an intentional decision to invite these members to provide input while the process was still much in draft form, to help educate and articulate ways to truly consider community impacts and ensure they are built in to the foundation of the recommendations. The authentic feedback was influential on the development of the recommendations and these components became key drivers of the final recommendations.

FINAL SURVEY

After final feedback was incorporated into the recommendations, a survey containing all 5 recommendations was sent out to the workgroup members to express whether they agreed with the final wording of each recommendation. Out of the approximately 150 total participants in the EPTDS workgroup, we received 33 survey responses. The respondents were not demographically representative of the overall makeup of the workgroup, so we have simply identified some themes that came back in the open-ended written comments from the survey that we feel may be valuable to the Council:

1. Multiple respondents said they felt the process was productive and valuable, and expressed that they were impressed with the final recommendations.
2. Multiple respondents said it was difficult to definitively say whether they agreed or disagreed with the overarching recommendations because there are too many distinct parts. Many stakeholders agreed with some parts of the recommendation, but not others.
3. Some respondents felt that the process for developing the recommendations was too fast and didn't allow for enough discussion and vetting of major issues by the subgroups. One respondent felt that much of the detail and nuance discussed in the subgroups had been lost in the act of simplifying, consolidating, and shortening into just 5 recommendations.

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[4] Michigan's definition of Environmental Justice: Environmental Justice is the equitable treatment and meaningful involvement of all people, regardless of race, color, national origin, ability, or income and is critical to the development and application of laws, regulations, and policies that affect the environment, as well as the places people live, work, play, worship, and learn. Equitable treatment means:

- no group of people bears a disproportionate share of the negative consequences resulting from governmental, industrial, or commercial operations and policies
- all people benefit from the application of laws and regulations
- eliminating barriers such as poverty and lack of access, as well as repairing systemic injustices
- Meaningful Involvement means: people have an opportunity to participate in decisions that affect their environment and/or health
- decision makers seek out and facilitate the involvement of those potentially affected
- people's concerns are considered in decision-making processes
- people can influence state agency decisions

Notably, much of the detail and value created by this workgroup is in the 73 individual recommendations (almost all of which contain their own detailed template), not just in the 5 summary recommendations. The breadth of these recommendations reflects that there is no silver bullet to achieving decarbonization, equity, and environmental justice.

Appendix: 5 Lakes Energy Analysis

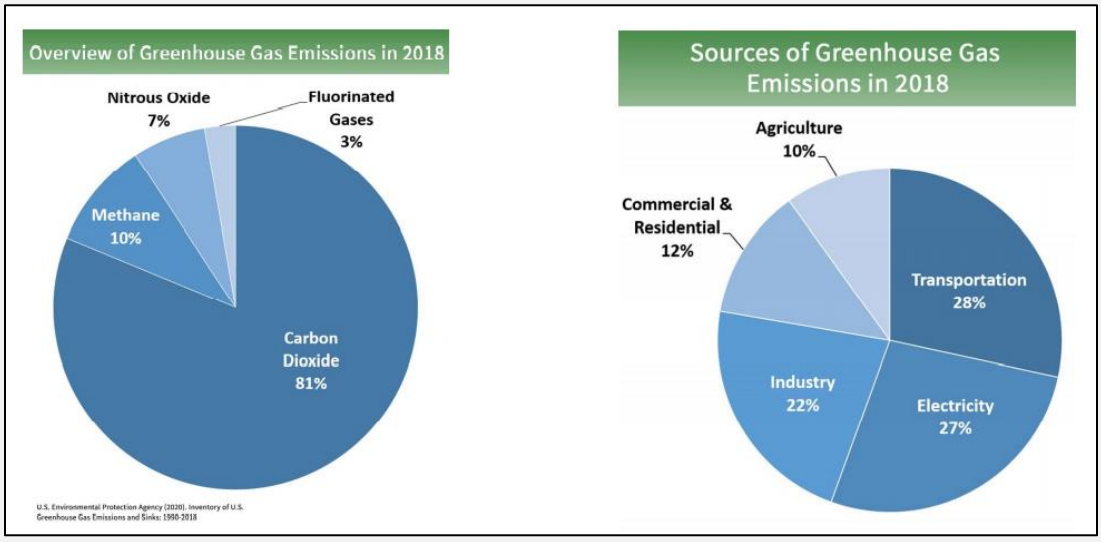
Analysis of Michigan Greenhouse Gas Emissions Targets by 5 Lakes Energy

The analysis within this appendix was completed by Douglas Jester of 5 Lakes Energy to provide additional context to the recommendations. The Michigan Public Service Commission does not endorse this analysis.

Across sectors, cumulatively, Michigan has reduced overall emissions to 164.1 MMT or a roughly 14% reduction from the 2005 baseline. Pursuant to Governor Whitmer's Executive Directive 2019-12, Michigan joined the United States Climate Alliance. As noted in her Executive Directive 2020-10, this committed Michigan to pursue at least a 26-28% reduction below 2005 levels of GHG emissions by 2025. Subsequent changes in the United States Nationally Determined Contribution under the Paris Agreement and Michigan's continuing participation in the United States Climate Alliance commit Michigan to pursue at least 50-52% reduction below 2005 levels of GHG emissions by 2030.

In order to achieve the 28% by 2025 target, we will need a further reduction of 27 MMT or reduction of 16.4%. In order to reach the aggregate GHG emissions reductions needed of 68.8 MMT from 2018 levels to 2030 levels, each sector needs to set aggressive targeted reductions, which are reflected in the working group's recommendations. However, even with aggressive targets, we can only reasonably expect the other sectors (residential, commercial, industrial, and transportation) comprise 22 MMT reduction, leaving the remaining 46.8 MMT reduction responsibility to the electric power sector.

Figure 2: Greenhouse Gas Emissions



To fully understand trends of current inventory of GHG emissions in MI, it is important to note two observations from this chart. First, Carbon Dioxide (CO_2) is by far the largest share of greenhouse gases, and second, the electricity, transportation, building heat, and industrial sectors roughly contribute equally, around 25% each, to total sources of GHG emissions in MI.

While we can expect some incremental changes in each of the sectors over the near term, the onus largely falls on the electric power sector to develop solutions to significantly reduce carbon dioxide emissions. The subsequent chart shows projected estimates of achievable carbon dioxide reductions from each industry, with the largest burden falling upon the electric power sector. The projected estimates of achievable carbon dioxide emissions reductions are based on aggressive electrification of transportation and heating, but near-term reductions in carbon dioxide emissions are limited by the relatively slow turnover of equipment in use, with the average age at which vehicles and heating equipment are retired being in the range of 15-20 years. These projections are not proposed as the “optimal path” to achieve this level of GHG emissions reductions, but as indicative of what will be necessary.

Figure 3: Michigan Emissions By Sector 2030-2018% Change

Michigan Carbon Emissions 2030-2018 (million metric tons)	Residential Sector	Commercial Sector	Industrial Sector	Transportation Sector	Electric Power Sector	All Sectors
Coal	0.0	0.0	-5.0	0.0	-43.2	-48.2
Petroleum Products	-0.2	-0.1	-1.2	-13.1	-1.6	-16.2
Natural Gas	-1.9	-0.8	0.5	-0.3	0.0	-2.5
Total	-2.0	-0.9	-5.7	-13.4	-44.8	-66.8

Michigan Carbon Emissions 2030-2018 (% change)	Residential Sector	Commercial Sector	Industrial Sector	Transportation Sector	Electric Power Sector	All Sectors
Coal			-100%		-100%	-100%
Petroleum Products	-6%	-8%	-30%	-25%	-100%	-26%
Natural Gas	-10%	-8%	5%	-25%	0%	-5%
Total	-10%	-8%	-30%	-25%	-76%	-41%

Summarized Recommendations

Below, we have summarized each of the overarching recommendations. More detailed versions of each recommendation follow. The recommendations have been numbered for reference purposes only; the numbers do not reflect a ranking or prioritization unless otherwise noted.

1. **Implement holistic and integrated energy system planning:** The Michigan Public Service Commission (MPSC) should implement a series of measures towards more holistic and integrated energy system planning in Michigan. This should include traditional resource planning, long-range transmission planning, distribution planning, storage planning, consideration of new and emerging resources, planning around areas of interdependency between the electric and natural gas systems, and consideration of community and health impacts.
2. **Enable behind-the-meter resources:** Advance policies that enable behind-the-meter resources, demand control, and demand flexibility including rooftop solar, electric vehicle aggregation and vehicle-to-building and vehicle-to-grid technologies, microgrids and off-grid capabilities, energy storage, and enhanced energy productivity and energy waste reduction while utilizing low-cost financing and prioritizing low-income and environmental justice communities.
3. **Explore innovative rate designs:** Explore innovative rate design concepts, including studies and other considerations in the design of customer rates as decarbonization efforts progress.
4. **Facilitate siting of necessary energy infrastructure:** Adopt state policies and programs that will facilitate siting of necessary renewable generation, storage, and transmission sufficient to achieve a clean energy transition of the electric power sector.
5. **Evaluate gas system regulatory and policy options**: The governor should direct EGLE and/or the Michigan Public Service Commission to initiate a staff-run stakeholder group or proceeding to evaluate opportunities and considerations for changes to gas utility regulatory and policy structures needed to support cost-effective and equitable achievement of the state’s economywide greenhouse gas reduction goals.

Detailed Recommendations

The following pages provide a rationale, detailed background, and savings projections for each of the five overarching recommendation themes. Within these themes, in response to the last question in the recommendation template, numerous sub-actions are listed. These sub-actions reflect the 73 recommendations that came out of the subgroup discussions.

The recommendations have been numbered for reference purposes only; the numbers do not reflect a ranking or prioritization unless otherwise noted.

I. Implement Holistic and Integrated Energy System Planning

1) Overview of recommendation.

Rationale: In order to achieve economy-wide net zero emissions by 2050 and necessary interim targets, we will need to plan for strategic alignment among resource, distribution, transmission, and storage planning. Traditional integrated resource planning (IRP) includes developing numerous scenarios and sensitivities to various utility futures, though is limited to only the electric side of utilities and has specific constraints developed in law, under PA 341. While these requirements are due to be revisited in 2022, it is recommended that the Council on Climate Solutions considers utility planning, resource adequacy and reliability more holistically, such as the impacts of transmission and storage on the system as well as considering how to cost effectively decarbonize the natural gas system. In addition, to fully plan for strategic alignment of the energy system, it is essential to ensure that the transition occurs in an equitable manner. To that end, specific additional considerations of externalities like the social cost of carbon, geographic considerations like assessment of environmental justice communities, climate resiliency planning, and local community impacts should also be included for a more holistic look toward the future.

Recommendation: The Michigan Public Service Commission (MPSC) should implement a series of measures towards more holistic and integrated energy system planning in Michigan. This should include traditional resource planning, long-range transmission planning, distribution planning, storage planning, consideration of new and emerging resources, planning around areas of interdependency between the electric and natural gas systems, and consideration of community and health impacts. This will require the implementation of a number of different changes to electric and natural gas utility planning, as detailed below. Importantly, a number of these are preliminary recommendations that should be provided to MPSC staff for consideration as they begin the stakeholder process to revise MI Integrated Resource Planning Parameters and Filing Requirements.[5] The changes to be considered in support of more holistic and integrated energy system planning and encourage continuous improvement with all planning activities in Michigan should include the following:

[5] MPSC - Phase III - Integrated Resource Plan (MIRPP, Filing Requirements, Demand Response Study, Energy Waste Reduction Study) (michigan.gov)

A. **Updates to IRP Modeling**- Improve and modernize Michigan's integrated resource planning process by streamlining the scope in some places and broadening it on others, including the following:

   i. Explore streamlining the Environmental Policy (EP) and Emerging Technology (ET) into one scenario. Ensure thoughtfulness in specifying scenarios in the MIRPP collaborative so only non-duplicative scenarios that add valuable information to the IRP are specified.

   ii. Reduce the number of the required sensitivities and allow the utility to work with stakeholders through an informal process to develop any extra sensitivities.

   iii. Utilities should submit their outputs from IRP modeling as a $/ton CO2 reduced calculation to compare various alternatives and to compare between plans in their filed IRP.

   iv. Utilities should be required to consider the most promising emerging technologies in their IRPs, such as Natural gas CCS, Biomass CCS, Biologic Direct air capture, energy storage (including long-duration energy storage), plus others.

   v. Treat Rate Design as a resource in the IRP, separate from Demand Response. Rate designs may be flat with or without demand charges, time of use, or dynamic rates.

   vi. Ask utilities to include a sensitivity or risk analysis projecting potential increased load due to climate change (e.g., increased load due to projected future temperature increases) to support resiliency planning of supply resources.

   vii. Require utilities to fully consider externalities of all technologies (including use of foreign and out of state components, Michigan labor, full lifecycle emissions and costs including disposal, effects on migratory birds, bats, and insects, 45-Q Tax credits) in their IRP modeling.

   viii. Emerging and some existing technologies have the potential to enhance carbon reductions beyond the traditional onshore wind, solar, and storage technologies and should be appropriately vetted in the IRP process.

B. **Improve Transmission Planning**- Better integrate Integrated Resource Planning and transmission planning through the following measures:

   i. Align Integrated Resource Planning scenarios with transmission planning scenarios used by MISO. Using these futures allows for aligned planning, provides baseline market expectations across the region and an understanding of how the market will impact Michigan and utility resource decisions to ensure resource adequacy.

   ii. The MPSC, in coordination with the Michigan transmission owners and utilities, should ask the applicable RTO to conduct 20-year forward-

looking transmission studies to identify needed transmission infrastructure to address economic, reliability, and energy adequacy issues arising from anticipated generation additions (including location, scale, and timing) and retirements, as well as load changes due to electrification and growth in energy efficiency and demand response programs, and evaluate resulting GHG emissions reductions achievable in pursuit of Michigan's carbon neutral by 2050 goal.

iii. The MPSC, in coordination with the Michigan transmission owners and utilities, should define "resilience" from a grid planning perspective and ensure that MISO and Michigan utilities are studying low-probability, high-impact events, including the effects of climate change on the magnitude and frequency of extreme weather events.

iv. The MPSC should express continued support of regional transmission in RTO processes to support the state's carbon neutral by 2050 goal and other state policies and seek to remove barriers and obstacles to the regional transmission planning process

v. IRPs should take into account transmission planning through a more holistic approach than just working with ITC and plan at the MISO level.

vi. In order to prepare for a transmission grid that is fully prepared to take on the increased renewable energy generation coming online, the Governor and MPSC should increase their efforts for MISO to plan for a high renewable future.

C. **Incorporate Holistic Natural Gas Planning-** Broaden integrated resource planning and support a holistic decarbonized energy system through the following measures:

i. There should be a natural gas "IRP" planning process created, and the electric IRP process should refer to this future gas plan and vice versa to avoid misalignment between plans.

ii. IRP modeling currently searches for the resource plan that has the lowest net present value of utility required revenue and meets various constraints, including serving all load, meeting MISO/Michigan resource adequacy standards, and various environmental regulations. At least one scenario should be modeled to minimize the net present value of the sum of utility revenue plus externalities (calculated as the social cost of emissions from power generation and of any changes in emissions due to electrification of transportation and heat) to find the optimal pace of decarbonization of power generation and of utility efforts to electrify transportation and heating.

D. **Align Distribution Planning -** Better integrate resource planning with distribution planning by incorporating co-optimization of distribution system planning and benefits in IRPs. This process should occur in a formal contested

case to ensure more visibility and accountability for the utilities' distribution planning process. Meaningfully consider public health and equity to ensure that resource planning processes consider impacts on communities and health by implementing the following measures:

i. Require utilities to conduct a Health Impact Assessment for each model run required by the Michigan Public Service Commission and each scenario or pathway proposed by the utility.

ii. Require utilities to identify environmental justice communities in their service territory and to describe how they are minimizing environmental risks and promoting equitable access to the utility's services and programs in such communities.

iii. Require that IRPs consider the goals of the communities that they are serving, help the communities achieve those goals, and ensure that lower income people are not subsidizing that work.

E. **Direct Storage Procurement-** Direct the Michigan Public Service Commission to explore possible structures to incentivize novel energy storage technologies (i.e. set amount of new generation resources, as non-wires alternatives, the addition of X amount of MWs) that can be adopted voluntarily by utilities and/or provided for consideration by the Michigan legislature.

F. **Plan for State Carbon Reduction Goals** - Ensure that planning is achieved in a way that meets the state's goals and commitments for carbon reduction. One way to achieve this is through a more aggressive renewable portfolio standard.

2) In what timeframe is this recommendation achievable?

Multi-Step Process: Many of the elements of this recommendation will take multiple years to execute and fully synchronize the coordination of multiple parties and stakeholders. Those recommendations that include revisions to the MI Integrated Resource Planning Parameters (MIRPP) and IRP Filing Requirements may occur as early as the 2022 timeframe, though would likely not be implemented until the end of 2027 (the second cycle of IRPs) and full implementation by 2032 (the third cycle of pilots). Since IRPs are on separate and staggered timeframes for each utility the implementation timeframes would also be staggered, but the coordination efforts can begin in the near term.

3) What is the relative magnitude of this recommendation, in terms of GHG emissions reductions?

Improved regional modeling can lead to more consistency in resource planning, which and should ultimately reduce emissions across the state's footprint. With a more aggressive renewable portfolio standard and/or additional state carbon reduction goals, holistic planning can directly work toward achieving the metrics put forth by the states.

4) Describe the potential impacts of this recommendation on environmental justice.

There are numerous ways which communities that are affected by traditional EJ issues, such as the burden of fossil fuel pollution, could benefit from the recommendations included in holistic planning of the power sector. Communities could experience the benefits of reduced emissions and other impacts of plant closures, which underscores the need for community outreach when developing closure plans, potential site redevelopment, and siting of new resources. Replacing generating resources with renewable energy resources will help build a more reliable, resilient, and economic electric system, with a reduction in harmful impacts on vulnerable populations.

5) **Describe the potential impacts of this recommendation on labor.**

As the energy system undergoes substantial transition with the continued closure of coal and other fossil fuel plants, there will be some immediate loss of tax dollars in communities and reciprocal impacts on labor. 20-year forward looking transmissions studies could help to unlock the potential of 8,000-10,000 MW of renewable generation and other technologies to support a net-zero carbon power system, which could have positive impacts on labor in terms of job-creation.

Right sized transmission infrastructure could help create long-term sustainable jobs, which will escalate over the next several years with a duration that will likely surpass 20 years, requiring a skilled and dedicated workforce.

6) **Describe the potential impacts of this recommendation on the environment.**

A decrease in emissions from legacy fossil fuel generation through more intentional long-term planning processes will help to improve air quality over time and effective land-use planning. Holistic planning toward state carbon reduction goals will move the power sector toward clean and renewable forms of energy, and away from traditional fossil fuel resources that have serious environmental impacts.

7) **Describe the potential impacts of this recommendation on economic development.**

Renewable energy attracts new industry; investment in areas of transmission and storage have the long-term potential of reducing electric rates. The marginal cost of most net-zero energy generation is much lower than the marginal cost per kWh of traditional fossil fuel plants. Connecting transmission resources helps to better “connect” with our neighbors and ensure Michigan has the needed infrastructure to support carbon-neutral goals. The elements of this goal that have to do directly with building out infrastructure such as transmission lines and expanding renewable energy would have positive economic development impacts through construction and maintenance jobs.

8) **What are the relative costs of this recommendation?**

The recommendations having to do with improved coordination and alignment have minimal cost. These recommendations would require coordination and study work largely utilizing existing resources.

Combining or streamlining some modeling scenarios and associated sensitivities will help improve efficiency. Each additional scenario can add 4 to 6 weeks to the process, and this recommendation would in fact lower costs.

Regulated utilities in Michigan are already required to conduct an IRP every 5 years; this recommendation specifies the scenarios they would be required to model with the ability to conduct utility-specific scenarios if they desire to. This has no cost.

9) Who is empowered to implement this recommendation?

Much of the responsibility to implement this recommendation falls on the Michigan Public Service Commission to order utilities to amend their processes. Some of the responsibilities will fall onto the private sector – namely the investor-owned utility companies and transmission owners – to cooperate with alignment efforts.

10) Is there consensus among the subgroup for this recommendation, or are there differing perspectives? If differing perspective, what are they?

There are numerous conflicting perspectives on each of the sub-recommendations contained within holistic planning that are included in the separate workgroup templates and too lengthy to list all here. Per a preliminary assessment, there were 2 sub-recommendations that had full support, 8 sub recommendations that had majority support, 5 which were neutral, and three which had some opposition. Here are some examples of the notable controversial views raised:

Improve Transmission Planning: there are significant jurisdictional complexities to this proposal; integration could result in delays and MISO remains the best conduit for stakeholders to participate.

Holistic Gas Planning: Natural gas remains the most efficient and cost-effective fuel for customer's safety during cold Michigan winters. Significant technological advancement and cost reductions would be needed from prevailing technologies to minimize customer cost impacts to transition away; robust and transparent cost benefit analysis should be completed prior to any policy objective that calls for moving away from, or limiting natural gas heating in Michigan.

Regarding Coal and Gas Generation: The shift away from coal will continue to result in sunk costs; replacing gas that will need to be phased out in the future continues to come with sunk costs. We should be facilitating a transition to clean resources that continues to ensure reliability to customers. While alignment with the Biden Administration's goal is important, it may be unfair to put all the pressure on the power sector because it may lead to increased sunk costs in the name of meeting an interim goal. What's more important is facilitating those measures that help utilities learn to run a cleaner electric grid in the long term.

Align Distribution Planning: Cases where planning takes place should remain separate from cases with a particular provision for cost approval.

Accounting for Externalities: There were several complexities raised within the subgroup discussions including the following: 1. What type of model would be used to account for

externalities? 2. Since the MPSC cannot dictate how utilities are run, incentives vary by utility and type of customers; 3. Cost of service in rate cases vs. IRP cases – where does this specifically fall for vehicles or the transportation sector? 4. Incorporating the heating sector into IRPs is complex; 5. The large IOUs take issue with the specifics of how and which modeling is used prior to implementation.

Some groups would like to push for an even more aggressive target of achieving carbon-free electric power. For instance, commenters submitted the following language:

> In order to align with the Biden Administration's emission reduction strategies and to set Michigan on an accelerated path toward mitigating the effects of climate change, Michigan should revise its target to 80% carbon-free electric power by 2030.
>
> A. Retire all Michigan's remaining coal-fired plants by 2030
>
> B. No new gas-fired power plant development.
>
> C. Establish a Renewable Portfolio Standard of 60% by 2030, with ramping up targets in 2035 and 2040 commensurate with Michigan's goal of reaching 100% carbon-free power by a date certain.

11) What are the most important considerations for achievability and feasibility of this recommendation?

The goals contained within this recommendation are complex, long-range, and will require plenty of coordination between regulators, utilities, transmission owners, developers and other business interests, as well as engagement with the advocate community. Planning for the future requires an understanding of the impacts, goals, and developments beyond Michigan's borders. This understanding of alignment of planning across resource and transmission development facilitates holistic grid solutions that help MI achieve a path toward a carbon-free future.

Several of the concepts discussed here fit squarely into upcoming conversations to take place as part of the MPSC's MI Power Grid Phase Three Advanced Planning process. Electric utilities are required to file plans every five years with the MPSC that look at anticipated customer electricity needs over the next 5, 10, and 15 years. The MPSC establishes parameters and filing requirements for utility integrated resource plans and conducts studies on achieving energy waste reduction and demand response.

In addition, the Governor's ED that directs the MI Healthy Climate plan includes the following language:

> Expand its environmental advisory opinion filed by [EGLE] in the Michigan Public Service Commission's Integrated Resource Plan process under MCL sections 460.6t and also file environmental advisory opinions in IRPs filed under MCL 460.6s. [EGLE] must evaluate the potential impacts of proposed energy generation resources and alternatives to those resources, and also evaluate whether the IRPs filed by the utilities are consistent with the emission reduction goals included in this Directive. For advisory opinions relating to IRPs under both

MCL 460.6s and MCL 460.6t, [EGLE] must include considerations of environmental justice and health impacts under the Michigan Environmental Protection Act. The Commission's analysis of that evidence must be conducted in accordance with the standards of the IRP statute and the filing requirements and planning parameters established thereto.

Many of the issues discussed in these recommendations discussed in the Holistic Planning theme build upon concepts included in the MI Power Grid Phase Two work. Per MPSC Order in Case No. U-20633, Staff is to initiate a redline draft of revised MIRPP and filing requirements and share with stakeholders by Dec. 22, 2021; a stakeholder process will follow which provides ample opportunity to incorporate several of these recommendations.

Some other complications to consider:

A. Neither the Emerging Technology nor Environmental Policy scenarios currently reflect the Governor's GHG goals. This is an opportunity to streamline the State's GHG reduction goal into an integrated scenario. This could be accomplished through MIRPP Advanced Planning.

B. GAS IRPs: Other states are pursing Gas IRP type planning such as, Minnesota and Colorado indicating it is feasible and achievable implement.

C. This is a long and complicated process. By the second cycle of IRPs (2023/2025) minor adjustments could be made to refer to a Gas IRP, however the level of fully mature integrated planning necessary to create a unified gas and electric plan is expected to require additional time beyond the second cycle of IRP filings. Full alignment could take many years to negotiate.

D. Much like transmission infrastructure, only a fraction of the gas infrastructure is regulated by Michigan. This recommendation would need to consider those federally-regulated lines where gas passes through Michigan to some other destination, therefore it is unclear about how a "gas IRP" would be performed in the context of a utility IRP. Certainly the availability of gas can be contemplated in an IRP and the closure of gas lines can be contemplated in a gas rate case.

II. Enable Behind-the-Meter Resources

1) Overview of recommendation.

Rationale: Greatly increased renewable energy generation plus energy storage is a given requirement for achieving the goal put in front of the Council on Climate Solutions of carbon neutrality for the state. This will require new, innovative approaches to achieving load balance and fair compensation for grid services. Additionally, the effects of the already changing climate, in the form of increased extreme weather, must be mitigated via improved reliability and resiliency. This recommendation attempts to address both increasing usage of clean electricity generation and guarding against the

impacts of climate change, while uplifting and protecting the most vulnerable populations and historically disadvantaged communities.

Recommendation: Advance policies that enable behind-the-meter resources, demand control, and demand flexibility including rooftop solar, electric vehicle (EV) aggregation and vehicle-to-building and vehicle-to-grid (V2X) technologies, microgrids and off-grid capabilities, energy storage, and enhanced energy productivity and energy waste reduction (EWR) while utilizing low-cost financing and prioritizing low-income and environmental justice (EJ) communities. Specific actions include:

A. Eliminate the solar distributed generation (DG) cap to allow for individuals to install solar panels that can serve both their residence and the larger electric grid with carbon-free power at low cost
    i. This would have the result of incentivizing more solar developers to enter the Michigan market, increasing competition and financing options, and reducing upfront and maintenance costs;
B. Update the DG avoided cost calculation to better value solar generation and encourage private development of rooftop solar;
C. Update and expedite the grid interconnection process for all technologies, including distributed solar, solar + storage, and electric vehicles with V2X capabilities;
D. Enable tax benefits and/or purchase credits for all renewable and storage projects, regardless of size and ownership;
E. Expand MI Saves funding and enable on-bill “pay-as-you-save" and other financing for distributed energy resources (DERs), but with both appropriate safeguards and direct funding support for low-income customers who are often unable to assume and/or manage additional debt;
F. Expand and enhance existing EWR, DR, and DER programs, particularly for low-income communities, including:
    i. Pairing electrification programs with residential DR, managed charging, and other peak reduction measures;
    ii. EWR programs for the most efficient and affordable home heating and appliance technology, including efficient heating, grid connected appliances, and weatherization measures that reduce heating loads/needs;
G. Incentivize automated energy management through new and existing AMI infrastructure, and fully utilize the data available to better match generation to load with clean resources;
H. Expand energy storage and battery purchase and lease programs;
I. Enact policies to support EV V2X integration programs by allowing vehicles to alter charging time, charging level, or location at which they can charge or discharge, in a manner that optimizes plug-in electric vehicles’ interaction with the electrical grid and provides net benefits to ratepayers by doing any of the following:

i. Increasing electric grid asset utilization,

ii. Avoiding unnecessary distribution infrastructure upgrades,

iii. Integrating renewable energy resources,

iv. Reducing the cost of electric supply;

J. Support development and management of vehicle load aggregation programs to support balancing of load in an utility service area. Adopt programs that allow utilities to offset loss of battery capability and warranty through periodic usage-based rebates to customers and/or OEMs.

K. Allow microgrids for electrically contiguous sites, allowing for greater procurement of renewables, shared energy storage resources, and greater resilience. Establish uniform interconnection standards and rates that reflect the cost of service and do not include unnecessary charges.

2) In what timeframe is this recommendation achievable?

This recommendation includes a series of distinct elements for implementation, many of which will take multiple years to execute and fully synchronize the coordination of multiple parties and stakeholders. Some of the elements could be implemented relatively quickly. Others require the legislature to make changes to statue.

3) What is the relative magnitude of this recommendation, in terms of GHG emissions reductions?

There are many parts to this recommendation that could have a large impact on GHG reductions by switching electric generation source from fossil fuels to renewables, shaping demand to rely more on clean sources, and reducing waste of energy produced. This could be a primary driver to reduction of the electric sector's GHG emissions.

4) Describe the potential impacts of this recommendation on environmental justice.

The burden of fossil fuel pollution has fallen traditionally on EJ communities, and by enabling BTM, demand response, demand control, and demand flexibility resources, there will be reduced need for these traditional fossil fuel resources, particularly the most polluting peaking plants. Communities could experience the benefits of reduced emissions and other impacts of fossil fuel plant closures. Replacing generating resources with DERs, EWR, and demand flexibility will help build a more reliable, resilient, and economic electric system, with reduced harmful impacts on vulnerable populations. Expanding and enhancing funding, financing, and direct support for low-income communities will allow these benefits to go directly to the communities that need them most and have been historically disproportionately impacted by our current grid and the changing climate.

Through enhancing and expanding EWR programs, the energy burden on low-income households can be reduced. Additionally, lower income communities have traditionally not had the resources to improve their own electric reliability, such as by buying a

backup generator. Through enabling deployment, financing, and direct support for microgrids, DERs, rooftop solar.

5) **Describe the potential impacts of this recommendation on labor.**

As the energy system undergoes substantial transition with the continued closure of coal and other fossil fuel plants, there will be some immediate loss of tax dollars in communities and reciprocal impacts on labor. This transition will need to be managed closely.

Labor opportunities will grow for the development of DERs, microgrids, residential energy storage, and V2X infrastructure.

EWR programs will require added labor for implementation, whether for installation of efficient heating, grid-connected appliances, and installation of weatherization measures in homes and buildings.

6) **Describe the potential impacts of this recommendation on the environment.**

Reducing peak demand via DR, demand flexibility, and demand control will lower the need for generation during peak times. Often times, the traditional power plants used to serve peak loads are the heaviest polluting, with the most lenient emissions controls. Grid flexibility is important to reducing emissions so load can be matched with the cleanest generation technologies.

Increased DER deployment in the form of rooftop solar and energy storage will replace the generation needed from legacy fossil fuel generation and replace it with zero carbon sources.

Supporting electric vehicles and V2X capabilities will reduce emissions from transportation, while simultaneously enabling residential energy storage and supporting renewable generation sources.

7) **Describe the potential impacts of this recommendation on economic development.**

Advanced energy attracts new industry; investment in DERs, microgrids, energy storage, grid-connected appliances, and other new technology creates jobs both through technology development, but also through service and installation requirements. Advanced energy has the long-term potential of reducing electric rates for ratepayers since the marginal cost of net zero energy and emission producing generation will grow.

Demand for electric vehicles through expanded V2X programs will boost the automotive industry.

8) **What are the relative costs of this recommendation? Unknown, or different timeframe – explain why:**

The costs to taxpayers would be in the form of tax benefits, purchase credits, funding, and financing costs for the programs outlined. The costs will need to be further analyzed in implementing these recommendations and cannot be estimated at this level.

9) Who is empowered to implement this recommendation?

Much of the responsibility to implement this recommendation falls on the State Legislature and some on the Michigan Public Service Commission.

10) Is there consensus among the subgroup for this recommendation, or are there differing perspectives? If differing perspectives, what are they?

There were differing perspectives noted during subgroup discussions and via comment, noted below:

- Utility scale solar should be pursued instead of BTM solar
- Grid interconnection process should not be focused on distributed resources
- On-bill financing should only be available for participants in utility programs, not for financing outside of utility programs
- Do not allow microgrids, as it appears to be a way to get around the ROA cap
- Do not recommend electric vehicle aggregation
- Do not recommend off-grid capabilities, as it is inconsistent with reliability and resiliency
- Points A and B should be updated to reflect a more balanced viewpoint on these issues which have been repeatedly discussed in legislative and regulatory venues. BTM solutions are already enabled in policy and regulation under MI statute. The "cap" does not correlate with emission reductions; it simply creates a threshold for a quantity of customers to receive a specific rate. Utilities are required to continue interconnecting BTM systems regardless of this threshold. Recommendations should not expressly incentivize one technology over another, but set a foundation around market-based dynamics and price signals, as well as align with current distributed generation policy.
- Rate design should be aligned with the cost to serve customers and should not be used to pick technology winners
- Need to ensure that EWR, DR, and DER programs are cost effective for customers
- Any changes to microgrid structures must respect the utility franchise agreement
- Elimination of the solar distributed generation cap could result in reduced reliability of the grid in the near and medium terms and ultimately result in increases in necessary distribution facility capital investments by incumbent distribution utilities to enable the distribution systems to safely accommodate the bidirectional flow of power. Such a policy would increase costs for all customers, including seniors and lower income customers who may not have the means or inclination to invest in a distributed generation system of their own. The distribution system in Upper Peninsula would likely see a magnified impact due to the reduced density of the customers and energy flow analyses would be very important to ensure reliability.
- "Pay-as-you-save" financing and on-bill financing would increase administrative costs that would need to be paid by all utility customers to manage proper collection and administration of these lending relationships. This would be

particularly impactful to smaller utility customers because they don't have the scale that would support the fixed costs associated with such programs.

- Requirement of opt-out, time-varying rates could result in increased volatility in customer bills and negatively modify the customers' relationship due to customers' likely perception that the utility made these changes to the TVR rates. Furthermore, it could increase customer bills and have the opposite effect to the apparent objective for customers that are not able to or unwilling to modify their behavior with respect to how they consume energy. TVR where customers have the ability to opt into allows customers to self-identify as sophisticated users of energy and willing to actively manage their energy consumption to minimize their bills.

11) What are the most important considerations for achievability and feasibility of this recommendation?

Much of the success for the recommendation comes down to coordination, coordination, and shared goals between the state executive branch, the state legislature, the MPSC, and Michigan's utilities. In particular, the political will of the state legislature will be required to enable much of the recommendation outlined. For example, the current level and functioning of the DG cap is set in statute by the legislature, and would need to be amended there before it could be implemented by the MPSC. The DG avoided cost calculation is similarly set by the legislature and would need to be amended and implemented in a similar fashion. The law preventing microgrids across property boundaries is set by statue as well, and would require consensus in the legislature that the development of microgrids is a net benefit to customers, and will then require coordination between the legislature and the MPSC in order to be implemented and projects rolled out.

The grid interconnection process would need to be modified by the MPSC and utilities together, as well as EWR and DR programs and the utilization of AMI infrastructure for matching load to generation.

Funding for MI Saves, on-bill financing programs, and other financing, lease, and direct support programs would need the support of the State or Federal budget.

Ultimately, there needs to be some agreement on the pathway from those making the laws and regulations and stakeholders – including utilities – for this to work.

For further discussion on considerations for achievability and feasibility of this recommendation, see the detailed sub-recommendations connected in the Airtable.

III. Explore Innovative Rate Designs

1) Overview of recommendation.

Rationale: Rate design is a critical element in the efforts to decarbonize. As the energy transition evolves in many ways, including away from baseload resources to cleaner and intermittent resources in efforts to reduce greenhouse gas emissions, electricity and

natural gas rate design must be reformed to ensure a stable transformation. For example, customer owned behind the meter resources, third party energy providers, and other distributed energy resources draw revenues away from the traditional utility framework in which revenues are collected by utilities and customer rates are founded on. Customers continue to have more rate options available to them, such as time-of-use pricing and specific rates for customers with electric vehicles, to encourage more effective usage off-peak. However, the needs of both customers and utilities will continue to be challenged and innovative rate design will be essential as technology and decarbonization solutions are deployed. Further, the energy transition and specifically rate design must promote equitable access to the benefits of clean energy and ensure the most vulnerable customers are uplifted and protected.

Recommendation: Explore innovative rate design concepts, including studies and other considerations in the design of customer rates as decarbonization efforts progress. Efforts should include the following:

A. Require all investor-owned utilities to adopt an opt-out, time-varying rate (TVR) program and ensure all participating customers have smart meters installed. To further encourage energy waste reduction, grid modernization, and peak demand shifting, offer state and utility-driven incentives to encourage customers to purchase home energy management systems (HEMS). Consider partnering with municipal utilities and electric co-operatives, or requiring them through legislation, to adopt similar programs. Reducing system-wide peak demand through a combined TVR, smart meter, HEMS approach will reduce the need for Michigan's fossil-fueled peaking plants, which are often located in or near communities of color. As a result, the subsequent drop in demand will contribute to better air quality and lower respiratory disease rates in these neighborhoods. Additionally, lowering peak demand and installing HEMS in low-income homes/rental units will make energy more affordable in the long-term. Utilities should utilize the full functionalities of AMI during real-time operations and focus on customer education.

B. The legislature should require all electric service providers (investor owned, cooperatives, municipal, etc.) to unbundle their rates, clearly differentiating between the energy charge (comprised of a $/kWhr amount and a $/kW demand charge amount) and the distribution charge (which reflects the providers O&M for distribution) for all rate structures. This will provide energy users with information they need in order to manage their loads and offers demand side flexibility. Charges should also be simplified and crafted to ensure customers can appropriately understand and react in the most efficient manner possible.

C. To achieve broader electrification, an equity and low-income lens must remain a top priority. In addition to program efforts to reach low-income customers, it is recommended that utilities study and offer:

    i. Electric or natural gas rates based on percent of income, rate subsidies for low-income customers, or even net-zero cost of electricity or natural

gas for low-income customers (subsidized usage capping is one option or based on the rating of the energy efficiency of the building);

ii. Those receiving subsidized rates would also be connected to an enhanced EWR program;

iii. Expand and improve energy assistance programs;

iv. Flexible payment programs;

v. Rebates and carve-outs for low-income customers;

As new rates are designed, utilities must make a real commitment to customer education, especially for low-income customers. Customers should be offered rate options that are the best for their circumstance and needs. Movement to a new rate should be intuitive, simple, and mitigate the need for customers to fill out forms.

D. Require utilities to collect race, income, and geographical-based information regarding billing as well as the implementation, participation, and marketing of key utility programs in order to identify race and income-based inequities in utility operations.

E. Align electric rate design with electrification goals. Electric rate designs should be structured to better reflect the marginal cost to the grid of adding new electrified loads, particularly added loads that are optimally managed or controlled. Such rates are expected to be much lower than current average rates per kWh. The MPSC, utilities, and other parties should explore whether and the extent to which changes to advanced metering infrastructure technologies may help support such efforts. Electric vehicle line extension policies, and potentially other line extension/connection policies, should be reviewed and potentially updated in order to accelerate EV adoption.

F. Integration of new rate design should include a new rate paradigm for distributed energy resources, which incentivizes the construction of DERs and values carbon dioxide reduction, but maintains current cost of service requirements among the rate classes.

G. Explore performance-based regulation and ratemaking methodologies. Review and revisit the utility monopoly construct and amend to reflect what no longer fits the regime going forward.

H. The potential of stranded assets in the natural gas or electric sector should be addressed in rate design and ensure those costs, if they occur, are distributed equitably.

I. Require the utilization of securitization or other forms of recovery for early retirement of power plants or stranded assets during the energy transition. Securitization will lessen the cost impact on ratepayers.

J. Require all investor-owned utilities to adopt and offer EV time-of-use rates to encourage and spur EV adoption in the state. Further allow the OEMs to report EV charge data directly to the utilities without the need of a separate sub meter. This will lower the upgrade cost to the customer switching to an EV.

2) In what timeframe is this recommendation achievable?

Rate design can begin immediately. Other studies and pilots may take two to five years for study, analysis, and implementation.

3) What is the relative magnitude of this recommendation, in terms of GHG emissions reductions?

Rate design will not have a direct impact on GHG emissions, but will be a major factor in achieving GHG reductions. It can be thought of as a necessary and enabling tool for GHG reductions in the energy sector.

4) Describe the potential impacts of this recommendation on environmental justice.

Low-income households are disproportionally likely to suffer from higher energy burdens, more likely to live in less efficient housing, and more likely to rent their homes. Rate design will have to be intentionally crafted and innovative to ensure inequities are marginalized in decarbonization and clean energy efforts and that vulnerable customers are not abandoned, the last to transition, or left footing the bill.

Thoughtful rate design has the potential to significantly impact and improve environmental justice and equity directly. Rates can be designed based on historic advantage/disadvantage, poverty level thresholds, and to lift up particular zip codes or communities that are in need or disproportionately impacted by the changing climate. Thoughtful and well-designed rates can have a direct impact in the short term.

5) Describe the potential impacts of this recommendation on labor.

Rate design studies can be performed and shared widely with other states. It opens the opportunity for creativity and data collection. There is not a large impact on labor, but reaching out to industry experts, researchers, and universities may be beneficial.

6) Describe the potential impacts of this recommendation on the environment.

Proper rate design can have indirect benefits by the potential to lead to a quicker and smoother clean energy transition.

7) Describe the potential impacts of this recommendation on economic development.

Suitable rate design will drive adoption of electrification investments, which can generate economic activity related to construction, retrofits, and electric infrastructure development. Competitive energy prices will also attract businesses to Michigan.

8) What are the relative costs of this recommendation? Unknown, or different timeframe – explain why:

Costs for rate design studies and pilots would be minimal.

9) Who is empowered to implement this recommendation?

Legislators, community, environmental and low-income advocates

10) Is there consensus among the subgroup for this recommendation, or are there differing perspectives? If differing perspectives, what are they?

Certain aspects of how rate design should be structured is not agreed to by all stakeholders. Some group members believe, for example, that marginal cost appropriately reflect the cost to serve customers and that electrification will drive investment decisions of fixed assets that must be recovered.

11) What are the most important considerations for achievability and feasibility of this recommendation?

Broad stakeholder involvement, transparency in data and design, customer education and engagement.

IV. Facilitate Siting of Necessary Energy Infrastructure

1) Overview of recommendation.

Rationale: Decarbonizing the power system at acceptable cost using known commercially available technologies will require building substantial amounts of wind and solar generation in Michigan, as well as siting grid-scale storage and some additional transmission. Siting these power system components will require community acceptance in many places in Michigan and based on prior experience may be challenging. This recommendation addresses the need to achieve the necessary siting with community acceptance.

Recommendation: Adopt state policies and programs that will facilitate siting of necessary renewable generation, storage, and transmission sufficient to achieve a clean energy transition of the electric power sector. Specific actions include:

A. Establish consistent, predictable, and stable taxation and community benefits policies for renewable generation and electricity storage.

B. Assign lead responsibility to a state organization to facilitate siting through information sharing, development and communication of best pratices, and stakeholder engagement.

C. Enable local zoning and planning and renewable facility developer planning by creating publicly available grid hosting capacity maps (this may also be useful in planning electric vehicle charging infrastructure). Ideally, grid hosting capacity maps would also overlay with renewable resource conditions, existing land use information, environmental considerations, zoning information, and other information that will be useful for siting decisions and community consideration of siting requests.

D. Engage an advisory group of stakeholders and create a public toolkit of information related to power system siting that will be useful to host communities and establish best practice expectations for all stakeholders.

E. Develop feasibility studies and siting criteria for battery and non-battery energy storage systems in Michigan.

F. Evaluate whether off-shore wind siting is needed or warranted to decarbonize Michigan's power sector and if warranted, develop the necessary legal construct and guidelines for such development.

2) In what timeframe is this recommendation achievable?

This recommendation is achievable by 2025 and should be implemented within that timeframe to ensure that Michigan has an adequate foundation for siting the renewable generation, storage, and transmission resources that will be needed to decarbonize the electricity grid.

3) What is the relative magnitude of this recommendation, in terms of GHG emissions reductions?

Siting is one of several actions that must take place to decarbonize electricity in Michigan. Holistic integrated systems planning, deployment of behind-the-meter resources, and effective rate designs will all help to ensure an efficient electricity grid and reduce the need for large new infrastructure projects. However, even with all of those recommendations, there will likely need to be a large build-out of renewable energy resources, storage, and transmission to achieve the state's climate goals. That new infrastructure will need to be successfully sited somewhere. This recommendation will help to ensure it is sited wisely and with community input. For these reasons, this doesn't necessarily have direct emissions reductions, but is an enabler of reductions.

4) Describe the potential impacts of this recommendation on environmental justice.

Environmental justice must be a core consideration of siting energy infrastructure in Michigan. By implementing the sub-actions listed in this recommendation, Michigan has an opportunity to ensure that siting is done in a way that addresses past injustices, does not create new injustices, and ensures equitable allocation of the costs and benefits of energy infrastructure projects.

5) Describe the potential impacts of this recommendation on labor.

Building out energy infrastructure will create significant opportunities for Michigan's workforce, but the opportunities may not necessarily be spread evenly across the state. Siting is important because siting constraints will determine where in the state those opportunities occur.

6) Describe the potential impacts of this recommendation on the environment.

All energy infrastructure has environmental impacts. Thoughtful siting can help to ensure that negative impacts are minimized and that co-benefits are maximized. For example, solar panels can be planted with pollinator friendly habitat underneath the panels to support local ecosystems and reduce runoff.

7) Describe the potential impacts of this recommendation on economic development.

Building new energy infrastructure will create economic development opportunities in Michigan, including for businesses involved in construction, local economic ripple effects from those businesses, and potentially tax benefits for local governments where the infrastructure is being sited. However, as with workforce impacts (see #5 above), the opportunities will be located based on siting constraints.

8) **What are the relative costs of this recommendation? Unknown, or different timeframe – explain why:**

Compared to the costs of energy system infrastructure, the sub-actions under this recommendation are relatively affordable. Moreover, money spent on these actions can help to reduce the costs of building new infrastructure. For example, poorly sited infrastructure may create community pushback that delays construction timelines and increases project costs. Therefore funding to support these actions may create additional value for the State of Michigan.

9) **Who is empowered to implement this recommendation?**

State government, including EGLE, should take the lead in implementing this recommendation. Some components of this recommendation will also need to be implemented by local governments.

10) **Is there consensus among the subgroup for this recommendation, or are there differing perspectives? If differing perspectives, what are they?**

The group was mostly in consensus about the recommended sub-actions. There was some concern expressed that the siting question presumed renewable development rather than evaluating renewables against other options. But the group was otherwise in agreement that the renewable presumption did define the task, and made sense for Michigan.

11) **What are the most important considerations for achievability and feasibility of this recommendation?**

V. Evaluate Gas System Regulatory and Policy Options

1) **Overview of recommendation.**

Rationale: Natural gas used for space heating, water heating, and industrial processes is the primary driver of greenhouse gas emissions from Michigan's residential, commercial, and industrial sectors, which collectively contribute one third of the state's economy-wide greenhouse gas emissions. Achieving the state's goals of economy-wide carbon neutrality by 2050 and net negative GHG emissions thereafter will require significantly reducing emissions from natural gas end uses through a combination of technologies and approaches including, but not limited to, energy efficiency, electrification, and low/no emissions gaseous fuels. Determining the right mix of technologies and approaches to serve Michigan's needs in each sector will require ongoing research and analysis, stakeholder engagement, and learning through action.

Given the importance of natural gas service in Michigan as a cold climate state with a significant industrial sector, the impacts of natural gas use on state greenhouse gas emissions reduction goals, and the effects of climate change on the state, the Governor's Office, EGLE, the legislature, and the Michigan Public Service Commission (MPSC) will likely need to make decisions in the future about how to reduce greenhouse gas emissions from natural gas in a way that balances environmental and health concerns with rates, reliability, safety, and equity.

Many of those decisions will pertain to new ideas and emerging technologies. This presents three challenges:

- First, the State's lawmakers, regulators, and stakeholders will need to become knowledgeable about the different approaches and technologies that can reduce emissions from natural gas end uses in order to assess and determine appropriate utility investments.
- Second, the State will need to have a regulatory framework in place that provides for consideration and evaluation of approaches and technologies that can reduce emissions from natural gas end uses, especially those that may be brought forward by the state's natural gas utilities.
- Third, to the extent the natural gas system may shrink in favor of electrification, the State and the state's gas utilities will need a process to handle a wind-down of the gas system infrastructure while maintaining system safety, affordability and reliability.

The following recommendation aims to address these needs through a series of measures.

Recommendation: The governor should direct EGLE and/or the Michigan Public Service Commission to initiate a staff-run stakeholder group or proceeding to evaluate opportunities and considerations for changes to gas utility regulatory and policy structures needed to support cost-effective and equitable achievement of the state's economywide greenhouse gas reduction goals. This stakeholder group or proceeding should include the following components:

A. First, conduct a pathways analysis to assess options to achieve net zero greenhouse gas emissions from natural gas production, transmission, distribution, compression, storage, and end uses in a least-cost manner. This should be implemented as part of a broader pathways analysis to achieve Michigan's climate goals, addressing all key economic sectors (power generation, transportation, industry, and agriculture), as their interconnected nature will require consistent assumptions and cross-referencing of outputs. This analysis should include the following:

    i. An assessment of the strengths and limitations of net zero emissions fuels and technologies, and the costs and implications of various decarbonization pathways for current gas end uses. Fuels and technologies to consider should include, but not be limited to, energy

efficiency, demand response, electrification, renewable natural gas, hydrogen, and district energy systems.

ii. An inventory of assets utilized in the production, transmission, and distribution of natural gas in Michigan, to build understanding of the current natural gas system and aid the evaluation of any potential wind-down of the system.

iii. Impacts to Michigan's workforce that may occur as a result of reducing emissions from natural gas production, transmission, and distribution .

B. Second, based on the assessment, identify and implement actions and policy changes that are needed to meet Michigan's greenhouse gas reduction goals with respect to natural gas production, transmission, distribution, compression, storage, and end uses. This should include the following:

i. Consideration of regulatory measures and frameworks that can support natural gas and electric utility innovation to reduce emissions, including, but not limited to, the following:

a. A gas utility emissions reduction planning process, under which gas utilities could submit innovation plans to the MPSC that propose (for MPSC review and approval) investments to reduce greenhouse gas emissions from the natural gas system. This could include measures to maintain affordability, such as spending caps.

b. Utility and/or customer facing financial incentives for approaches and technologies that can reduce natural gas system emissions. These could include tax incentives, rebates, loan funds, or regulatory incentives.

c. A clean fuel standard, which would require a certain percentage of fuel in a utility's natural gas supply to have a lower carbon intensity than fossil natural gas, and which would put all solutions for reducing natural gas end use emissions on a level playing field.

d. Facilitate permitting of utility infrastructure than can aid in achieving greenhouse gas emissions reductions, including seeking "primacy" from EPA on the permitting of CO2 pipelines and storage facilities, which will allow for more local control over permitting decisions and facilitate faster decarbonization in a more cost-effective manner.

e. Create liability protection associated with CO2 leaks from underground reservoirs, assuming that a standard set of precautions and controls are appropriately implemented by the reservoir operator.

f. Policies that support the development and interconnection of facilities supplying lower carbon intensity sources to the natural gas system (e.g., RNG, hydrogen).

ii. Consideration of policy changes to reduce emissions from natural gas production in Michigan, including the following:

a. Recommending to the Legislature that MCL 324.61502 – part of “Act 61” – be amended to strike the following policy language: "It is accordingly the declared policy of the state to protect the interests of its citizens and landowners from unwarranted waste of gas and oil and to foster the development of the industry along the most favorable conditions and with a view to the ultimate recovery of the maximum production of these natural products."

b. Recommending that EGLE begin to enforce the statutory prohibition of oil-gas waste, MCL 324.61504, by stopping a current practice of operators in Michigan's Antrim Shale, the venting of one million tons per year of produced CO_2 to the atmosphere.

c. EGLE and MPSC work with natural gas producers, pipelines and LDCs to develop a mechanism to detect and mitigate methane leaks.

iii. Consideration of the role of the natural gas system in a decarbonized economy, including whether parts of the system should be decommissioned in favor of electrification. To the extent that parts of the natural gas system will be decommissioned, the State should consider the following:

a. Developing and implementing a strategic and orderly process for evaluating the gas distribution system and determining whether, where, and how the system should wind down in order to meet the state's GHG reduction goals. In the process, the commission should continue to address safety, liability, and reliability.

b. Evaluating possible gas system reuse or retrofit options (broadband/fiber optics infrastructure, water infrastructure & transport, use for liquid storage, use for CO_2 transport to storage, use for green long-duration energy storage).

c. Securitization or other regulatory or financing measures to reduce the ratepayer and/or utility burden that may result from stranded assets.

d. Implementing analysis, planning exercises, and pilot programs to effectively engineer the deconstruction of existing fuel system infrastructure and provide for electrification retrofits.

e. Ensuring that state agencies lead any gas system wind-down process by maintaining granular management of the process inputs and firm control of outputs using in-house expertise.

f. Ensuring that body of law for the State of Michigan and the structure within and among State agencies and/or departments is functional to facilitate the work of "winding down the gas system."

g. Establishing policies and standards for integrity, transparency, and accountability with regard to a gas system wind-down.

2) In what timeframe is this recommendation achievable?

The recommended MPSC process should be initiated before 2025, however the changes resulting from the process may take longer.

3) What is the relative magnitude of this recommendation, in terms of GHG emissions reductions?

The policy and regulatory changes that would be identified after the pathways analysis have the potential to help Michigan achieve net zero emissions from natural gas production, transmission, distribution, compression, storage, and end uses. Looking at carbon emissions from natural gas end-use combustion in the residential, commercial, industrial, and transportation sectors (excluding natural gas for electricity generation), this recommendation has the potential to reduce up to 39.5 million metric tons of carbon dioxide emissions. This recommendation also has the potential to reduce methane leakage from the natural gas system. Methane doesn't last in the atmosphere as long as carbon dioxide, but it has a much higher warming potential, making it more potent and concerning from climate standpoint.

4) Describe the potential impacts of this recommendation on environmental justice.

It is important that this process include the perspectives of environmental justice communities and advocates. Any pathway to achieve net zero greenhouse gas emissions from the natural gas system will likely have environmental justice and equity implications. For example, switching from geologic natural gas to renewable natural gas may reduce greenhouse gas emissions, but may still result in public health concerns with respect to indoor air quality. This can be mitigated with better ventilation in homes, but it should not be ignored. Electrification may also have implications, as serving Michigan's building heating load with electric heat pumps would likely require a significant build out of the electric system to serve the winter heating peak – the siting of the infrastructure should be done carefully and with input from local communities.

Finally, without policy intervention to address affordability, electrification of natural gas end uses could result in a scenario where the fixed costs of the gas system need to be spread out across fewer units of gas sold and/or fewer customers, raising gas rates. In particular, the customers least able to adopt electrification technologies may be stuck with much higher energy bills. This will need to be carefully mitigated.

5) **Describe the potential impacts of this recommendation on labor.**

Any pathway to achieve net zero greenhouse gas emissions from the natural gas system will likely create both challenges and opportunities for Michigan's workforce. The specific impacts will depend on which pathway is ultimately pursued. For example, significant electrification may create new workforce opportunities for workers in the electric sector, but may reduce opportunities for workers in the gas sector. These impacts should be considered as part of the process outlined above. To the extent there will be new workforce opportunities, the state should work to facilitate fair and equitable access to those opportunities.

6) **Describe the potential impacts of this recommendation on the environment.**

The goal of this process is to significantly reduce greenhouse gas emissions. However, all fuels and technologies may have environmental impacts. Significant electrification may require greater land use for renewable energy such as wind and solar. If sited appropriately and with community input, renewables can be sited to minimize environmental impacts and maximize co-benefits, such as pollinator friendly habitat planted under solar panels. Significant development of ne-zero emissions gaseous fuels may also have environmental impacts. Producing green hydrogen for industry would likely have many of the same environmental impacts as electrification, given that wind and solar will be needed to power electrolyzers. Renewable natural gas would have reduced lifecycle GHG emissions, but would still emit some air pollution at the point of combustion.

7) **Describe the potential impacts of this recommendation on economic development.**

The actions resulting from this process will likely create several economic development opportunities. Regardless of the fuels or technologies being deployed, any pathway to achieve net zero emissions from the gas system will require significant investment in research, development, and deployment, including building out new infrastructure.

8) **What are the relative costs of this recommendation? Unknown, or different timeframe – explain why:**

The stakeholder engagement process outlined above would be very inexpensive in comparison to magnitude of investment that will be needed to significantly reduce emissions from the industrial sector. A year-long stakeholder engagement process could cost around $300,000 to $500,000, though the costs may vary depending on the process design and extent of modeling required.

Achieving net zero emissions from the gas system will be expensive, and the costs will depend on a number of factors, including the mix of fuels and technologies deployed, policy favorability for those fuels and technologies, competition for net zero emissions fuels from other sectors (such as transportation), and the relative cost of conventional natural gas, which would impact the incremental cost of net zero emissions options. Recent modeling conducted in Minnesota found that, by 2050, achieving net zero emissions from natural gas end uses in that state would incur an incremental cost of $9 billion to $20 billion annually (in nominal dollars).

Source (figure 22 on page 47): https://e21initiative.org/wp-content/uploads/2021/07/Decarbonizing-NG-End-Uses-Stakeholder-Process-Summary.pdf

9) **Who is empowered to implement this recommendation?**

State Government – Executive

Michigan Public Service Commission

10) **Is there consensus among the subgroup for this recommendation, or are there differing perspectives? If differing perspectives, what are they?**

There was broad support, if not consensus, amongst the workgroup for conducting the pathways analysis described in this recommendation. There was also broad support for the idea that the pathways analysis should inform the development of policies and frameworks to reduce greenhouse gas emissions from the gas system. However, there is debate about which policies and frameworks should be considered, including a variety of perspectives on whether and how a wind down of the natural gas system should be considered. There is also debate about the specific fuels and technologies that should be considered to achieve net zero emissions. Importantly, the process that is recommended could provide a venue for stakeholders to continue discussing these perspectives.

11) **What are the most important considerations for achievability and feasibility of this recommendation?**

The pathways analysis is vital to this recommendation. In order for the modeling results to be trusted by stakeholders, there should be an effort to build agreement on the modeling inputs and assumptions so that stakeholders can discuss the meaning of the results, rather than discuss whether the results are accurate or not.