October 28, 2021

Ms. Lisa Felice
Michigan Public Service Commission
7109 W. Saginaw Hwy.
P. O. Box 30221
Lansing, MI 48909

RE: MPSC Case No. U-21090

Dear Ms. Felice:

The following is attached for paperless electronic filing:

Direct Testimony on Behalf of The Environmental Law & Policy Center, Ecology Center, The Union of Concerned Scientists and Vote Solar:

Joe Daniel
Chelsea Hotaling
Will Kenworthy
Alison Sutter
Elena Krieger
Kelsey Bilsback
Synia Gant-Jordan

Proof of Service

Sincerely,

Margrethe K. Kearney

Margrethe Kearney
Environmental Law & Policy Center
mkearney@elpc.org

cc: Service List, Case No. U-21090

STATE OF MICHIGAN
MICHIGAN PUBLIC SERVICE COMMISSION

In the matter of the application of **CONSUMERS ENRGY COMPANY** for approval of its integrated resource plan pursuant to MCL 460.6t and for other relief.	)))))	Case No. U-21090

DIRECT TESTIMONY OF

JOSEPH DANIEL

ON BEHALF OF

THE ENVIRONMENTAL LAW AND POLICY CENTER,
THE ECOLOGY CENTER,
UNION OF CONCERNED SCIENTISTS
AND
VOTE SOLAR

October 28, 2021

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I. STATEMENT OF QUALIFICATIONS

Q. Please state your name and business address.

A. My name is Joseph M. Daniel. Prior to the COVID-19 pandemic, I worked from the Union of Concerned Scientists office at 1825 K street NW, Suite 800, Washington DC 20006.

Q. By whom are you employed and in what capacity?

A. I am employed by the Union of Concerned Scientists ("UCS") as a Senior Energy Analyst and Manager, Electricity Markets. In that capacity, I conduct objective economic and technical analysis of energy policy and the electric sector. In my role, I lead research and advocacy efforts to shape state energy policies and electricity markets in order to develop a modern electric grid that can accommodate high levels of renewable energy, demand-side resources, and electric vehicles.

Q. Please describe the Union of Concerned Scientists.

A. The Union of Concerned Scientists was founded in 1969 by scientists and students at the Massachusetts Institute of Technology. UCS employs scientists, analysts, economists and engineers to develop and implement innovative, practical solutions to some of the most pressing problems that society faces today—from developing sustainable ways to feed, power, and transport ourselves, to reducing the threat of nuclear war. UCS's mission is to put rigorous, independent research to work by combining technical analysis and effective advocacy to create policy solutions for a healthy, safe, and sustainable future.[1]

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[1] For more information, including UCS's history and mission statement, visit: https://www.ucsusa.org/about-us.

Q. On whose behalf are you testifying?

A. I'm testifying on behalf of Environmental Law & Policy Center, the Ecology Center, the Union of Concerned Scientists, and Vote Solar, which are referred to collectively as the Clean Energy Organizations, or CEOs.

Q. Please describe your educational background and professional affiliations.

A. I hold a Bachelor of Science in Chemical Engineering from the Florida Institute of Technology and a Master of Public Administration in Environmental Science and Policy from Columbia University in the City of New York. I also hold a certificate in Petroleum Fundamentals from the University of Texas.

I am a member of the American Economic Association, the International Association for Energy Economists, and the US Association for Energy Economics. I am also a recurring guest lecturer at various academic institutions including Columbia University and Johns Hopkins University.

Q. Please describe your professional background and work experience.

A. I have 15 years of experience working on energy issues from engineering, regulatory, and economic perspectives. In my current work at UCS, I focus on energy system planning and the deployment and integration of clean energy technologies. I have applied my technical expertise on these topics in regulatory proceedings at the state, regional, and national level. This includes serving as a participant in the joint NARUC-NASEO Task Force on Comprehensive Electricity Planning[2] and presenting at the National Council on Electricity Planning on stakeholder engagement.

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[2] For more information: https://www.naruc.org/taskforce/

I began my career as an engineer working for Baker Hughes where I conducted engineering studies at power plants, co-generation facilities, and petroleum refineries. I conducted engineering performance analyses at refineries across the US including Texas, Washington, Louisiana, California, Delaware, New Jersey, and Hawaii.

In 2010, I was awarded a fellowship to work with the Deputy Mayor of Tel Aviv. There I worked with the Deputy Mayor, her staff, the office of the mayor and the city council to help quantify and monetize the social and economic benefits of existing and proposed policies.

After Tel Aviv, I went on to graduate school where I focused on energy and environmental economics while enrolled at Columbia's School of International and Public Affairs, Environmental Science and Policy Program.

After earning my MPA, I conducted economic and technical analysis of utility plans on behalf of public interest clients while employed at Synapse Energy Economics. At Synapse, my clients included state and federal government agencies, state utility commissions, consumer advocates, rural affair advocates, and environmental advocates.

Prior to being hired by UCS, I was employed by the Sierra Club where I reviewed numerous utility filings related to utility integrated resource plans and long-term resource plans, PURPA, net metering, energy efficiency avoided costs, and environmental compliance plans.

My resume is attached to this testimony as Exhibit CEO-1 (JD-1).

Q. Have you provided testimony as an expert before this Commission?

A. Yes. I testified in the 2018-19 Consumers Energy IRP, Case No. U-20195, in the 2019 DTE IRP, Case No. U-20471, and in the 2021 Consumers Rate Case, Case No. U-20963

Q. Have you provided testimony or comment as an expert in other forums?

A. Yes. I presented public testimony to the U.S. Environmental Protection Agency regarding its proposal to delay implementation of the Effluent Limitation Guidelines under the Clean Water Act, providing my expert opinion on the costs of delayed implementation.[3] I provided a declaration to the Federal Court of Appeals in *Sierra Club, et al., v. FERC*, 867 F.3d 1357 (D.C. Cir. 2017), testifying regarding the utilization of the Sabal Trail gas pipeline and the electric system's ability to meet electric demand.[4] I presented a framework for calculating avoided costs of rooftop solar projects to Commission Staff at one of the Arkansas Net Metering Working Group meetings.[5] I have also assisted in the composition of regulatory comments in dockets across the country, including Pennsylvania Avoided Costs[6] and comments associated

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[3] Testimony on Proposal to Postpone Certain Compliance Dates for the Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category. Docket No. EPA-HQ-OW-2009-0819. Public Hearing in Washington, D.C. July 31, 2017.

[4] Declaration of Joseph Daniel. *Sierra Club, et al., v. Federal Energy Regulatory Commission, Duke Energy Florida, et al.*, United States Court of Appeals Case #16-1329. October 31, 2017. Available online: http://blogs2.law.columbia.edu/climate-change-litigation/wp-content/uploads/sites/16/case-documents/2017/20171110_docket-16-1329_response.pdf

[5] Presentation to Arkansas Public Service Commission Staff on a Framework for Calculating Avoided Costs of Rooftop Solar. On behalf of Net Metering Working Group, Sub-Group 1. Docket No. 16-027-R, Implementation of Act 827 of 2015. Little Rock, AR. February 8, 2017

[6] Joint demand response comments on the tentative order on the Amended demand response study of: Citizens for Pennsylvania's Future; Clean Air Council; Keystone Energy Efficiency Alliance; the Sierra Club. Docket Numbers: M-2012-2289411 and M-2008-2069887 December, 2013. http://www.puc.state.pa.us/Electric/pdf/Act129/SWE_DRSFR-PF-CAC-KEEA-SC_C_111413TO.pdf

with a proceeding related to a renewable portfolio standard in New Orleans.[7] In 2020, I provided a declaration in *Union of Concerned Scientists v. The Department of Energy* detailing the value and need for certain types of data to be kept publicly available.[8] I co-authored UCS's public comments to the Federal Energy Regulatory Commission (FERC) and spoke at FERC's public listening session regarding the funding and formation of the Office of Public Participation. [9] Most recently, I presented on self-commitment issues at the FERC technical conference on Energy and Ancillary Services Markets on October 12, 2021.[10]

Q. Are you sponsoring any exhibits?

A, Yes. I am sponsoring one exhibit: Exhibit CEO-1 (JD-1): Resume of Joseph Daniel

II. <u>PURPOSE OF TESTIMONY</u>

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to explain why Consumers Energy Company's ("Consumers," or the "Company") use of the "must-run" constraint in IRP modeling is inconsistent and imprudent.

Q. Can you summarize your testimony?

A: First, I explain how the Company uses the must-run designation for its coal plants for some, but not all, of the IRP model runs, and explain the impact of that decision. Then

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[7] The Alliance for Affordable Energy's First Comments. Responsive to Resolution R-19-109 https://www.all4energy.org/uploads/1/0/5/6/105637723/2019_06_03_ud-19-01_aae_comments_final.pdf

[8] Daniel, J. 2020. Declaration of Joseph Daniel. Union of Concerned Scientists v. Department of Energy. United States Court of Appeals Case No. 20-1247. 2020

[9] Daniel, J., S. Gomberg, E. Sitko. 2021. Comments of the Union of Concerned Scientists on the Office of Public Participation. Public Comments before the Federal Energy Regulatory Commission. Docket No. AD21-9-000. April 23, 2021.

[10] Daniel, J. 2021. Comments Regarding Energy and Ancillary Services Markets. Technical Conference before the Federal Energy Regulatory Commission. Docket No. AD21-10-000. October 12, 2021

I explain why integrated resource planning does not require utilities to treat coal units as must-run resources and that removing the must-run designation is more appropriate in an IRP as it allows the model to select the most economic resources available.

Q. Can you summarize any recommendations you have for the Commission?

A. Yes. Given that a purpose of the IRP is to determine the economics of existing and new resources under a range of scenarios and sensitivities, the Commission should order the Company to set the must-run designation to "off" as the default setting for all thermal coal units in all scenarios and sensitivities.

III. CONSUMER'S USE OF MUST-RUN DESIGNATION

Q: How does the Company use must-run designations in its Integrated Resource Planning?

A. The Company assigns a "must-run" designation to all its coal units. This designation forces the model to run coal plants at a minimum capacity factor regardless of economics; the coal units "must-run" no matter what. However, the Company removes the must-run designation for the carbon price sensitivities in order to determine the economics of the coal plants under a carbon price.

Q. Can you please describe the Company's treatment of coal units in modeling?

A. The company applies the must-run constraint in the base case and most of the other scenarios/sensitivities. This forces the model to run the coal units at some minimum level in all years where the units are in service, regardless of economics.

Q. What reasons does the company provide for this decision?

A. The Company stated in discovery that the must-run designation is applied to coal units in most scenarios due to the Company's concerns about physical constraints of its coal units (such as concerns around cycling, physical minimum operating level, minimum up time, minimum down time, etc.). The company further asserts that the coal units will be offered into the MISO market as "must-run" resources.[11]

Q. Are there any exceptions to the company's use of must-run?

A. Yes. In an attachment to both direct testimony and discovery requests, the Company explains how the must-run designation was treated in the carbon price sensitivities and risk analysis. The Company asserts that:

> *[The] "must-run" designation was turned off for all thermal generating units in the model... This change in designation allowed the Aurora model the option to choose to either dispatch that thermal unit under the assigned carbon price, or remove the unit from service when it is unecomomic[sic] and choose to dispatch other resources or purchase energy from the market.*[12]

> *[O]nly the must run designation was removed, in order to provide a theoretical approximation of the reduction in generation that may result from coal units dispatching under a carbon price. Operational constraints associated with coal units, such as minimum up and down time, would still be of concern for daily operations, but those concerns were not formally accounted for in risk analysis.*[13]

Q. Does it make sense to remove the must-run designation for the carbon price sensitivities / risk analysis?

A. Yes, it makes sense to remove the must-run designation for a carbon price because a carbon price is going to have a significant impact on coal plant economics. As the

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[11] U21090-ELPC-CE-199.
[12] Munie Direct at 25.
[13] Company response to DR U21090-ELPC-CE-200.

company points out, a carbon price will increase coal electricity costs.[14] Generally speaking, this increase in costs will mean that there are fewer hours in the year when it is economic to operate a coal plant and result in less dispatch of coal.[15]

Q. What is the effect of removing the must-run designation?

A. Removing the must-run designation allows the model to select to dispatch the unit or remove it from service.[16] Removing the must-run constraint in the carbon price sensitivities is prudent because a carbon price is likely to significantly change the number of hours that a coal plant is economic to operate.

Q. Does it make sense to leave the must-run designation on for the other scenarios and sensitivities?

A. No. This function (selecting to dispatch a unit economically or remove it from service) should be part of all scenarios and sensitivities because a core function of an IRP is to determine the relative economics of different resources in a wide range of sensitivities and scenarios. Moreover, a carbon price is only one variable among many that impact the number of hours in a year when it is economic to run a coal plant.

Q. What else can have that same relative effect?

A. Several variables will impact a coal plant's relative economics. Increased renewable adoption, low gas prices, increased adoption of rooftop solar, demand response, and energy efficiency are all variables that will impact wholesale market prices in such a way that there will be fewer hours of the year when it makes economic sense to run a

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[14] Company response to DR U21090-ELPC-CE-200.

[15] Butner, M. Ph.D., et. al., "Carbon Pricing in Wholesale Electricity Markets." Institute for Policy Integrity. March 2020. Available online at: https://policyintegrity.org/files/publications/Carbon_Pricing_in_Wholesale_Electricity_Markets_Report.pdf

[16] Munie Direct at 25.

coal plant (holding all other variables constant). For example, a 2017 study from Columbia University found that 93% of the historical decline in coal generation in the US was a result of low natural gas prices, increased renewables adoption, and lower-than-expected demand.[17] Other studies have drawn similar conclusions.[18] The best way to account for all these variables when determining when and how often a coal plant is economic, is to allow the model to endogenously make those determinations by removing the must-run designation.

Q. Does the Company have scenarios or sensitivities where the aforementioned variables change?

A. Yes. Consumers explicitly has scenarios and sensitivities with varied gas prices and higher adoption levels of demand side resources such as energy efficiency, demand response, and rooftop solar.

Q. Is the must-run designation the only option?

A. No. As the company does in the carbon price sensitivities, the must-run designation can be turned off. And while the company asserts that it plans on operating the coal plant as must-run, there are alternative options. Many coal plant operators have moved away

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[17] Houser, T., et. al., April 2017. Columbia University. "Can Coal Make a Comeback?" https://energypolicy.columbia.edu/sites/default/files/Center%20on%20Global%20Energy%20Policy%20Can%20Coal%20Make%20a%20Comeback%20April%202017.pdf

[18] *See generally*:
Fell, H., et. al., 2018. "The Fall of Coal: Joint Impacts of Fuel Prices and Renewables on Generation and Emissions" American Economic Journal: Economic Policy. https://pubs.aeaweb.org/doi/pdfplus/10.1257/pol.20150321
Rystad Energy. 2019. "Cheap gas is killing coal in the US." https://www.rystadenergy.com/newsevents/news/press-releases/Cheap-gas-is-killing-coal-in-the-US/
Gruenspecht, H. 2019. "The U.S. Coal Sector: Recent and Continuing Challenges." https://www.brookings.edu/wp-content/uploads/2019/01/H.Gruenspecht_U.S.-Coal-Sector_Final_Jan_20191.pdf

from must-run, including in MISO where usage of it has been declining.[19] Additionally, some MISO utilities now offer their coal units in on a seasonal basis.[20, 21]

Q: How have those companies explained their decision to eliminate the designation of coal units as must-run resources?

A: In every example that I am aware of, economics have been the stated reason, or part of the stated reason. In MISO, Cleco and Xcel have both changed the operational paradigm of their coal plants due to the changing market conditions that make their coal plants uneconomic to operate all year long. Cleco operated the Dolet Hills coal plant in Louisiana. The company's 2018 estimate indicated that its decision to switch to seasonal operations would save ratepayers $85 million by 2020. Xcel Energy similarly found that changing its coal unit operations from must-run to economic dispatch would save customers tens of millions a year in operating costs, and switching to seasonal operation would save millions more in operation and maintenance costs.[22] One way for Consumers to make this type of determination is for it to turn off the must-run designation in the IRP to see if the application of that setting is in the ratepayers' best interest.

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[19] MISO IMM 2020. IMM Quarterly Report: Winter 2020. March 24, 2020. https://cdn.misoenergy.org/20200324%20Markets%20Committee%20of%20the%20BOD%20Item%2006%20IMM%20Quarterly%20Report437855.pdf

[20] "Xcel Minnesota: Running coal seasonally will save customers millions, reduce emissions" https://www.utilitydive.com/news/xcel-minnesota-running-coal-seasonally-will-save-customers-millions-reduc/569971/

[21] https://www.ksla.com/2018/12/05/swepco-announces-coal-mine-layoffs/

[22] Minnesota PSC DOCKET NO. E002/M-19-___ https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPoup&documentId=%7b6045256F-0000-CB17-8630-C2EEBC86BB66%7d&documentTitle=201912-158520-01

Q. Is this trend unique to MISO?

A. No. Outside of MISO, many coal units are offered on an economic basis or seasonal basis, such as in the Southwest Power Pool.[23] This trend to operate coal plants less is also reflected in national trends. Nationally, the average capacity factor for coal units has dropped from 63 percent in 2011 down to 40 percent in 2020 —yet, in its modeling, Consumers forced multiple coal units to run at higher capacity factors.[24]

IV. RECOMMENDATIONS

Q. What are your recommendations?

A. The Commission should order the Company to set the must-run designation to "off" as the default setting for all thermal coal units in all scenarios and sensitivities in its next IRP. The Commission should be clear in its final order that it expects all utilities subject to Commission regulation in Michigan to remove the must-run designation for coal units in all scenarios and sensitivities.

Q. Does this conclude your testimony?

A. Yes.

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[23] SPP MMU. "Self-Committing in SPP Markets." https://www.spp.org/documents/61451/stakeholder%20presentation,%202.3.2020%20-%20self-committing%20in%20spp%20markets%20overview,%20impacts,%20and%20recommendations.pdf

[24] EIA Table 6.07.A. Capacity Factors for Utility Scale Generators Primarily Using Fossil Fuels. https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=epmt_6_07_a

STATE OF MICHIGAN
MICHIGAN PUBLIC SERVICE COMMISSION

In the matter of the Application of **CONSUMERS ENERGY COMPANY** for approval of an Integrated Resource Plan under MCL 460.6t, certain accounting approvals, and for other relief	) **)**)))	Case No. U-21090

DIRECT TESTIMONY OF

CHELSEA HOTALING

ON BEHALF OF

THE ENVIRONMENTAL LAW AND POLICY CENTER,
THE ECOLOGY CENTER,
UNION OF CONCERNED SCIENTISTS
AND
VOTE SOLAR

October 28, 2021

I. INTRODUCTION AND QUALIFICATIONS

Q1. PLEASE STATE FOR THE RECORD YOUR NAME, POSITION, AND BUSINESS ADDRESS.

A1. My name is Chelsea Hotaling. I am a Consultant at Energy Futures Group. My business address is 30 Court St., Canton, NY 13617.

Q2. PLEASE SUMMARIZE YOUR BUSINESS AND EDUCATIONAL BACKGROUND.

A2. I have worked for five years in electric utility regulation and related fields. I have reviewed over a dozen integrated resource plans ("IRPs") and related filings by utilities located in Arizona, Colorado, Kansas, Indiana, Missouri, Montana, Minnesota, New Mexico, Nova Scotia, Puerto Rico, and South Carolina. I have performed my own capacity expansion and production costing modeling in numerous cases using EnCompass (the same tool DTE now uses). I have reviewed planning modeling based on multiple models including EnCompass, Aurora, PLEXOS, PowerSimm, and System Optimizer. I have had formal training on the EnCompass, Aurora, and PowerSimm models. Finally, I was responsible for developing most of the analytics underpinning an IRP produced by a small retail cooperative in Vermont.

I hold a B.S. in Accounting and Economics from Elmira College, and a Master's in Business Administration, Master's in Data Analytics, and a Master's in Environmental Policy and Governance from Clarkson University. My work experience is summarized in my resume, provided as Exhibit CEO-2 (CH-1).

Q3. **HAVE YOU TESTIFIED PREVIOUSLY BEFORE STATE UTILITY COMMISSIONS**?

A3. Yes. I have previously submitted testimony before the Colorado Public Utilities Commission.

Q4. ON WHOSE BEHALF ARE YOU SUBMITTING TESTIMONY?

A4. I am submitting testimony on behalf of the Environmental Law & Policy Center, the Ecology Center, the Union of Concerned Scientists, and Vote Solar (collectively, the "Clean Energy Organizations" or "CEO").

Q5. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A5. I was responsible for Aurora modeling conducted on behalf of the CEO. This modeling examined the impact on portfolio cost of replacing a portion of the utility scale solar in Consumers' Proposed Course of Action ("PCA") with two types of distributed ("DG") solar. One tranche is the DG solar that witness Will Kenworthy forecasts would be adopted in Consumers' service territory if a $40 per MWh incentive were made available. The second tranche assumes that a ten-year, $10 million per year budget to support low-income solar is adopted by Consumers. Mr. Kenworthy describes the details of these proposed programs in his testimony.

Q6. PLEASE DESCRIBE HOW YOU CONDUCTED THIS MODELING.

A6. My clients were one of the parties to receive an Aurora license from Consumers for purposes of this proceeding. Consumers also shared with us its Aurora project files that were used to conduct the analyses described in its IRP and accompanying testimony. After receipt of those files, Energy Futures Group tried to align them with information contained in the testimonies of Sara T. Walz and Anna Munie. Because of the difficulty in doing so, my colleague, Anna Sommer and I, consulted with Consumers' IRP modeling team and received additional information that clarified how the runs discussed in the testimony of Ms. Walz, in particular, align with the project files our clients received. I then relaunched Consumers' PCA Aurora run, verified that the "PVRR" value derived from the run was sufficiently close to that reported by Consumers and used Consumers' PCA project file and change set as the basis for the changes described by Mr. Kenworthy.

The only additional modification I made to the PCA was to reduce the level of utility scale solar in line with the level of distributed solar contemplated under Mr. Kenworthy's tranches. This may mean that the total remaining utility scale solar represents project sizes that are different than what Consumers modeled. This is not an unreasonable approach, because solar is a modular resource that does not need to be acquired in a few discrete blocks in the same way that thermal generators do, and because IRPs, as a general matter, are inherently approximations of the resources that a utility will ultimately acquire. This step was necessary because the PCA resources were forced in, not the result of strict resource optimization. If I had kept the PCA resources as filed by Consumers and simply added in the DG resources on top, that would have both overstated total cost and obscured the cost impacts of the distributed solar.

Q7. WHAT WAS THE RESULT OF THE CHANGES YOU MODELED?

A7. Table 1, below, shows the results of this modeling.

Table 1. PVRR Results of Consumers and ELPC, et. al modeling (000$)

Consumers' PCA (as reported)	***Re-Simulation of Consumers' PCA (Difference from Consumers' PCA)***	***PCA with ELPC et. al DG Solar (Difference from Consumers' PCA)***
$18,587,796	$18,580,838 (-0.04%)	$18,576,193 (-0.06%)

Q8. DOES THIS CONCLUDE YOUR TESTIMONY?

A8. Yes, it does.

STATE OF MICHIGAN
BEFORE THE MICHIGAN PUBLIC SERVICE COMMISSION

In the matter of the application of Consumers Energy Company for Approval of an Integrated Resource Plan under MCL 460.6t, certain accounting approvals, and for other relief.	))))	Case No. U-21090

DIRECT TESTIMONY OF WILLIAM D. KENWORTHY

ON BEHALF OF THE ECOLOGY CENTER, THE ENVIRONMENTAL LAW & POLICY CENTER, AND VOTE SOLAR

October 28, 2021

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I. <u>Witness Identification and Qualifications</u>

Q: Please state your name, business name and address.

A: My name is William D. Kenworthy. My business address is 332 South Michigan Avenue, 9th Floor, Chicago, Illinois 60604.

Q: By whom are you employed and in what capacity?

A: I serve as Regulatory Director, Midwest for Vote Solar. I oversee policy development and implementation related to large scale and distributed solar generation in the region. I also review regulatory filings, perform technical analyses, and testify in commission proceedings on issues relating to solar generation and the distribution grid.

Q: What is Vote Solar?

A: Vote Solar is an independent 501(c)3 nonprofit working to repower the U.S. with clean energy by making solar power more accessible and affordable through effective policy advocacy. Vote Solar seeks to promote the development of solar at every scale, from distributed rooftop solar to large utility-scale plants. Vote Solar has over 120,000 members nationally, including over 5,000 members in Michigan. Vote Solar is not a trade organization, nor does it have corporate members.

Q: On whose behalf are you submitting this direct testimony?

A: I appear here in my capacity as an expert witness on behalf of the Ecology Center, Environmental Law & Policy Center ("ELPC"), and Vote Solar (collectively, the "Clean Energy Organizations" or "CEO").

Q: Can you please summarize your qualifications, experience and education?

A: I have nearly 30 years of experience in the energy industry in both the public and private sectors working in the renewable energy business and in energy policy. Of that experience, I spent eight years in solar energy project development working primarily on commercial and industrial distributed solar projects in the Midwest.

Prior to Vote Solar, I was Managing Director – Midwest for Microgrid Energy, where I was responsible for leading Microgrid Energy's expansion of its solar project development capabilities into markets in the Midwest. As a solar project developer, I analyzed financial and economic aspects of projects. This involved understanding all aspects of project finance and economics for our customers, partners, and financiers. My project development experience includes project finance, rate analysis, economic modeling, risk assessment, regulatory compliance, sales, and customer relations.

During my tenure at Microgrid Energy, we completed the Solar Chicago program, a residential bulk purchase program, as well as a number of commercial projects ranging in size from 25 kW to 2 MW. Prior to that, I was a partner with Tipping Point Renewable Energy based in Dublin, Ohio, where we developed what was at the time the largest rooftop solar project in Ohio for the City of Columbus.

In addition, my tenure at Microgrid Energy was punctuated with a one-year hiatus during which time I served as President of Infer Energy, currently Root3 Technologies. Infer Energy provided energy optimization services to large commercial and industrial energy users. We used advanced data analytics and machine learning algorithms to optimize complex energy systems. Prior to joining the solar energy industry, I worked on energy policy at the federal and state level for over 20 years. As a consultant, I represented electric utilities and other industry participants before Congress, the Department of Energy, the Nuclear Regulatory Commission, the Environmental Protection Agency, and the Office of Management and Budget. I began my career as a Professional Staff Member to the House

Energy & Commerce Committee, where I represented Chairman John D. Dingell and other majority members of the Committee in negotiations and legislative drafting on nuclear regulatory matters, the Clean Air Act Amendments of 1990, and electric industry structure issues, among others.

I received a Master of Public & Private Management degree from the Yale University School of Management with a concentration in Regulation and Competitive Strategy. My research in graduate school focused on regulatory theory and practice. I also have a Bachelor of Science in Foreign Service from Georgetown University.

A copy of my resume is included as Exhibit CEO-3 (WDK-1).

Q: Have you testified before the Michigan Public Service Commission Previously?

A: Yes. I provided direct and rebuttal testimony in Case No. U-20162 (DTE rate case), Case No. U-20471 (DTE IRP), Case No. U-20359 (I&M rate case), Case No. U-20561 (DTE rate case), Case No. U-20649 (Consumers VGP Case), Case No. U-20697 (Consumers Energy rate case), and Case Nos. U-20713/U-20851 (DTE Consolidated VGP and REP Amendment).

Q: Have you testified or provided comments in similar state regulatory proceedings?

A: Yes. In addition to testimony noted above before the Michigan Public Service Commission, I have provided testimony in rate cases before the Iowa Utilities Board and the Wisconsin Public Service Commission. I have provided testimony on community solar services, the value of distributed energy resources, and the calculation of distributed generation penetration before the Illinois Commerce Commission. I also have provided comments in numerous proceedings before the Illinois Commerce Commission, the Illinois Power Agency, the Minnesota Public Utility Commission, and the Wisconsin Public Service

Commission. A list of testimony and comments that I have filed is included as Exhibit CEO-3 (WDK-2).

Q: Are you sponsoring any exhibits?

A: Yes, I am sponsoring the following exhibits:

- Exhibit CEO-3 (WDK-1) – Resume of William D. Kenworthy
- Exhibit CEO-3 (WDK-2) – List of Testimony and Comments of William D. Kenworthy
- Exhibit CEO-3 (WDK-3) – DG as a Resource Model

II. PURPOSE OF TESTIMONY

Q: What is the purpose of your testimony?

A: The purpose of my testimony is to review and make recommendations on several aspects of Consumers Energy's Integrated Resource Plan ("IRP" or the "Plan"), with a focus on the progress that the Company has made in aligning resource planning with distribution system planning, and on the failure of the plan to appropriately consider distributed generation resources.

Q: Please summarize your conclusions and recommendations.

A: I recommend that:

- The Commission should direct the Company to continue to improve the evaluation of distribution system benefits in considering resources offered to IRP modeling.
- The Commission should direct the Company to initiate a pilot program to test the DG adoption model proposed here and to conduct benefit-cost analysis in the study to serve as a basis for a fully realized Distributed Generation Resource model in future IRPs.

- The Commission should direct the Company to initiate a Low-Income DG as a Resource pilot program.
- The Commission not approve the Company's proposal that QFs smaller than 150 kW should no longer be eligible to receive the full PURPA avoided cost rates under the standard offer contract.

III. <u>Alignment of Integrated Resource Plan with Distribution System Planning</u>

Q: What steps has the Company taken to improve the integration of transmission and distribution planning with resource planning in this IRP?

A: Company Witness Mr. Richard Blumenstock discusses several steps the Company has taken to integrate planning processes across the Company. First, the Company worked with the local transmission owner during the consideration of various portfolios and retirement plans on the transmission system. In addition, in designing the distribution-connected solar resources that were offered to the model, the resource planners worked with distribution planners "to design proxy units for solar and batteries including distribution-level value and benefits, and network upgrade and interconnection costs at the distribution level (46kV and below)…"[1] Mr. Blumenstock also noted that the Company filed its 5- and 10-year Electric Distribution Infrastructure Investment Plan ("EDIIP") concurrently with the IRP filing.

[1] Direct Testimony of Richard T. Blumenstock, *In the Matter of the Application of Consumers Energy Company for Approval of an Integrated Resource Plan under MCL 460.6t, certain accounting approvals, and for other relief*, Docket No. U-21090, June 30, 2021 ("Blumenstock Direct"), pg. 46.

Q: Please describe the distribution system benefits that the Company analyzed.

A: Company Witness Mr. Nathan J. Washburn explains the development of the Battery Energy Storage System ("BESS") prototypes in the IRP modeling.[2] In order to evaluate different use cases for the energy storage, the Company developed four different resource prototypes that were modeled to show how the technology could capture different value streams:

1) Energy and Capacity;

2) Solar Plus Storage;

3) Distribution Asset Upgrade Deferral; and

4) Ancillary Services Market.

In order to build these use cases into Aurora, the value of each of these use cases were calculated outside of Aurora and provided for each prototype as a credit that reduced the cost of the asset in Aurora.

Q: Do the Company's BESS modeling efforts improve the ability of the Company, the Commission, and stakeholders to evaluate benefits and costs across planning frameworks?

A: Yes, the Company's modeling represents a new effort to incorporate benefits in the distribution system that can be realized through resources offered to the resource plan.

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[2] Direct Testimony of Nathan J. Washburn, *In the Matter of the Application of Consumers Energy Company for Approval of an Integrated Resource Plan under MCL 460.6t, certain accounting approvals, and for other relief*, Docket No. U-21090, June 30, 2021 ("Washburn Direct").

Q: In calculating the need for distribution system capacity upgrades for the BESS valuation calculations, how does the Company forecast future load growth?

A: Mr. Washburn explains:

> Substations were deemed eligible for deferral if their existing load was over 80%, and their projected overload year was between 2020 and 2040. A substation's existing load was defined as the highest peak demand from 2015 to 2019. The annual load growth rate was calculated based on the annual peaks during that same period. The projected overload year was determined by applying the annual load growth rate to the existing substation loading.[3]

Q: How could this approach be strengthened?

A: While the approach described by Mr. Washburn is simple, future load changes from increased beneficial electrification as well as load profile changes from increased adoption of distributed energy resources are likely to accelerate. As we have discussed in the context of distribution system planning, a more sophisticated and granular approach to load forecasting would provide a more meaningful analysis.

Q: Do you have other suggestions about the valuation of distribution asset deferral?

A: In comments submitted by several environmental groups on the Company's Draft Electric Distribution Infrastructure Investment Plan in June, we suggested that the Company should consider soliciting bids from third parties for Non-Wires Solutions.[4] While this suggestion applies generally to all resource procurement solutions, it is particularly salient here as

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[3] Washburn Direct at 14.

[4] Comments of the Environmental Groups on Consumers Energy Company's Initial Draft of the Electric Distribution Infrastructure Investment Plan ("EDIIP") 2021-2025, *In the matter, on the Commission's own motion, to open a docket for certain regulated electric utilities to file their distribution investment and maintenance plans and for other related, uncontested matters*, Docket U-20147, June 1, 2021.

utilities have operationalized this approach in other states. For example, PGE has solicited a Request for Offers in its Distribution Investment Deferral Framework.[5]

Q: What do you recommend with respect to the evaluation of distribution system and transmission system benefits in IRP modeling?

A: The Company's modeling of the storage prototypes represents an advancement in the efforts to integrate resource, transmission, and distribution system planning. The Commission should direct the Company to continue to improve the evaluation of distribution system benefits in considering resources offered to IRP modeling. In addition, as discussed above, the Company should include market solicitations for deferral opportunities to make sure that it can take advantage of DERs to address discrete system costs.

IV. Distributed Generation in the IRP

A. Solar Resources Modeled by Consumers Energy

Q: What types of solar generation did the Company consider in its planning process?

A: The Company included two different types of solar in its modeling: distribution-connected solar and transmission-connected solar. The Company's "distribution-connected" resource recognizes the different cost and performance characteristics of solar connected to the distribution grid. In addition, the Company considered, but did not model, distributed generation as a resource.

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[5] https://www.pge.com/en_US/for-our-business-partners/energy-supply/electric-rfo/wholesale-electric-power-procurement/fall-2021-didf-rfo.page

Q: Please explain the difference between distribution-connected solar and distributed generation as the Company uses the terms.

A: As used by the Company throughout the Plan and in the testimony of Company witnesses, the term "distribution-connected solar" refers to front-of-the-meter, small wholesale generators. These projects are similar to the 584 MW of projects from the PURPA QFs that were accepted in the settlement agreement in Case No. U-20165. In contrast, the Company uses the term "distributed generation" to refer to behind-the-meter-generation ("BTMG"). To be more specific, distributed generation seems to include generators currently eligible to participate in the Company's DG Program (Tariff C11.3). In the discussion below, I adopt these terms as used by the Company. In addition, I will refer to distributed energy resources ("DER") as a blanket term that can refer to both distribution-connected solar and distributed generation, as well as other types of generation, storage and hybrid resources connected to the distribution system

B. Treatment of Distribution-Connected Solar in Consumers' Plan

Q: What costs did the Company model for distribution-connected solar resources?

A: Company Witness Mr. Jeffrey E. Battaglia described the process that the Company used to estimate the capital costs for the distribution-connected solar prototype to represent projects connected at the 46 kV level and lower, but not customer-sited BTMG.[6] To set the price of the distribution connected solar, the Company compared the price of the recently signed Power Purchase Agreement ("PPA") for River Fork Solar to the PPA for Bay Windpower I – "a small-scale distribution connected PPA." The Company found that the

[6] Direct Testimony of Jeffrey E. Battaglia, *In the Matter of the Application of Consumers Energy Company for Approval of an Integrated Resource Plan under MCL 460.6t, certain accounting approvals, and for other relief*, Docket No. U-21090, June 30, 2021 ("Battaglia Direct), pg. 9.

PPA rate on the smaller project was 23% higher than the larger PPA and set that differential as "a representative market differential between the two scales of projects."[7]

Q: Do you agree with the Company's approach to the capital costs for distribution-connected solar?

A: No, the approach described by Mr. Battaglia compares a utility-scale solar project to a much smaller wind project. While the vintages are the same, there is no record to support comparing cost data from very different technologies and scales to set a price differential. In fact, the Company has actual cost data from fifteen PURPA QF projects up to the Company's current must buy obligation of 20 MW from its September 30, 2019 solicitation.[8] A better approach in the future would be to use data from competitive solicitations to inform cost assumptions for comparably sized solar projects.

Q: How is Distribution-Connected solar treated in the Advanced Technology Scenario?

A: Company Witness Walz explains that in the Advanced Technology Scenario, the Company modeled declining costs for distribution-connected solar resources. Specifically, the Advanced Technology scenario modeled a 50% reduction in the cost of the resources compared to the Business as Usual ("BAU") for both distribution-connected solar resources and energy storage by the end of the study period.[9]

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[7] Battaglia Direct, pg. 9.

[8] Direct Testimony of Keith Troyer, *In the Matter of the Application of Consumers Energy Company for Approval of an Integrated Resource Plan under MCL 460.6t, certain accounting approvals, and for other relief*, Docket No. U-21090, June 30, 2021 ("Troyer Direct"), pg. 33.

[9] Direct Testimony of Sara Walz, *In the Matter of the Application of Consumers Energy Company for Approval of an Integrated Resource Plan under MCL 460.6t, certain accounting approvals, and for other relief*, Docket No. U-21090, June 30, 2021 ("Walz Direct"), pg. 11.

Q: How does the lower cost impact the resources chosen by the model?

A: This lower cost results in the selection of more distribution-connected solar resources being selected in lieu of transmission-connected resources. Another factor in this cross-over between transmission-connected solar and distribution-connected solar resources is transmission network upgrade costs (i.e. avoided transmission costs).

Q: What conclusions does the Company reach regarding distribution-connected solar?

A: The Company's interpretation of this analysis is that the price competitiveness between transmission- and distribution- connected solar is relatively narrow, and the "breakeven point" – the price at which the overall economic comparison of the resources is equal – is somewhere within the ranges identified. Specifically, results indicated that if the cost of network upgrades or any other related transmission costs are higher than forecasted, and capital costs of renewable assets are at least 35% lower than forecast, distribution-connected resources may be a lower-cost option than transmission-connected resources.[10]

The Company's PCA does include incremental capacity additions, even compared to its previous plan, but does not distinguish between transmission- or distribution-connected solar since both are eligible to compete in the competitive selection process.[11]

C. Treatment of Distributed Generation in the Company's Plan

Q: Did the Company consider distributed generation as a resource in its preferred course of action in this IRP?

A: No. While the Company recognized DG as a potential resource, distributed generation was removed from the menu at the screening level prior to modeling. According to the Plan:

[10] Walz Direct, pg. 61
[11] Walz Direct, pb. 69

> Factors that were considered during the initial technical screening included appropriate control equipment to isolate or curtail power flow to ensure grid optimization, contractual and rate agreements with customers, and components of customer programs such as Distributed Generation programs."[12]

However, the Company concluded the DG would not be offered to the Aurora model as an option the model could select. The Company did not explain why distributed generation was screened out, but did indicate that it would "continue to monitor and understand trends and adoption rates of distributed generation resources in future planning processes."[13]

Q: Does the distribution-connected solar resource model represent behind-the-meter generation costs?

A: No. As Company Witness Battaglia pointed out, the Company's intention in the distribution-connected solar prototype was to represent projects connected at the 46 kV level and lower, but not customer-sited BTMG. The distribution-connected solar resources modeled by the company are assumed to be 20 MW and below.[14]

Q: Did the Company include BTMG as a supply-side resource?

A: Customer-sited BTMG was included as a separate supply side resource in the Advanced Technology Scenario in the modeling but not as a resource available for selection.[15] The Company did "lock in" some amount of incremental BTMG in some sensitivities to determine which resources would be "kicked out" of selection, and found that customer owned-solar programs tend to reduce the amount of transmission- or distribution-

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[12] Blumenstock Exhibit A-2 (RTB-2), pg. 138.
[13] Blumenstock Exhibit A-2 (RTB-2), pg. 138.
[14] Battaglia Direct,pg. 9.
[15] Walz Direct, pg. 64

connected solar resources.[16] In other words, the Company hard coded in some BTMG to compare costs in the sensitivities with and without BTMG, and to see what resources the model selected, but the Company did not offer BTMG a resource that the model could select on its own.

In addition, in modeling the BTMG, the Company continued the conventional practice of treating BTMG as a decrement to load in the load forecast rather than as a supply-side resource. As described by Company Witness Walz:

> Behind-the-meter generation is supply sources at customer locations. Since these are such small sources of electric supply, and since they are behind the meter and not accounted for on the utility distribution or transmission systems, the energy is modeled as a reduction in load instead of a supply resource.[17]

As noted above, although it was hard coded in (not selectable), the Company did include BTMG on the supply side of the modeling in the Advanced Technology Scenario. In the retirement base case, the Advanced Technology Scenario included 163 MW of BTMG. However, it appears in Ms. Walz workpaper WP-STW-7, that the number coded in was 157 MW.[18]

Q: Does the Company reach any conclusions about behind-the-meter generation?

A: In the end, the Company dismisses BTMG in developing the final PCA. As explained by Ms. Walz:

> The BTMG resource was evaluated to understand the portfolio changes associated with customer adoption of BTMG; but this resource was offered in at no cost, which

[16] Walz Direct, pg. 65
[17] Walz Direct, pp. 19-20
[18] Adding the values for Residential BTM and C&I BTM from Tab 4a of WP-STW-7, the IRP Assumptions Book.

obviously is not realistic. Due to uncertainty in adoption rates and resource costs, BTMG will not be included in the PCA at this time.[19]

Q: In the Settlement Agreement for the Company's last IRP, what did the Company agree to consider with respect to distributed generation in this IRP?

A: In testimony provided in the Company's previous IRP, Staff Witness Ms. Meredith Hadala proposed that "2% of the capacity planned to be acquired in every solicitation be reserved for a Customer Distributed Generation program." As part of the Settlement Agreement, the Company agreed that its next IRP would include: "Consideration of a distributed generation program, similar to Staff's Customer Distributed Generation Program proposed by Staff witness Meredith A. Hadala in this case."[20]

Q: What has the Company done to meet its obligations for considering distributed generation in the Settlement Agreement in U-20165?

A: Company Witness Mr. Keith Troyer explains that the Company voluntarily expanded its statutory cap of 1% of distributed generation on Category 1 and Category 2 distributed generation on January 1, 2021. Mr. Troyer then asserts that by expanding the DG cap, the Company fulfilled its obligations under the settlement agreement. He argues, "The voluntary expansion of the Company's DG tariff achieves the goal of facilitating increased customer access to rooftop solar."[21] In addition, the modeling work conducted by Ms. Walz on BTMG does consider distributed generation without specifically addressing the Ms. Hadala's proposal.

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[19] Walz Direct, pg. 69

[20] U-20165, June 7, 2019, Order approving Settlement Agreement, Exhibit A (Settlement Agreement), Paragraph 13(i), pg. 11.

[21] Troyer Direct, pg. 13.

Q: What is your assessment of the Company's modeling of distributed generation, including both distribution-connected solar resources and BTMG?

A: The Company made several important advances in modeling different types of distribution-connected solar resources in its IRP. While it did conduct an analysis of the potential impacts of renewable prices being lower than modeled for the baseline assumptions, the Company concluded that the impact of low BTMG prices in the Advanced Technology scenario merely displaced utility scale (and potentially distribution-connected solar resources). This treatment of distributed solar in the Advanced Technology scenario forces the model to optimize around distributed solar, rather than allowing the model to optimize the future system with customer-sited solar as a resource.

In my opinion, this is not the most useful way to incorporate distributed generation into IRP modeling. As I discuss in Section IV.F, the Company should use a model that addresses the cost and adoption uncertainty cited by Ms. Walz. Finally, as I discuss in the next section, leveraging distribution-connected solar resources provides multiple benefits beyond the costs and benefits recognized in traditional resource planning and may in fact result in lower total system costs for all customers. In addition, by not including distributed generation as a selectable resource, the Company may have missed an important opportunity to cost effectively to meet its capacity needs.

D. Treatment of Transmission-Connected, Utility-Scale Solar Resources

Q: What cost assumptions did the Company make about transmission-connected, utility-scale solar resources?

A: Company Witness Jeffrey Battaglia explains the pricing of renewable capital costs used in the modeling. He noted that the primary industry source for developing the estimates of utility-scale solar was the average of the low- and mid- range of relevant utility scale solar cost outlooks from the National Renewable Energy Laboratory's 2019 Annual Technology Baseline ("ATB") report.

Q: Did the Company use results of its most recent competitive solicitation process to determine the cost of the utility scale solar?

A: No. Mr. Battaglia explained the contracts resulting from the September 2019 solicitation were not final until approximately January 2021.[22] As a result, the relevant information from that solicitation was not available sufficiently early to allow it to be incorporated into the modeling.

Q: Should they have?

A: Yes. Although contracts were not finalized until January 2021, ENEL X's *Report of the Independent Administrator* was available March 18, 2020[23] Thus, aggregate bid information sufficient to inform the cost estimate for modeling the transmission-connected, utility scale solar resources was available in spring of 2020. In addition, the 2020 edition of the NREL Annual Technology Baseline was released on July 9, 2020.[24]

E. Policy Basis for Distributed Generation

1. DG can reduce total system costs

Q: Please explain how distributed energy resources can be leveraged to reduce total system costs and provide non-resource benefits.

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[22] Direct Testimony of Jeffrey E. Battaglia, *In the Matter of the Application of Consumers Energy Company for Approval of an Integrated Resource Plan under MCL 460.6t, certain accounting approvals, and for other relief*, Docket No. U-21090, June 30, 2021, pg. 8.
[23] Exhibit No: A-48 (DGT-4) in Docket No. U-21090.Enel X, *Report of the Independent Administrator: Consumers Energy Company – Request for Proposals for Solar Generation Projects*, Public Report Issued on: March 18, 2020
[24] https://www.nrel.gov/news/program/2020/2020-annual-technology-baseline-electricity-data-now-available.html

A: Recent studies are bringing to light the value that distributed energy resources can bring to the grid. The recent study by Vibrant Clean Energy ("VCE") for the Local Solar for All Coalition found that deploying significant amounts of local clean energy is the most cost-effective way for the United States to transition to a clean energy system by 2050, while saving consumers up to $473 billion on electricity. VCE's research also shows that leveraging the precision and flexibility of local clean energy can reduce overall system costs and, therefore, costs to all customers. Co-optimization of distribution-connected resources with utility scale investments provides even greater benefits in the form of reduced cumulative costs.[25]

In addition to the efficiencies resulting from co-optimization and avoided transmission system costs, the VCE modeling work shows that distributed generation also provides several categories of benefits to both the bulk power system and the distribution grid; these benefits include capacity avoidance/deferral, ancillary services, line loss reduction, and resilience.

- **Capacity**: DERs reduce distribution system peak demand and can thereby defer or avoid distribution system capital investments and capacity planning reserves in the short and long run;
- **Ancillary services**: DERs reduce the need for operating reserves, such as spinning reserves, and frequency regulation, and reduce the need for voltage regulation;

[25] Clack, Christopher, et al., *Why Local Solar for All Costs Less: A New Roadmap for the Lowest Cost Grid, Executive Summary*, Vibrant Clean Energy, LLC, at 4 (Dec. 1, 2020).

- **Line loss reduction**: DERs inject power close to load, reducing the line losses inherent in the displaced electricity that must be transmitted over long-distance transmission lines and distribution wires; and
- **Resilience**: DERs diversify the energy supply mix, which can increase energy surety, or uninterrupted service by reducing vulnerabilities associated with the loss of fuels, in addition to enhancing resilience.

The degree to which DERs provide these benefits will depend on the operating profile of the distributed generation asset (including any storage paired with solar), the timing of production, and the location (within the distribution system) of the asset. However, distributed generation assets also provide long-run value to the distribution grid no matter where the asset is located.

2. DG can directly address equity concerns

Q: What other benefits of distributed generation make it attractive to customers compared to only relying on utility-scale renewable resources?

A: Unlike other supply side resources available in conventional resource planning, distributed generation can be used to directly address equitable access to clean energy through programs designed to reduce energy burden and increase energy independence. On September 23, 2020, Governor Gretchen Whitmer issued Executive Directive 2020-10 on *Building a Carbon Neutral Michigan*[26] which expands the scope of the environmental advisory opinion filed by in Integrated Resource Plans to include climate and environmental justice considerations:

[26] Governor Gretchen Whitmer, Executive Directive 2020-10, September 23, 2020. https://www.michigan.gov/whitmer/0,9309,7-387-90499_90704-540278--,00.html

> The Department must expand its environmental advisory opinion filed by the Department in the Michigan Public Service Commission's ("Commission") Integrated Resource Plan (IRP) process under MCL sections 460.6t and also file environmental advisory opinions in IRPs filed under MCL 460.6s. The Department 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, the Department 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.[27]

Distributed generation allows energy users to own and control the long-term revenue from future energy sources, allowing individuals and families to share in wealth that historically has been limited to utility investors (for utility-owned assets) and Wall Street (for energy assets operating under Power Purchase Agreements with utilities). This opportunity is further expanded through community solar and other forms of shared renewables that allow renters and low-income households and businesses who otherwise lack sufficient capital or physical space to share in the returns from renewable generation.

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[27] *Ibid.*

Customer-owned or sponsored distributed generation provides increased value by distributing the profits from renewable generation as direct customer bill savings. The value of a megawatt of solar owned by customers produces returns as direct bill savings to individual customers, whereas the value of a megawatt of utility-scale clean energy must be split between shareholders and customers, leaving less value for ratepayers. Utility scale generation also requires transmission and results in increased line losses, further reducing the value to customers. In addition to less overall savings for ratepayers, the savings that do occur from utility owned generation are not equally shared by those historically shut out of the economy. Instead, the savings flow through cost of service rules to predominantly the largest energy users.

Finally, job creation and local business development opportunities are inherently greater for community-based renewable energy than for large, centralized energy systems for multiple reasons:

- A larger number of smaller projects create more jobs, both during construction and long-term during operations, than a single large project of the same total size. This creates a much more stable and sustainable long-term workforce opportunity.
- Distributed generation development also disperses business development and job creation opportunities, making jobs and enterprises more accessible to a wider range of Michiganders. Financing is also more feasible locally for relatively smaller sized projects.

A recent report by Soulardarity and the Union of Concerned Scientists described the benefits that can be realized through adoption of multiple strategies DER deployment in Highland Park, Michigan.[28]

F. Distributed Generation as a Resource Model

Q: Please expand on your discussion of the conventional approach to modeling distributed generation in resource planning.

A: The conventional utility planning approach for DERs (to the extent they account for DERs at all) is to treat them as an exogenous variable to their capacity expansion modeling. Like weather, or the economy, DER growth is something that "happens to" the utility and needs to be planned around, rather than something that the utility can affect through its own actions and can utilize to meet its customers' requirements. The conventional approach typically forecasts energy efficiency and distributed solar adoption and then subtracts them from the utility's gross load forecast to establish a net load forecast. The net load forecast is then used, either as the base case or a sensitivity, to model system expansion through large, supply-side, additions.

Q: Please describe the methodology you propose to evaluate Distributed Generation as a Resource in the Aurora model.

A: I propose a Distributed Generation as a Resource ("DGR") model that has been modeled in testimony submitted by CEO Witness Chelsea Hotaling. The DGR model applies the adoption model proposed by Eric Williams, Rexon Carvalho, Eric Hittinger, and Matthew

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[28] Union of Concerned Scientists and Soulardarity, *Let Communities Choose: Clean Energy Sovereignty in Highland Park, Michigan*, October 2021.

Ronnenberg in the journal *Renewable Energy* in December 2019.[29] The model relies on a robust relationship between the net present value ("NPV") cost per kilowatt for a customer to install solar and the likelihood of adoption. The Williams *et. al.* paper found:

> Empirical analysis for five regions (three U.S. states: Arizona, California, and Massachusetts; and two countries: Germany and Japan) from 2005 to 2016 shows a consistent relationship between annual adoption per million households and NPV.

The DGR model that I propose utilized the Williams price response model to determine the cost decline for solar required to incent the next block of distributed solar uptake by customers. I then monetized that price decline as an incentive that the utility could offer to achieve the requisite cost to the customer to produce the associated level of solar installation.

Q: What inputs did you use for the DGR model?

A: The DGR model was calculated and adapted using the following inputs I developed and adapted for the Consumers Energy service territory:

- System size: 4 kW
- Installation cost: 2021 NREL ATB for Residential PV (starting at $2710/kW in 2020)
- Investment Tax Credit: 26% through 2022, then 22% in 2023, then 0.
- Annual Production: 1,280 kWh/kW (PV Watts for Jackson, MI)
- Self -Consumption: 50%

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[29] Eric Williams, Rexon Carvalho, Eric Hittinger, and Matthew Ronnenberg., *Empirical development of parsimonious model/or international diffusion of residential sola*r, 150 Renewable Energy 570, 570- 577 (2020) ("Williams et al." or the "Williams model").

- Inflow Price: $0.16/kWh
- Outflow Credit: $0.08/kWh
- Electricity Price Inflation: 2.5%/year[30]
- Customer Discount Rate: 4.4% (from 2021 NREL ATB)
- Solar Life: 25 Years
- Williams Price Response formula variables[31]
  - K – 2,000 MW per million households
  - Mu – 7,100 per kilowatt (kW)
  - Sigma – 4,100 per kW
- Number of single-family households per year: annual values from the 2021 Statewide EWR Potential Study[32]

Q: What did you do after setting up the model?

A: After setting up the model, I then calculated the NPV of a kW of solar installed on a residential customers home for each year of the study period (through 2040). The next step was to calculate the NPV that a customer would realize with an incentive equaling $40/MWh. From there, I applied the adoption function detailed in the Williams *et al* study to find the expected incremental additional megawatts of distributed generation adoption that would be expected in each year starting in 2023, the assumed first year that a program could be initiated.

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[30] That average annual inflation rate for Michigan residential electricity prices from 2001 to 2020 was 3.67% according the Department of Energy's Energy Information Administration. https://www.eia.gov/electricity/data/browser/

[31] Williams, et. al., pg. 573.

[32] The annual number of single family household accounts was taken from the EWR Modeling Results data file from the 2021 Statewide Energy Waste Reduction Study downloaded from https://www.michigan.gov/mpsc/0,9535,7-395-93307_93312_93320_94834-552726--,00.html

Q: What were the results?

A: A sample of the resulting annual number of MW available in each year at each incentive level is below. The complete table is attached as Exhibit CEO-3 (WDK-3)

	2023	2024	2025	2026
Total Expected Annual DG MW	67	70	72	74
Incremental over Baseline	22	21	20	20

Once the model was specified, in consultation with CEO Witness Chelsea Hotaling, we chose to offer only the $40/MWh level to the model. Ms. Hotaling's testimony explains the rationale and process for including the DGR in the portfolio at the $40/MWh level. The results of the modeling are discussed below in Subsection H: *DGR Modeling Results*.

G. Low-Income DG as a Resource

Q: Why do you propose a Low-Income DG as a Resource (LI-DGR) model?

A: The purpose of the Low-Income DG as a Resource model is to illustrate the fact that an investment in distributed generation for low-income customers results in benefits that achieves equity goals, and that the full cost of the programs is significantly offset by the resource value of the new, customer-sited generation.

Q: What did you model with respect to the potential for applying the DGR model to provide low-income customers with distributed generation?

A: Distributed generation presents several opportunities for addressing equity concerns. To illustrate this, we modeled a low-income solar incentive that as its initial cost would essentially pay the full cost of installing DG on low-income single-family homes. In order to test this hypothesis, we chose to model a $10,000,000/year program for 10 years. In each year, we assumed that the program would build as much solar at the full NREL ATB rate for residential distributed solar as it could for that amount. The model assumes an incentive design that would essentially rebate 100% of the installed costs of a system to a low-income homeowner upon energization.

H. DGR Modeling Results

Q: What does statute say about the use of private investment in cost-effective renewable energy assets?

A: Public Act 342 makes it clear that it is the policy of the state to "encourage private investment in renewable energy and energy waste reduction."[33] In addition, the cost effectiveness of renewable energy is specifically cited in the goal:

> (3) As a goal, not less than 35% of this state's electric needs should be met through a combination of energy waste reduction and renewable energy by 2025, if the investments in energy waste reduction and renewable energy are the most reasonable means of meeting an electric utility's energy and capacity needs relative to other resource options. Both of the following count toward achievement of the goal:
>
> > (a) All renewable energy, including renewable energy credits purchased or otherwise acquired with or without the associated renewable energy, and any banked renewable energy credits, that counted toward the renewable energy standard on the effective date of the 2016 amendatory act that added this subsection, as well as renewable energy credits granted as a result of any investments made in renewable energy by the utility or a utility customer after that effective date.

[33] Public Act 342, Section 1(1)(c)

> (b) The sum of the annual electricity savings since October 6, 2008, as recognized by the commission through annual reconciliation proceedings, that resulted from energy waste reduction measures implemented under an energy optimization plan or energy waste reduction plan approved under section 73.[34]

Q: Please describe the results of the offering the DGR and the Low-Income DGR to the Aurora model.

A: To summarize the results of the modeling by CEO Witness Chelsea Hotaling, we found that offering the DGR at $40/MWh and offsetting equivalent annual volumes of utility scale resources in the Company's preferred portfolio reduced the total net present value of revenue requirements ("NPVRR") compared to the Company's preferred plan. Over the term of the study period, the net present value of revenue requirements for the portfolio that included both the DG as a Resource and the Low-Income DG as a Resource model was $12.5 million lower than the portfolio in Consumers' preferred course of action. This demonstrates that it would be cost effective from a resource planning perspective for the Company to encourage the adoption of distributed generation by its customers.

Q: What do you recommend based on the results of the DGR model?

A: In light of the findings of this modeling exercise, there are sufficient grounds for the Commission to direct Consumers to modify its IRP to: (1) initiate a pilot program to test the DG adoption model proposed here; and (2) conduct benefit-cost analysis in the study to serve as a basis for a fully realized Distributed Generation Resource model in future IRPs.

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[34] Public Act 342, Section 1(3)

V. <u>DG RESOURCES AND PURPA AVOIDED COSTS</u>

Q: What has the company proposed for the application of PURPA avoided costs for Qualifying Facilities below 150 kW?

A: Company Witness Troyer argues that QFs below 150 kW are eligible to participate in the competitive solicitation process and should therefore no longer be eligible to receive the full avoided cost rates under the standard offer.[35]

Q: Do you agree?

A: No, projects at the 150 kW and below size are almost certainly behind the meter projects. It is unreasonable to require these projects to compete with small wholesale projects in the 2 MW to 20 MW size range that make up the majority of the interconnection queue. In any event, this should not be addressed here. PURPA-specific implementation issues should be addressed in the context of the Company's PURPA implementation dockets.

VI. <u>NATURAL GAS PRICES</u>

Q: What did Consumers use as a natural gas price forecast in the IRP?

A: Company Witness Mr. Brian D. Gallaway described the four Henry Hub natural gas forecasts that were prepared for the IRP:

1. Consumers Energy's internal Business As Usual ("BAU") forecast utilizing 10 third-party sources;
2. U.S. Energy Information Administration's ("EIA") 2020 Annual Energy 12 Outlook ("AEO") "Reference" case Henry Hub forecast;
3. EIA 2020 AEO Reference case Henry Hub forecast, 200% Sensitivity; and

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[35] Direct Testimony of Keith G. Troyer, *In the Matter of the Application of Consumers Energy Company for Approval of an Integrated Resource Plan under MCL 460.6t, certain accounting approvals, and for other relief*, Docket No. U-21090, June 30, 2021, pg. 20.

4. EIA 2020 AEO "High Oil and Gas Supply" case Henry Hub forecast.

Q: What is the range of prices for October 2021 in the Company's gas supply forecasts?

A: The fuel supply forecasts were provided in the data tab of "Exhibit A-61 (BDG-1) through A-74 (BDG-14).xlsx." According to that exhibit, the forecast natural gas supply prices ranged from $2.12/MMBtu to $2.58/MMBtu. The "200% Sensitivity" prices forecast was $2.53/MMBtu.

Q: What is the current Henry Hub spot price?

A: Spot prices for the Henry Hub as reported on the Energy Information Administration's website on October 26, 2021 show that the spot price was $5.59.

Q: What do you recommend?

A: The Commission should require the Company to update its gas supply forecast and re-run a high gas price sensitivity on its preferred course of action.

VII. CONCLUSION AND RECOMMENDATIONS

Q: Please summarize your conclusions and recommendations with respect to the alignment of Integrated Resource Planning and other processes.

A: I recommend that:

- The Commission should direct the Company to continue to improve the evaluation of distribution system benefits in considering resources offered in IRP modeling.
- The Commission should direct the Company to initiate a pilot program to test the DG adoption model proposed here and to conduct benefit-cost

analysis in the study to serve as a basis for a fully realized Distributed Generation Resource model in future IRPs.

- The Commission should direct the Company to initiate a Low-Income DG as a Resource pilot program.
- The Commission should not approve the Company's proposal that QFs smaller than 150 kW should no longer be eligible to receive the full PURPA avoided cost rates under the standard offer contract.
- The Commission should require the Company to update its gas supply forecast and re-run a high gas price sensitivity on its preferred course of action.

Q: Does that conclude your testimony?

A: Yes.

STATE OF MICHIGAN
MICHIGAN PUBLIC SERVICE COMMISSION

In the matter of the application of **CONSUMERS ENERGY COMPANY** for Approval of an Integrated Resource Plan under MCL 460.6t, certain accounting approvals, and for other relief.	)))))))	Docket No. U-21090 Administrative Law Judge Sally L. Wallace

DIRECT TESTIMONY OF

ALISON WASKE SUTTER

ON BEHALF OF

THE ENVIRONMENTAL LAW & POLICY CENTER, THE ECOLOGY CENTER, THE UNION OF CONCERNED SCIENTISTS, AND VOTE SOLAR

October 28, 2021

Q: Please state your name, business name and address.

A: My name is Alison Waske Sutter and I am the Sustainability and Performance Management Officer at the City of Grand Rapids, located at 300 Monroe Ave NW, Grand Rapids, MI 49503.

Q: What groups are sponsoring your testimony in this case?

A: The Environmental Law & Policy Center, the Ecology Center, the Union of Concerned Scientists, and Vote Solar are sponsoring my testimony. I am testifying in my capacity as the Sustainability and Performance Management Officer at the City of Grand Rapids.

Q: Can you please summarize your educational background?

A: I received a bachelor's degree in Architecture from the University of Cincinnati in 2002. Following my undergraduate work, in 2006 I received both a Juris Doctorate and a Master of Public Affairs from Indiana University's Maurer School of Law and Paul H. O'Neill School of Public and Environmental Affairs, respectively. My Juris Doctorate included a specialty in environmental law.

Q: Can you please summarize your work experience?

A: I have nearly 20 years of experience in the field of sustainability, including practicing as an environmental attorney, establishing a sustainability practice for a law firm, providing sustainability consulting to health care institutions across the country and working for a Fortune 350 food distribution and retail company on corporate responsibility. While the concept of sustainability is complex, the ultimate goal is to use available resources in such a way that we equitably preserve our economic, environmental, and social resources. Sustainability efforts include changes in our built environment to reduce energy and greenhouse gas emissions, eliminate pollution, provide healthy spaces, and preserve natural resources; changes in procurement of resources such as energy, to mitigate contributions to climate change and air pollution; and designing resilient systems and structures that can and will adapt to our changing climate. My work experience has spanned multiple industries—from health care to food service to local government—and in my diverse positions I have gained first-hand experience of the challenges and obstacles that different kinds of organizations face in achieving their sustainability, environmental justice, energy and climate goals.

Q: What positions have you held in the field of sustainability?

A: Since March 2019, I have served as Sustainability and Performance Management Officer at the City of Grand Rapids. Before moving into an Officer position, starting in September 2017, I served as the City of Grand Rapids' Sustainability Manager. Immediately prior to working for the City, I served as Manager of Corporate Responsibility at SpartanNash. Prior to SpartanNash, I was Senior Sustainability Consultant at Key Green Solutions LLC, Sustainable Business Officer at University of Michigan Metro Health Hospital, and an Environmental Attorney and Sustainability Manager at Warner Norcross + Judd LLP. My work experience is set forth in detail in my resume, attached as Exhibit CEO-4 (AWS-1).

Q: Have you engaged in any professional development coursework in the field of sustainability?

A: I received a certificate from Aquinas College in Sustainable Business practices. I also am a frequent speaker at local, state and regional conferences regarding sustainability. I also participated in over 25 hours of equity training with the National Equity Project.

Q: **Have you testified before this Commission or as an expert witness in any other proceeding?**

A: Yes. I submitted testimony in U-20679 (Consumers Energy Rate Case) and U-20649 (Consumers Energy Voluntary Green Pricing Case).

Q: **Are you sponsoring any exhibits?**

A: Yes, I am sponsoring the following exhibits:

1. Exhibit CEO-4 (AWS-1): Resume of Alison Waske Sutter
2. Exhibit CEO-4 (AWS-2): March 23, 2021, C4 Presentation to the Grand Rapids City Commission
3. Exhibit CEO-4 (AWS-3): Housing Next Presentation
4. Exhibit CEO-4 (AWS-4): Zero Cities Consumer Survey on Residential Energy Utilization

Q: **Have you reviewed the Company's Application and Testimony in the above-captioned case?**

A: I have reviewed relevant portions, including the testimonies of Blumenstock, Breining and Kapala and Exhibit A-2, the IRP Plan itself. Since the filing was voluminous, I was not able to closely review it in its entirety.

Q. **What is the purpose of your Direct Testimony?**

A. The purpose of my testimony is to discuss Consumers Energy Company's ("Consumers" or the "Company") Integrated Resource Plan from the perspective of the City of Grand Rapids, both with respect to our municipal energy and resiliency needs and the goals and objectives that we are developing in response to our residents' concerns about environmental and sustainability issues, including carbon reduction, climate adaptation, resiliency and environmental justice.

Q: When did the City of Grand Rapids get involved in sustainability and energy work?

A: The City of Grand Rapids was one of the first cities in the United States to adopt sustainability as a guiding principle. Beginning in the mid-2000s, the City has taken concrete actions in setting and achieving renewable energy goals, ultimately expanding its renewable energy goal to 100% by 2025. This commitment to and progress on renewable energy, in addition to other environmental sustainability accomplishments, helped the City become the first U.S. city to earn the United Nations University Regional Center for Expertise and Sustainability designation (2006) and be awarded the U.S. Chamber of Commerce's Most Sustainable Mid-Sized City (2010).

Q: Does the City focus on environmental justice?

A: Yes. In 2010, the City's first five-year Sustainability Plan focused on environmental, social and economic outcomes. When Mayor Rosalynn Bliss took office in 2016, the City began more formally focusing on social equity, starting with the City's acceptance into the first ever Racial Equity Here Cohort with the Government Alliance for Race and Equity. With respect to the Office of Sustainability and Performance Management's work, the dual focus on environmental quality and social equity was ignited by the City's participation in the national Zero Cities Project beginning in 2017. The goal of the three-year Zero Cities Project was for cities to create equitable decarbonization policies and programs for the entire community building sector, including single family homes. Participation in this program led to an amazing partnership with a local non-profit, the Urban Core Collective, who is the Office of Sustainability and Performance Management's equity partner. In April

2019, the City adopted its Strategic Plan, which includes sustainability and equity as two of the City's six core values. Since that time, the Office of Sustainability and Performance Management has heightened its focus on environmental and climate justice. In the summer of 2019, the City launched the Community Collaboration on Climate Change (C4). And in the summer of 2021, the City hired its first Environmental and Climate Justice Specialist.

Q: What is the C4?

A: In July 2019, the City publicly announced a desire to co-create the C4 in partnership with community stakeholders. With the support of a planning grant, the C4 Planning Team participated in equity training and engaged a facilitator to help the team create a 3-year framework for the initiative and to document the team's process, with specific focus on equity discussions and decision making.

In the spring of 2021, planning work on the C4 concluded with the following outcomes: momentum, direction and trusted relationships; infrastructure to launch the 3-year pilot (vision statement, values, community agreements, bylaws, and defined equity-centered processes); 3-year plan and accompanying budget to launch and pilot the C4; and a Leadership Team. The C4 Vision is that Black, Indigenous and People of Color (BIPOC) and historically white environmental organizations will dismantle extractive systems and build new systems to address climate change—centered in human wellbeing, the interconnectedness of life, and access to shared leadership. The team has fundraised just over $700,000 for this work and selected two BIPOC organizations to serve as fiduciary sponsors—Michigan Black Expo, Inc. and Hispanic Center of West Michigan.

The C4 is charged with working with the City to ensure, elevate and integrate environmental justice and climate change into the City's Comprehensive Community

Master Plan; partnering with the City to create a Climate Action and Adaptation Plan; and creating a networking hub for grassroots environmental organizations to partner with BIPOC communities on climate change and environmental sustainability issues. With support and community involvement, C4 will provide spaces for partners and residents to engage, resolve conflicts, build strategies, share resources, align vision, and most importantly shift the focus of environmental and climate change work to be more equitable.

Q: Are you aware that the Urban Core Collective intervened in this case?

A: Yes, and I am glad to see and support direct involvement by community groups, especially those led by and serving people of color, in energy planning.

Q: Does the City have goals with respect to municipal energy use or carbon emissions?

A: Yes. The City's four-year strategic plan identifies the City's key priorities. We have six core values, including equity, innovation and sustainability. These values drive all of our decisions. One of our six strategic priorities is Health and Environment, and the key desired outcome for this priority is that the health of all people and the environment are advocated for, protected and enhanced. The first objective under Health and Environment is reduced carbon emissions and increased climate resiliency. Our strategies include:

- Create carbon reduction goals and integrate them into appropriate City plans, including the Comprehensive Master Plan
- Reduce the carbon footprint of City operations (buildings, utilities and fleet)
- Assess the feasibility and cost of offsetting 100% of City electricity with renewable sources by FY2025
- Create and support programs and policies to reduce carbon emissions from the building and transportation sectors through the community

- Create a Climate Action and Adaptation Plan in partnership with the community
- Work with community partners and businesses to achieve a 40% tree canopy.

The City has had a 100% renewable energy goal for municipal operations for nearly fifteen years. The City's electricity consumption currently consists of 37.5% renewables. With the completion of a nearly one megawatt, ground-mounted, behind-the-meter solar array at our Lake Michigan Filtration Plan in early 2022, our renewable energy portfolio will increase to 41%. Also, in September 2021, City Manager Washington announced the City of Grand Rapids' best-in-class carbon reduction goals for municipal operations: 85% reduction by 2030 and net-zero by 2040. Based on 2020 data, City staff calculated that the City has already reduced its own emissions by 30% when comparing performance against its baseline year of 2008. These goals and performance exceed the Paris Climate Accord targets as well as goals established by President Biden and Governor Whitmer. If the City achieves its 100% renewable energy goal, then it should be able to achieve an 85% carbon emissions reduction goal. The City estimates that achieving the 85% carbon emissions reduction goal by 2030 could cost it between half a million and a million dollars annually for 24 years, which includes constructing solar at the Butterworth Landfill.

Q: Why does the City have a separate goal for its own municipal energy use and carbon emissions?

A: The reasons are numerous. Practically, the City's direct control over our own energy use allows us to adjust its energy procurement and consumption and thus our carbon footprint. The City also believes it is important to lead by example, and if we are encouraging our residents and businesses to reduce their energy use and carbon footprint, and then meet their remaining energy use through renewable energy, the City should demonstrate that such a goal is attainable.

Q: Can you describe the City's energy and carbon performance?

A: Based on a carbon emissions inventory by Fishbeck, Thompson, Carr & Huber, Inc. (FTC&H) in 2008, including scope one and two emissions, the City of Grand Rapids generated 74,490 metric tons of carbon dioxide equivalents ($MTCO_2e$). These carbon emissions were generated from the operation of buildings such as City Hall, the Police Station, 1120 Monroe / Development Center, its three utilities (water plant, Water Resource Recovery Facility and streetlighting), the Downtown Area Shuttle (DASH) and its municipal vehicle fleet (nearly 800 cars, trucks, fire trucks, police cars, refuse trucks, street cleaners, etc.). FTC&H captured the fossil fuels consumed for City operations in this baseline (electricity, natural gas, steam, diesel and gasoline).

In 2020, the City generated 52,449 $MTCO_2e$ of carbon emissions, which is a 30% reduction when compared to its 2008 baseline. This reduction came even with the City's continued growth and economic development, both of which demanded more City services. Additionally, the staff of the City's Office of Sustainability and Performance Management researched 37 other cities, finding only four that publicly reported better performance than the City of Grand Rapids: Austin (80%), Boston (40%), Philadelphia (32%) and Boulder (21%).

Many departments across the City have worked to achieve carbon reduction over the years. Some examples include:

- Water and Environmental Services Departments (ESD) implementing significant energy efficiency process improvements and equipment upgrades at the Lake

Michigan Water Filtration Plant (LMFP) and the Water Resource Recovery Facility (WRRF) as well as collectively purchasing more than 16 million kilowatt hours per year of renewable energy credits (RECs)

- Facilities Department implementing energy efficiencies in buildings (three Energy Star certified buildings—Police Station, 1120 Monroe and 201 Market)
- Mobile GR transitioning to LED parking lot lighting for both garages and surface lots
- Fire Department installing geothermal energy at the Kalamazoo and Leonard stations
- Fleet Department purchasing all electric and hybrid vehicles

Q: What proportion of the City's carbon emissions come from electricity consumption?

A: The City's electricity consumption accounted for 79% of all 2020 carbon emissions. Transportation, natural gas, and steam accounted for the remaining 11%, 8%, and 2% respectively. The City consumed electricity in 2020 for the following: water plant and systems (38%), Water Resource Recovery Facility (WRRF) and sewer system (24%), buildings and other facilities (21%), and street lighting and traffic lights (17%). Of the total electricity consumed, 37.5% came from renewable resources—28.3% coming from Consumers' Green Generation program (purchased RECs), 9% from Consumers as part of the statewide Renewable Portfolio Standard, and 0.2% from a small solar array at a City facility. The two largest contributing factors to our reduction in carbon emissions is Consumers' Renewable Portfolio Standard and the City's reduction in electricity usage. The fastest and most efficient way for the City and the Grand Rapids community to further reduce their carbon footprint is for Consumers to supply customers with electricity generated from renewable sources.

Q: How is the City evaluating future carbon reductions?

A: The City worked with partners including its Energy Advisory Committee, Consumers, and DTE Energy to model expected future carbon emissions reductions, which currently shows the City achieving a 47% reduction by 2025. The City accounted for both of the utilities' voluntary carbon emissions reduction goals (Consumers' 15% renewable portfolio standard and DTE Energy's 20% carbon emissions reduction). The model includes reductions achieved based on current construction projects, including the biodigester at the WRRF ($85 million cost), a nearly one megawatt behind-the-meter solar array under construction at the Lake Michigan Filtration Plant (net $1.2 million savings over 24 years), and the complete conversion of 18,000 streetlights to LEDs ($9.3 million cost). The model continues to include the purchase of a small amount of RECs.

Q: Has Consumers provided the City with the information necessary to model future carbon emissions?

A: No. The publicly available information to date only included carbon emissions factors for Consumers' asset owned generation, which makes up approximately 45% of all electricity Consumers supplies to customers. It did not include their market or MISO purchases. To model the City's future carbon emissions, we had to rely on outdated e-GRID carbon emissions estimates for our entire region.

Q: What is the role Energy Waste Reduction plays in the City of Grand Rapids' carbon reduction plans?

A: The City understands that the most effective and efficient way to achieve 100% renewable energy and net zero carbon is to focus heavily on implementing energy efficiency and energy waste reduction. We feel very strongly that Consumers should be investing more time and resources in energy waste reduction / energy efficiency programs. Over the years, we have worked closely with Consumers to leverage as many rebates as possible and also capitalize on available federal funding to improve the efficiency of our operations. The City will continue to prioritize, pursue and strategize on ways to implement more energy efficient systems, processes and buildings. We also advocate for energy efficiency by our businesses, institutions and residents, because it saves money, supports healthier environments, and reduces carbon emissions. However, I have become aware in my work that there are significant issues in ensuring that low-income individuals participate in and receive the benefits of energy efficiency programs. While I understand that Consumers is not, in this IRP case, proposing any particular program for achieving energy efficiency, I do think that much higher levels of energy use reduction could be achieved if the Company were to take actions that make energy efficiency more available to low-income customers as well as small businesses.

Q: Have you reviewed information about the energy burden on low-income households?

A: As shared in the Grand Rapids Equity Assessment Tool, households with incomes below 50% of the federal poverty limit (FPL) in Kent County spent about a third of their household income on home energy bills whereas households with incomes between 185-200% of the FPL paid almost 7% of their household incomes on energy bills. Furthermore, all households up to 200% FPL spent more than 6% of their household income on energy costs, which is considered energy burdened. *See* Exhibit CEO-4 (AWS-3) at 3. And nearly

30,000 households in Kent County are below 100% FPL. Approximately 50% of Grand Rapids households live in rental properties. Housing Next shared that in Grand Rapids, 17,052 rental households (52% of total) spend more than 30% of their income on housing. *See* Exhibit CEO-4 AWS-3 (AWS-3) at 14. Finally, increasing the energy efficiency of low-income households will almost certainly help prevent evictions as well as late or non-payment of electricity bills.

Q: Are you aware of any particular situations where energy efficiency is hard to access for low-income residents?

A: Yes. As part of the City's participation in the Zero Cities Project, the Urban Core Collective worked with other community-based organizations to survey 120 people living in our Neighborhoods of Focus (17 census tracts experiencing the greatest disparities in the city) on why, how, and when they use different energy services intended to benefit them. The majority of the participants were renters (58%), households with income less than $50,000 (GR median income) (82%), and African American (70%). Out of 20 energy services listed, Consumers Energy's Energy Efficiency Assistance program was only recognized by 35 respondents (the sixth most recognized service) compared to Get the Lead Out (75), Home Repair Services (72) and DTE's Energy Efficiency Assistance Program (66). Cost savings was the biggest motivator to participate, 50% of the respondents said they were interested in energy efficiency programs and DTE's Energy Assistance Program was the most used over the last 10 years. The top three responses for barriers to access were: did not know about the existing programs (106), did not meet eligibility requirements (33), and paperwork was too long or difficult to complete (10). In addition, non-profit program providers received the highest ratings of trust and for-profit program providers received the lowest ratings of trust. Respondents shared that they are willing to invest in insulation (15.19%), weatherization (15.82%), roofs (15.19%), appliances (14.56%), fire safety (9.49%), and lead abatement (4.43%). Finally, 38% of the respondents said they invest between $1,001 and $5,000 per year in maintenance and 16.67% invest between $5,001 and $10,000. *See* Exhibit CEO-4 (AWS-4).

Q: If Consumers were to develop programs that addressed some of these obstacles to low-income participation in energy efficiency programs, do you think that would improve participation?

A: My perception from interactions with community members is that there is significant interest from low-income communities for energy efficiency because it helps reduce financially burdensome electricity bills. I believe that if low-income access were improved, Consumers would see greater savings from implementation of its energy efficiency programs.

Q: Does the City still have plans for installing on-site solar?

A: Yes. While we applaud Consumers for more aggressively pursuing net zero carbon emissions, the City has a more aggressive goal with respect to renewable energy. We are currently installing a nearly one megawatt ground-mounted behind-the-meter solar array at our Lake Michigan Filtration Plant, and we continue to work with multiple stakeholders, including Consumers Energy, on a plan to develop solar at the Butterworth Landfill ("Butterworth"). The City has evaluated six other properties for solar installation and while each has shown the ability to generate a valuable amount of solar energy, due to Consumers' distributed generation rate, installing solar is financially not viable.

Q: What is the Butterworth Landfill?

A: The Butterworth Landfill ("Butterworth") is a fully remediated, monitored Superfund site owned predominantly by the City. The site occupies approximately 190 acres bordered by Wealthy Street, the Grand River and I-196. The City owns 140 acres of the landfill. Butterworth is currently an undeveloped site with some walking trails. Actions regarding the site are reviewed by a consortium of responsible parties known as the Butterworth Site Group, which includes the City and Consumers as members. In 2013, the United States Environmental Protection Agency issued a Solar Reuse Assessment finding Butterworth well-suited for solar power generation.

Q: Why does the City continue to pursue solar on the Butterworth Landfill?

A: The City has been working for over seven years to find a successful pathway to install solar at this location. Butterworth is a great example of how renewable energy can lead to the beneficial reuse of urban brownfield sites. The site is located in the city limits, very close to the load and within the community that it could serve. The land could be used for passive recreation, but is more valuable deployed for solar and is in a location visible to the community. While the costs of developing solar on this brownfield site may be higher than using a greenfield, I believe that the intangible benefits gained from using this parcel outweigh those additional costs. Consumers' IRP should consider the opportunities to work with partners to install solar on urban brownfields near load, as well as large industrial, manufacturing and retail rooftops available within our city limits. Supporting and siting solar within the city limits decreases the distance between generation and consumption, which has many tangible benefits.

Q: Does Grand Rapids have a communitywide carbon emissions goal?

A: No. In September 2021, when the City passed its municipal carbon reduction goal, the City also agreed to continue collaborating with community stakeholders over the next twelve months to determine if the City should establish a communitywide goal and, if yes, what that goal should be. That said, the City does have the 2030 District, which establishes voluntary carbon reduction goals for the built environment (commercial and industrial) and transportation across the entire City. Mayor Bliss has signed on to the We Are Still In Pledge as well as the Cities Race to Zero. In addition, the City participated in the Zero Cities Project and launched the Grand Rapids Policies and Programs for Equitable, Healthy and Zero Carbon Buildings Initiative (E.H.Zero).

Q: What is your overall reaction to Consumers' Proposed Course of Action?

A: I appreciate that Consumers is accelerating the closure of its coal units, and that the Company will no longer be using coal after 2025. However, I am concerned about the purchase of existing gas plants, because those plants also run on fossil fuels that contribute to climate change. And I am concerned that Consumers does not intend to reach net zero until 2040, that is not fast enough. I also do not believe Consumers has sufficiently considered the equity impacts of its plan, and feel the Commission should encourage a more robust analysis of environmental justice than that provided by Consumers' witness Breining. I appreciate witness Breining's testimony highlighting more meaningful opportunities for both Consumers and the Commission to consider the public health, energy burden and other environmental justice impacts of the plan. Furthermore, I believe that both Consumers and the Commission should go beyond what Breining suggests. The data demonstrates that communities of color and low-income communities are significantly more negatively impacted by environmental pollutants and power outages. Consumers could establish a best-in-class approach to addressing environmental justices by modeling the plan's impacts on communities of color and low-income communities. In addition, Consumers could commit to dedicating the majority of their energy waste reduction program investments to communities of color and low-income communities.

Q: Do you have any concerns about the closure of the coal plants?

A: Yes. I am concerned about the impact the closure will have on jobs in the communities where those plants are located, the local governments who rely on tax revenue, and how the property where the plants were located will be cleaned up and put to productive use. Company witness Kapala discusses these impacts, and states that "the Company will evaluate remediation of the land on which the coal pile sits to determine if that land can be redeveloped for other purposes." (Kapala Direct at 59). Kapala also states that the closure of plants will impact the community's tax base and employment base and that the Company is committed to assisting in redevelopment. (Kapala Direct at 59). The Commission should require additional details from Consumers regarding how Consumers will support redevelopment of sites, including how much money it will invest in the transition plan and communication strategy, and consider requiring Consumers to ensure the coal pile and any other portion of the closed plant be remediated to a level that allows for some type of redevelopment. I urge the Commission and Consumers to commit to and be strategic about plant closures, reskilling and transition plans specifically for employees of color and low-income employees. Job transitions can be very difficult on people and households, particularly those that are vulnerable.

Q: Why are you concerned about the purchase of natural gas plants?

A: Natural gas plants are still fossil fuel-based electricity generation. While I am glad that the Company does not seek to build new fossil fuel infrastructure, and I recognize that gas plants have a different, and hopefully reduced, impact on health and the environment than coal plants do, they are not zero-emissions resources. It is important to the City and its residents that Consumers generate all of its energy from renewable resources as quickly as possible. The more energy Consumers generates from renewable resources, the closer the City gets to its renewable energy goals and the health and environmental benefits they achieve.

Q: Do any of the proposed gas plant purchases concern you in particular?

A: Yes. Consumers' purchase of the Dearborn Industrial Generation (DIG) plant concerns me. Governor Whitmer appointed me to serve on the inaugural Michigan Advisory Council on Environmental Justice (MAC-EJ), and the AK Steel plant where DIG is located has been a topic of much concern among the MAC-EJ. I have reviewed the Michigan Department of Environment, Great Lakes, and Energy (EGLE) Advisory Opinion, and it appears that neither AK Steel, Consumers nor EGLE have evaluated the local community impacts of air pollution from DIG, or how the cumulative impacts of those emissions may harm the community. Even if neither Consumers nor EGLE are obligated to undertake such a review, I believe that it is critical for the cumulative impacts to be analyzed as well as other environmental justice concerns. Consumers should utilize the environmental justice screening tool that EGLE is in the process of finalizing for all energy projects to understand the existing and potentially exacerbated injustices that exist. And the Commission should require the use of this tool for all energy projects.

Q: Are you aware of Consumers' carbon reduction goals?

A: Yes. According to Consumers' witness Breining, Consumers plans to be net zero carbon by 2040. I am encouraged to see that they are including carbon emissions not just from owned generation, but also from PPAs and market purchases. In previous testimony I explained the challenge of understanding how Consumers' clean energy goals impacted the City, because those goals applied only to the generating resources Consumers owned—they did not include third-party or market purchases. I understand that Consumers has now improved its analysis so that its net zero carbon goals apply to third-party and market purchases as well as the Company's owned generation. This change in the way Consumers defines its goals is very helpful to the City in understanding how the City's goals are impacted by Consumers' plan.

Q: Is the pace at which Consumers will reduce carbon emissions sufficient?

A: No. The Grand Rapids City Commission recently passed a resolution declaring climate change a crisis. Some of the City's residents, including the Grand Rapids Climate Coalition, have demanded the City commit to achieving community-wide carbon-neutrality for all of Grand Rapids by 2030. It will be very challenging and extremely costly for the City and its residents to meet either the community's call for a 2030 goal or the City's established municipal carbon goals without Consumers setting the same target. Furthermore, President Biden has established a goal that to reach 100 percent carbon pollution-free electricity by 2035. The 2040 deadline for Consumers' carbon goals are not aggressive enough to meet the President's stated goals, and while Consumers references President Biden's 2035 goal for carbon pollution-free electricity, the Company does not explicitly state that it will comply with this goal. The faster that Consumers achieves net zero carbon, the less regulating local municipalities will have to do to ensure their communities can achieve net zero carbon by established goal dates.

Q: Why doesn't the City just enroll in the Consumers Voluntary Green Pricing Programs for 100% of its energy needs?

A: While the City has participated in Consumers' historic renewable energy offerings and continues to advocate for improvement of those programs to meet customer needs, participation in these programs for 100% of the City's electricity needs would be cost prohibitive and alone would not result in the City meeting its net zero carbon goal. The purchase of renewable energy or carbon credits always comes at a cost premium and the prices that Consumers is offering for RECs through their Voluntary Green Pricing (VGP) Program, whether national or Michigan based, are more expensive than what is available for purchase through different avenues. In addition, installing behind-the-meter solar when 100% of the electricity generated can be consumed at the time of generation is more financially advantageous than participating in the VGP. Furthermore, even if the City's electricity consumption is net zero carbon, we still generate carbon from natural gas, steam, gasoline, and diesel consumption. One option to achieve net zero carbon is to completely electrify all of our operations and ensure that all electricity supplied to the City is generated from net zero carbon sources. Another option would be to purchase carbon offsets for any energy consumed other than renewably supplied electricity. In the long run, if Consumers meets its carbon goals, then all of the City's and community's electricity would be zero net carbon and this would meet the majority of our carbon emissions goals. It would also avoid the City and other customers investing capital and resources into alternative options to meeting more aggressive goals to then no longer need those options once Consumers ultimately reaches its goal.

Q: Why wouldn't the Company's VGP Programs provide net-zero carbon for the City?

A: The way the Voluntary Green Pricing Programs are structured, the City continues to purchase all of its electric energy from Consumers on its normal rates as a full-service customer. My understanding is that the resources that are part of the Voluntary Green Pricing programs generate energy that is sold into the MISO market. Participants in the VGP programs pay the full cost of constructing and operating solar and wind resources, and then receive a credit that reflects the price that the energy from those resources receives when sold into the market. In order for the City's renewable energy goals to be consistent with our climate and carbon reduction goals, we need zero carbon generating resources to displace the fossil fuel resources on Consumers' system. In order to make meaningful carbon reductions, the electricity that is supplied to the City as we use it needs to come from renewable resources. That is not the case with VGP programs. While I believe the VGP programs do result in increased use of renewable energy overall, the only way to ensure that the City's use of electricity purchased from Consumers is net zero carbon is for Consumers to be net zero carbon in its generation and purchases.

Q: Do you have any other concerns about the Company's plan?

A: Yes. Some of my other concerns include Consumers' tree maintenance practices to minimize power outages, particularly those impacting vulnerable communities. I would also like to see Consumers investing more in and encouraging the development of microgrids to support essential services that cannot lose power even during extreme weather events. Climate adaptation and resilience are extremely important and need to be priorities in the plan. With the increasing number of extreme heat days and the large number of Grand Rapids households without air conditioning, we are likely to see an increase in electricity consumption and for Consumers to meet its carbon goals it will need to ensure that air conditioning is as efficient as possible for those that are most vulnerable. I also hope that Consumers is planning appropriately for increased community solar, whether owned and operated by Consumers or private developers.

Q: Does this complete your testimony?

A: Yes.

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In the matter of the application of **CONSUMERS ENERGY COMPANY** for Approval of an Integrated Resource Plan under MCL 460.6t, certain accounting approvals, and for other relief.	)))))))	Docket No. U-21090 Administrative Law Judge Sally L. Wallace

DIRECT TESTIMONY OF

ELENA KRIEGER, PHD

ON BEHALF OF

THE ENVIRONMENTAL LAW & POLICY CENTER, THE ECOLOGY CENTER, THE UNION OF CONCERNED SCIENTISTS, AND VOTE SOLAR

October 28, 2021

Q: Please state your name, business name and address.

A: My name is Elena Krieger. I am the Director of Research at Physicians, Scientists, and Engineers for Healthy Energy. My business address is 1440 Broadway, Suite 750, Oakland, California, 94612.

Q: On whose behalf are you testifying in this case?

A: The Environmental Law & Policy Center, the Ecology Center, the Union of Concerned Scientists, and Vote Solar.

Q: Can you please summarize your educational background?

A: I received an AB in Physics and Astronomy & Astrophysics from Harvard University and a PhD in Mechanical and Aerospace Engineering from Princeton University, where my dissertation research focused on characterizing and optimizing battery performance and lifetime in variable renewable energy systems.

Q: Can you please summarize your work experience?

A: I have worked on energy technologies and systems for more than fifteen years. I entered the field doing assessments of the air quality benefits of improved cookstoves across the developing world and developing design improvements. I subsequently conducted my PhD research at Princeton University on energy storage, where I cycled numerous battery chemistries to characterize performance and degradation in renewable energy and vehicle systems and develop optimization strategies. For the past eight years I have worked at PSE Healthy Energy, an energy science and policy research institute, where I launched our clean energy practice area and now oversee organization-wide research while leading teams of scientists on individual projects. My research efforts focus on the intersection of clean energy adoption, deep decarbonization, public health, energy equity, and resilience. Recent projects include characterizing environmental justice, air quality, emissions, and public health metrics of peaker power plants across nine states to identify optimal targets for replacement with energy storage; analyzing solar adoption rates in disadvantaged communities in California; analyzing where power sector carbon emission reductions will have the greatest public health benefits in Ohio and Pennsylvania; integration of public health and energy equity metrics such as affordability and resilience into deep decarbonization modeling for New Mexico, Colorado, and Nevada; and ongoing work designing and optimizing deployment of solar-plus-storage to create resilience hubs in vulnerable communities across California. I have written numerous peer-reviewed papers and technical reports, developed energy-focused data visualization tools, frequently give talks to stakeholders across the energy space, and serve on advisory committees such as the Disadvantaged Communities Advisory Group to the California Energy Commission and the California Public Utilities Commission. My work experience is set forth in detail in my curriculum vitae, which is attached as Exhibit CEO-5 (EK-1).

Q: Have you ever testified before this Commission?

A: No.

Q: Have you testified in other proceedings?

A: I have served as an expert before the New York State Board on Electric Generation Siting and the Environment.

Q: Are you sponsoring any exhibits?

A: Yes, I am sponsoring the following exhibits:

- Exhibit CEO-5 (EK-1) – Curriculum Vitae of Elena Krieger

Q: What is the purpose of your Testimony?

A: The purpose of my testimony is to 1) provide a framework to evaluate the public health and equity impacts of Consumers Energy Company's ("Consumers" or the "Company") Integrated Resource Plan (IRP) and 2) provide an assessment of those impacts. IRPs have the potential to both directly and indirectly impact energy equity and public health across the State of Michigan, but many of these impacts have not historically been considered in depth.

Q: What is Consumers' proposed plan?

A: Consumers proposes to use a suite of resources to meet electricity demand in the coming years. They propose to retire the J.H. Campbell and D.E. Karn coal plants earlier than previously planned, and to replace this generation with the expansion of solar and wind resources, energy waste reduction programs, and the procurement of four new gas plants.

Q: What role do you understand environmental justice and health impacts to play in Michigan's IRP process?

A: In September 2020, Governor Gretchen Whitmer issued Executive Directive No. 2020-10, requiring the Department of Environment, Great Lakes, and Energy ("Department") to file expanded environmental advisory opinions on IRPs, including "considerations of environmental justice and health impacts." Given the Governor's directive, and the widespread impacts and benefits of IRPs in relation to public health, energy affordability, energy equity, climate change, and the environment, it would be valuable for the Michigan Public Service Commission ("MPSC" or "Commission") to address these measures in its decision-making.

Q: How do you address those measures in your testimony?

A: In this testimony, I first introduce a framework for addressing public health and energy equity in the context of IRPs, and I subsequently apply these metrics to the Consumers IRP. This testimony will also draw on testimony from Dr. Boris Lukanov and from Dr. Kelsey Bilsback, who analyzed additional energy equity and public health impacts of the Consumers IRP. The inclusion of these considerations in IRP decision-making can benefit communities across Michigan by increasing energy affordability for those facing high energy cost burdens and reducing public health impacts, particularly for overburdened communities.

Q: In what ways do IRPs directly and indirectly impact public health and energy equity?

A: In this testimony, I provide an outline of both direct and indirect health and equity metrics. This testimony addresses *energy equity*—the inclusion of historically marginalized populations in the energy economy to create equitable, accessible, and economically beneficial policies and programs—and *environmental equity*—ensuring no populations face disproportionate pollution impacts and all populations access the benefits of clean resources and are given an opportunity to participate in the decision-making process.[1] An example of a *direct impact*, as defined here, is the public health impact of coal-fired power plants to meet projected electricity demand: the combustion of coal in these plants produces health-damaging air pollutants such as fine particulate matter ($PM_{2.5}$), and one can model the morbidity and mortality impacts of inhaling $PM_{2.5}$ that originates from these plants. An example of an *indirect impact*, here, is the energy affordability benefit of using demand-

[1] Krieger, Elena, *et al.* Equity-Focused Climate Strategies for New Mexico. *PSE Healthy Energy.* 2021. Available at: https://www.psehealthyenergy.org/wp-content/uploads/2021/08/Equity-Focused-Climate-Strategies_New-Mexico_Report.pdf

side energy efficiency to meet projected electricity demand: the bill savings from energy efficiency measures can be particularly valuable to low-income households who struggle to pay their bills, but these savings will only be fully realized if coupled with initiatives such as low-income efficiency programs and rates, which would be addressed in separate proceedings. For these indirect impacts, we can think of the IRP as an enabler: the inclusion of resources such as energy efficiency and rooftop and community solar, or reducing overall expenditures on energy supply, can hold distinct implications for energy affordability; however, the exact impacts or benefits will depend on decisions made in other proceedings. For example, the inclusion of sufficient demand-side energy efficiency enables these resources to be widely expanded in proceedings directly addressing low-income energy waste reduction programs.

Q: What impacts does your testimony address?

A: In this testimony, I will address several specific public health and energy equity impacts of the Consumers IRP. For public health, I will address the public health hazards, risks, and impacts of fossil fuel combustion at power plants and of coal ash impoundments, including reference to analysis by Dr. Kelsey Bilsback. For energy equity, I will address equitable energy access, energy affordability, and resilience, including reference to analysis by Dr. Boris Lukanov. This testimony is not meant to be all-inclusive when addressing environmental justice in IRPs and does not address such topics as workforce development and effective community engagement strategies. I also do not address many broader environmental considerations such as the climate impacts of resources used in the IRP and the ecosystem impacts of mercury emissions from coal plants. My aim is to provide guidance to address public health and energy equity measures in the IRP context as part of broader efforts to address environmental justice.

Q. Please summarize your conclusions.

A. I find that the resources included in Consumers' IRP hold widespread implications for public health and equity across the State of Michigan and beyond.

- The rapid retirement of coal plants proposed in Consumers IRP will save dozens of lives per year due to reductions in health-damaging air pollutant emissions (detailed in Kelsey Bilsback's testimony) and holds additional public health benefits such as the reduction of coal ash waste.
- The ongoing and expanded use of natural gas in the IRP raises environmental equity and public health concerns. In particular, Dearborn Industrial Generation (DIG) is located in an area with high cumulative environmental health impacts and socioeconomic burdens, a dense population, and has very high pollutant emission rates and public health impacts compared to other gas plants—and even higher public health impacts than the D.E. Karn coal facility (see Kelsey Bilsback's testimony).
- Many communities across Michigan face high energy cost burdens. Ongoing energy waste reduction programs and expansion of rooftop solar resources in the IRP would enable these resources to be coupled with efforts in other proceedings to increase efficiency and solar access for low-income households to improve energy affordability. Expansion of additional community resources, such as community solar, can achieve similar benefits; in particular, there are numerous opportunities to remediate existing brownfields to provide clean energy resources, which can be identified and prioritized based on community input and desires.

- Depending on where resources are deployed and how they are operated, the expansion of utility-scale and distributed energy storage in the IRP holds multiple potential benefits, including replacing high emission rate peaker power plants, such as Livingston, and increasing energy resilience, particularly for vulnerable populations.

Q: How does this testimony diverge from or expand upon the Advisory Opinion of the Michigan Department of Environment, Great Lakes, and Energy's Air Quality Division, Materials Management Division, Water Resources Division, and Office of the Environmental Justice Public Advocate on the Consumers Energy 2021 IRP?

A: The advisory opinion filed in September 2021 acknowledges that it takes a heavily qualitative, as opposed to quantitative, approach to environmental justice and public health. Certain measures are inherently qualitative and cannot be expressed in a quantitative way, and other measures are quantitative but the underlying data to calculate their value is unavailable. However, there are still significant opportunities to increase the quantitative assessment outlined in the advisory opinion and addressed by Consumers in its IRP. Furthermore, there are numerous topics that are not addressed in either case. The additional quantitative measures we include are modeled air pollutant health impacts, which are used rather than emission factors to identify spatial and demographic trends in health impacts; quantitatively evaluated environmental health hazards, such as coal ash waste; expanded environmental justice screening analyses that include proximity analyses of populations near facilities; an evaluation of resilience and public health benefits of energy storage; and analysis of energy cost burdens across the state. Furthermore we suggest a shift in the potential framing of this analysis. The current approach is to ensure that the IRP does not *increase impacts*, particularly health impacts on vulnerable populations. We suggest that the frame should be expanded to not only *reduce impacts* but to *increase benefits* as well, specifically public health, resilience, and affordability benefits. For example, instead of the current approach, which aims to ensure a scenario does not increase criteria pollutant emissions, we suggest evaluating which pathway actively reduces the most criteria pollutant emissions, particularly from plants that are located in and upwind from vulnerable and overburdened communities.

Q: Did Consumers undertake an Environmental Justice analysis?

A: Yes, but it is insufficiently robust and appears to contain errors. Consumers analyzed the U.S. Environmental Protection Agency's EJSCREEN indicators for populations living within 2 km and 10 km of each of its facilities (both current plants and proposed purchases). In Consumers witness Heather A. Breining's testimony, she reports that *none* of Consumers' current facilities have any EJSCREEN indicators ranking above the 75th percentile. I question this conclusion. It is unclear whether Consumers is using the *state* percentile or *U.S.* percentile for its analysis. The state percentile is a more appropriate indicator given that this is a state-level rulemaking and there is a wide diversity in populations and environmental regulations and outcomes across the nation. With use of either the state or U.S. percentiles, however, Jackson Generating Plant ranks above the 75th percentile for low-income populations and the lead paint indicator at a 2 km radius, and it also ranks above the 75th *state* percentile for ozone and low educational attainment. Regardless, Consumers' approach to vulnerable populations based on single indicators in insufficient. It should also look at *cumulative* socioeconomic and environmental burdens, using methods similar to those I describe below. Consumers also subsequently only considered these plants to be an environmental justice concern if they *increased* particulate matter (PM) emissions "materially" above historic emissions. This approach is problematic for numerous reasons. First, it is extremely limited because it only addresses PM emissions—not $PM_{2.5}$, nor nitrogen oxides (NO_x), nor sulfur dioxide (SO_2) nor any other pollutant—which is inadequate to address health impacts. The PM-related health impacts of power plants are not limited to primary emissions, and indeed a large portion of the $PM_{2.5}$ health impacts occur from the secondary formation of $PM_{2.5}$ from precursors like NO_x and SO_2. Second, the power plant emissions from two plants *do* increase, and Consumers uses an arbitrary "variability" metric to deem these increases immaterial. Finally, even if the emissions did not increase, that would not mean that these plants are not contributing to environmental justice impacts. Simply because a plant has been polluting a community for years already should not give it license to continue to pollute that area. Continuing to operate DIG, for example, will continue to pollute a highly environmentally overburdened and socioeconomically vulnerable community in a known air pollution nonattainment area, as detailed below, and continue to cause adverse public health impacts, including premature mortality (see Kelsey Bilsback's testimony). Any ongoing operation will continue to exacerbate the inequitable impacts of this facility. Consumers provided a limited health impact analysis based on standardized pollutant-impact emission factors, but as Kelsey Bilsback's testimony details, geographically-specific modeling of these air pollutant emission impacts can instead provide spatially detailed data on total and per-capita health impacts, including where plants may have a disproportionate impact on specific populations, providing better data on the environmental justice impacts of these facilities.

Q: What are some of the key elements that should be considered when addressing the public health and energy equity dimensions of Integrated Resource Plans?

A: In this testimony, I address the public health and energy equity impacts and benefits of resources included within IRPs, with a focus on opportunities to reduce environmental burdens in polluted and vulnerable communities and to increase energy affordability and access in historically underserved communities. I focus primarily on quantifiable metrics and measures to reflect public health and energy equity, but these should be coupled with meaningful community outreach and engagement to ensure the priorities of these communities are reflected in the planning process.

Q: Can you discuss some of the measures and metrics for addressing public health and energy equity?

A: Yes. I will start with public health. Typically, direct criteria air pollutant emissions from fuel combustion (e.g., NO_x, SO_2, and $PM_{2.5}$) are the most easily quantifiable public health metric for evaluating power sector resources, because most flue stacks are equipped with Continuous Emissions Monitoring Systems. It is useful to evaluate both the *total* emissions from any facility as well as the *rate* of emissions, per megawatt-hour of generation, from each facility. The total emissions can give a sense of which power plant has the greatest total impact, and if multiple scenarios are presented within an IRP, the sum of emissions across different scenarios can be a useful tool. The *rate* of emissions is also a useful comparison tool to illustrate where the reduction of a megawatt-hour of generation from across the resource portfolio would have the greatest reduction in pollutant emissions. For example, one megawatt-hour of solar generation will help reduce more criteria pollutant emissions if it displaces one megawatt-hour of electricity from a plant with a higher emission rate than a lower emission rate. A comparison of the rate of emissions from each plant in the fleet, averaged over a single or multiple historic years, can indicate whether strategies such as shifting electricity generation requirements between plants or retiring specific power plants would help maximize emission reductions.

Q: After quantifying emissions, what is the next step?

A: The next step is to evaluate the public health impacts of these emissions, as feasible given data and model availability. The health impacts of $PM_{2.5}$, either through direct emission of particulate matter or secondary formation from reactions of precursors such as NO_x and SO_2 in the atmosphere, can be modeled using tools such as the EPA's COBRA or the peer-reviewed InMAP model (see Kelsey Bilsback's testimony for application of these models). These tools estimate the impacts of emissions at a given location on ambient $PM_{2.5}$ and the subsequent $PM_{2.5}$-related health impacts based on epidemiological models. Plants located in or upwind from dense population areas are likely to have higher total impacts than those in rural areas, but per-capita impacts are highest close to and downwind from the emission source, no matter the population density. Much like for emissions, there can be a value in calculating the total health impacts of a given power plant or a given scenario as well as the rate of health impacts per megawatt-hour or gigawatt-hour of generation. These calculations are most easily conducted for power plants owned by or directly contracted by the utility. Emissions and impacts of power purchases from MISO may require estimates of average or marginal emissions across its territory, and it is more difficult to attribute the emissions associated with this purchased power to any specific facility.

Q: Should one take into account the location of the generating resources, emissions, and impacts?

A: Yes. In addition to total health impacts, it is valuable to calculate the *spatial distribution* of power plant public health impacts, both in total and on a per-capita basis. This spatial distribution can provide insight into which populations may be environmentally overburdened and impacted by emissions from multiple power plants, and therefore which communities might particularly benefit from pollution reduction. These analyses can also provide information on which populations face a disproportionate share of health impacts per capita. IRPs can incorporate these data on cumulative and disproportionate health impacts to inform resource selection that will reduce these impacts on particularly overburdened or vulnerable populations. In addition, while air pollutant impacts tend to be highest, per capita, on populations living near and downwind from a source, it is not straightforward to model the health impacts of all pollutant emissions, due to both limited data availability for all pollutants and more complicated modeling requirements for certain pollutants. Therefore, I also suggest completing a population proximity analysis to assess who lives near (or downwind) from power plants used in the IRP. A simple version of this analysis consists of evaluating demographic metrics for populations living within a given radius of a power plant. Here, I use the three-mile radius (the "buffer zone") used within the EPA's Power Plants and Neighboring Communities Tool,[2] but other radii (e.g., one mile) can provide useful information as well since a range of distances are associated with adverse health outcomes.[3,4]

[2] U.S. Environmental Protection Agency. "Power Plants and Neighboring Communities Tool." 2021. https://www.epa.gov/airmarkets/power-plants-and-neighboring-communities

Q: How do you address pollution concerns affecting populations living close to a power plant?

A: As a first step, I calculate the total population living within the three-mile buffer zone around the plant, compare specific metrics for this population—such as number of low-income households and households of color—to the rest of the state, and then evaluate cumulative socioeconomic and environmental health burdens for this population using environmental justice screening tool data. These population data can be coupled with the emissions and health impacts data described previously to identify where a plant may be contributing to high cumulative burdens on a given community. Facilities may be associated with other non-stack air emissions, such as those from heavy duty equipment and trucks serving the facility. Finally, there are non-air pollutant pathways that can be helpful to evaluate. These include ground and water quality, which can be impacted by on- and off-site waste disposal at power generation facilities, such as waste disposal in coal ash impoundments. While modeling these impacts can be complicated and data scarce, the cumulative waste and hazardous constituents in this waste are typically publicly available and can provide insight into where a change in electricity generation resources can help reduce reliance on facilities that produce excessive waste or store waste in high-risk impoundments. It is worth noting that the above metrics focus on direct power plant public health hazards, risks, and impacts, but that shifting away from resources such as coal and gas have the added benefit of reducing upstream greenhouse gas and health-damaging air

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[3] Liu, Xiaopeng, Lawrence Lessner, and David O. Carpenter. "Association between residential proximity to fuel-fired power plants and hospitalization rate for respiratory diseases." *Environmental Health Perspectives* 120.6 (2012): 807-810.

[4] Casey, Joan A., et al. "Retirements of coal and oil power plants in California: association with reduced preterm birth among populations nearby." *American Journal of Epidemiology* 187.8 (2018): 1586-1594.

pollutant emissions and associated impacts from activities such fossil fuel production, processing, and transportation.

Q: What are some metrics for addressing energy equity?

A: Many households across Michigan struggle to afford their utility bills. While rates, low-income solar programs, and other policy mechanisms are not addressed directly in the IRP, the inclusion of certain resources can hold implications for energy affordability in Michigan. One useful measure for evaluating energy equity is the estimate of energy cost burden, defined as the percent of household income spent on utility bills. If appropriate data are available on a household level, these data would be most useful for calculating energy cost burdens and identifying demographic and geographic trends. If not available, however, census tract level estimates can be calculated using regression analyses (as illustrated in Boris Lukanov's testimony) or other methods. The average bill impact of specific resources used in the IRP can be calculated to determine the overall directionality of these impacts on energy affordability. For example, the average impact of energy waste reduction and rooftop solar resources on average bills, and the impact of these measures on average energy cost burdens, can be calculated. However, the actual implementation and the evaluation of specific outcomes will require additional measures in other proceedings and an evaluation of specific rates or program costs. Other resources can provide equity benefits beyond bill impacts, but might be best measured in terms of potential number of customers or sites served. Examples include the capacity and number of community solar installations, which can provide bill stability; the potential to remediate brownfields and transform them into solar installations; and the availability of distributed solar-plus-storage to provide resilience during grid outages. An evaluation of energy cost burdens and discussion of resources that may alleviate these burdens are described in Boris Lukanov's testimony.

Q: How can utilities and the Commission identify communities where energy equity and pollution reduction may be most beneficial?

A: There are numerous approaches to identifying communities where clean energy adoption or pollution reduction may yield the greatest benefits. In many cases, it is valuable to identify communities experiencing high cumulative environmental, socioeconomic, and public health burdens. These communities not only frequently face a disproportionate share of environmental pollution, but they are often particularly vulnerable to the effects of that pollution due to the presence of sensitive populations (e.g., the elderly or those with pre-existing health conditions) and lack of access to resources (e.g., health care or adequate housing). The inclusion of different metrics to identify these communities should depend, in part, on input from community members and stakeholders across the state.

Q: Does Michigan have any environmental justice screening tools, and how do you identify vulnerable, overburdened, or disadvantaged communities?

A: The Department is currently developing an environmental justice screening tool that integrates public health, environmental burden, and socioeconomic data to identify disadvantaged communities.[5] This tool is not yet available, so for this testimony I developed a proxy Environmental Justice Index (EJ Index) for Michigan based largely on the indicators EGLE has proposed in its draft tool, [6] although I omit some of the proposed public health indicators due to limited data availability. This EJ Index is created by first

[5] Lambeth, Katie. "MiEJScreen." Michigan Department of Environment, Great Lakes, and Energy. 2021. https://www.michigan.gov/documents/egle/Presentation-AAC-MiEJScreen-2021-09-22_736899_7.pdf
[6] *Ibid.*

identifying environmental and demographic indicators for census tracts across the state. Next, each indicator is assigned a *percentile* to compare how an individual census tract ranks compared to the rest of the state for this specific measure. Then, these indicators are grouped into three categories, and the percentiles for each category are averaged. The three categories include Environmental Exposures, Environmental Effects, and Socioeconomic Factors. The proposed Michigan tool includes a fourth Sensitive Populations category for health indicators. In the proxy EJ Index, the three average category scores are combined using the following weighting:

$$EJ\ Index = (Socioeconomic\ Factor) * \frac{(Environmental\ Exposure\ Score) + 0.5 * (Environmental\ Effects\ Score)}{2}$$

The indicators for each category are derived from the EPA's EJSCREEN[7] tool and the American Community Survey.[8]

Q: What indices or information are included in those three categories?

A: Each of the three categories includes data from a variety of sources: *Environmental Exposures* include the NATA air toxics cancer risk index, NATA respiratory hazard index, and NATA diesel PM, $PM_{2.5}$, ozone, and traffic proximity metrics. *Environmental Effects* include a lead paint indicator and information about proximity to water discharge sites, Superfund sites, Risk Management Plan sites, and hazardous waste sites. *Socioeconomic Factors* include population of color, low-income population, lack of high school degree, population under 5, over 64, high rent burden, unemployment, and linguistic isolation.

[7] U.S. Environmental Protection Agency. "EJSCREEN."
[8] U.S. Census Bureau. "American Community Survey."

Q: Do you have any results for Michigan?

A: Yes. A map of Michigan showing the census tract scores for the proxy EJ Index is given below in **Figure 1.**

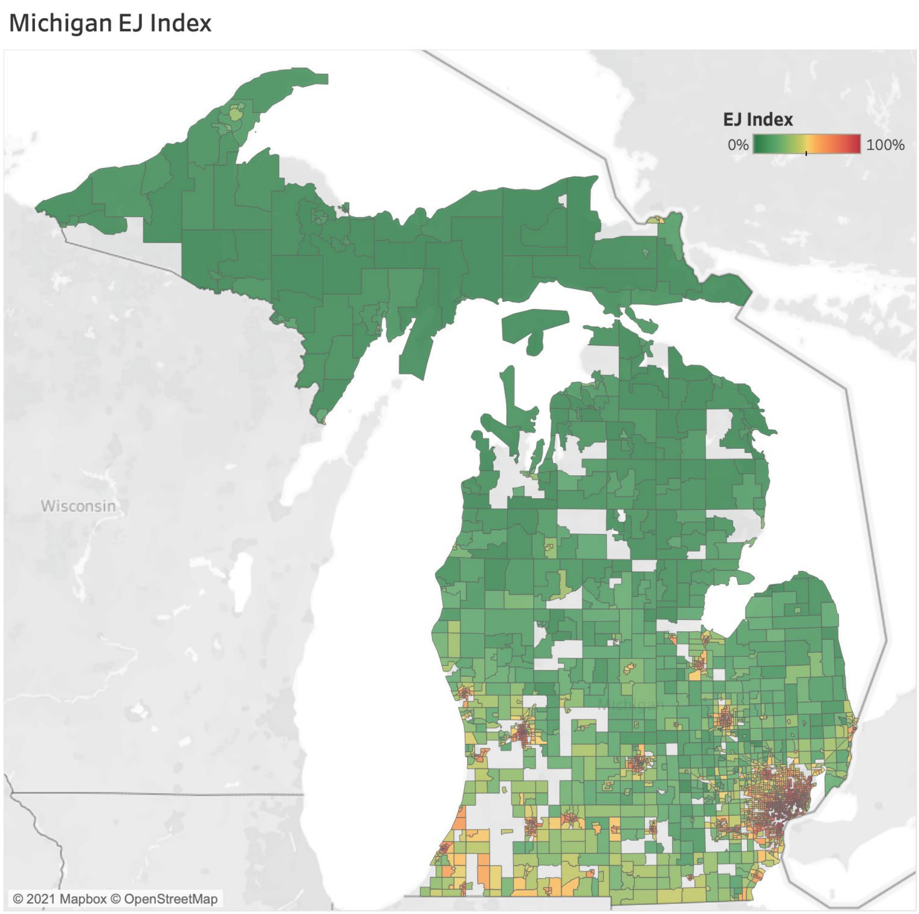

Figure 1. Proxy environmental justice index for Michigan.[9]

I use this proxy index in this testimony to provide an example for how Michigan's EJ Index can be applied to the IRP process but suggest that it be replaced with the Department's tool once complete. As discussed below, I apply the EJ Index in a number of cases, including using it to characterize populations living near power plants in Michigan. The tool can also be used to identify where populations might be prioritized for clean energy investments.

[9] Blank census tracts reflect missing data.

The overall index should not necessarily be applied in all cases, however, because individual indicators can provide valuable information on their own as well. Lack of solar adoption in areas with high linguistic isolation, for example, could indicate a potential need for greater multilingual outreach materials.

Q: What are the public health hazards, risks, and impacts associated with Consumers' continued operation of coal plants?

A: The public health hazards, risks, and impacts of coal plants are mediated by air, water, and soil pathways. Combustion of fossil fuels produces criteria and hazardous air pollutants, which have cardiovascular and respiratory health impacts, as detailed in Kelsey Bilsback's testimony. Coal combustion also produces coal ash, which can be held in coal ash impoundments, which if improperly lined and maintained can contaminate groundwater and soil, leading to high concentrations of heavy metals associated with adverse health outcomes ranging from organ failure to cancer.[10] Certain public health impacts, such as the cardiovascular and respiratory impacts associated with $PM_{2.5}$ exposure, can be modeled based on criteria pollutant emission rates measured at power plant stacks. Other public health hazards, such as increased heavy metal concentrations in waters and soils near coal ash impoundments, may be harder to model due in part to limited data availability on contamination rates, water- and soil-based exposure pathways, and levels of human exposure. Therefore, it may be valuable to use multiple methods to assess the public health dimensions of coal plant operation and the benefits of reduced operation and retirement.

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[10] U.S. Environmental Protection Agency. "National Primary Drinking Water Regulations." Available at: https://www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations#Inorganic

Q: Can you model these public health dimensions in this case?

A: Yes. In the case of direct $PM_{2.5}$ emissions, and secondary formation of $PM_{2.5}$ from criteria pollutants such as NO_x and SO_2, the health impacts can be modeled with commonly-used tools such as the EPA's COBRA and the peer-reviewed InMAP models, as detailed in Kelsey Bilsback's testimony. These health impacts are typically highest per capita close to and downwind from the plants, but also affect populations across the entire northeast United States. Dr. Bilsback's findings indicate that the 2019 emissions of $PM_{2.5}$ and $PM_{2.5}$ precursors from Consumers' coal plants—J.H. Campbell and D.E. Karn—have modeled mortality impacts of 38-85 premature deaths and \$422-\$958 million in health impacts annually; every year of early retirement for these plants should therefore achieve a public health benefit of nearly a billion dollars through avoided $PM_{2.5}$ health impacts alone. These estimates are in line with the Department's estimate of \$460-\$710 million in health benefits from emission reductions in the Consumers plan by 2025, as reported in its advisory opinion; the Department's estimate was based on generic health impact factors, however, whereas Kelsey Bilsbsack's modeling estimates are geographically specific. While we did not model the direct health impacts of other pollutants, such as primary SO_2 or NO_x emissions, we can quantify some proxy metrics for these pollutants. For example, we can still evaluate which power plants have the highest total and per-megawatt hour emissions of pollutants, and we can identify which populations live nearby and are likely to experience greater per-capita health impacts. For other health hazards, we can quantify total waste from these facilities disposed on- and off-site and determine risk levels based on coal ash impoundment integrity, groundwater measurements, and nearby population data if these are available. We can then use these various data to compare plants and determine total potential reductions in on-site waste disposal, off-site waste disposal, and air emissions.

Q: Did you do any modeling for other health hazards in this case?

A: Yes. J.H. Campbell, for example, released an annual average of 2.2 million pounds of waste in on-site land disposal between 2018 and 2020, and had high EPA Risk Screening Environmental Indicator Scores for chromium and nickel.[11] Ashtracker reports that 60 of 85 groundwater wells monitoring the coal ash ponds at J.H. Campbell have recorded exceedances of federal or state standards, including for antimony, arsenic, barium, boron, cadmium, chromium, lithium molybdenum, selenium, and thallium.[12] Coal Ash Pond A and Bottom Ash Ponds 1-2 have been rated as having "significant hazard potential" due to the environmental contamination risks of dam failures at this site.[13] Each year of retirement of this plant will therefore reduce on-site disposal by roughly 2 million pounds, mitigating additional risk of dam failure and reducing ongoing waste disposal at a site with groundwater contamination. D.E. Karn shares a site with the former J.C. Weadock Generating Complex, and their groundwater wells measure exceedances at 26 of 35 sites for pollutants including arsenic, beryllium, boron, cobalt, lead, lithium, molybdenum, radium and sulfate.[14] The D.E. Karn plant released an annual average of 640,000 pounds

[11] U.S. Environmental Protection Agency. "Toxics Release Inventory." 2021. Available at: https://edap.epa.gov/public/extensions/newTRISearch/newTRISearch.html?#

[12] Ashtracker. "JH Campbell Generating Complex." 2019. Available at: https://ashtracker.org/facility/188/jh-campbell-generating-complex

[13] Golder Associates Incorporated. "J.H. Campbell Generating Facility: Pond A Hazard Potential Classification Assessment Report." 22016. Available at: https://www.consumersenergy.com/-/media/CE/Documents/sustainability/coal-combustion-residuals/campbell-hazassess-pond-a.ashx?la=en&hash=64EF6A4527E43C9D96316229814B7E4FBBB1BC62

[14] Ashtracker. "D.E. Karn and J.C. Weadock Generating Complex." 2019. Available at: https://ashtracker.org/facility/171/de-karn-and-jc-weadock-generating-complex

of waste on-site from 2018-2020,[15] implying the potential to reduce this amount of waste for every year of retirement of this plant. While J.H. Campbell and the Weadock landfill have undergone upgrades since the groundwater measurements were taken, these exceedances highlight the risk posed by coal ash waste disposal at these sites.

Q: Who lives near the power plants Consumers owns or proposes to own and/or contract for power with in its proposed plan, and where are populations that might be particularly vulnerable to the pollution impacts of these plants?

A: I evaluated populations living within three miles of the coal-, gas-, and biomass power plants included within Consumers' IRP, including those it currently owns as well as plants it proposes to purchase or contract for power. Living near power plants is associated with adverse health outcomes, ranging from birth outcomes to respiratory impacts in vulnerable populations.[16,17] I used the EPA's Power Plants and Neighboring Community Tool combined with additional indicators as described in the EJ Index section above. In Figure 2, I show the total population living within three miles of each coal and gas power plant Consumers owns or plans to purchase, as well as the percentile value for low-income populations and populations of color. The color indicates the EJ Index score for the population living near the plant. Notably, six of eight plants are located in areas with a greater low-income population than the state median (i.e., they have a low-income percentile greater than 50) and five of eight have a greater population of color than the state

[15] U.S. Environmental Protection Agency. "Toxics Release Inventory." 2021. Available at: https://edap.epa.gov/public/extensions/newTRISearch/newTRISearch.html?#

[16] Casey, J. A., Karasek, D., Ogburn, E. L., Goin, D. E., Dang, K., Braveman, P. A., & Morello-Frosch, R. (2018). Retirements of coal and oil power plants in California: association with reduced preterm birth among populations nearby. *American Journal of Epidemiology*, *187*(8), 1586-1594.

[17] Liu, Xiaopeng, Lawrence Lessner, and David O. Carpenter. "Association between residential proximity to fuel-fired power plants and hospitalization rate for respiratory diseases." *Environmental Health Perspectives* 120.6 (2012): 807-810.

median. Once the two coal plants (D.E. Karn and J.H. Campbell) retire, the remaining plants will be even more disproportionately in low-income areas (five of six) and populations of color (five of six). In addition to these demographic trends, seven of eight plants have higher EJ Index scores than the state median, suggesting these populations face high cumulative socioeconomic and environmental health burdens. The plants with the largest number of people living nearby, indicated by larger circles, tend to have greater shares of low-income populations and populations of color nearby, and have higher cumulative environmental health and socioeconomic burdens than the other plants.

Q: Did any of the plants stand out in this analysis?

A: In particular, the DIG facility, which Consumers proposes to purchase, has the largest nearby population (118,000 people in a three-mile radius) and the highest cumulative EJ Index score (99th percentile). Consumers Energy proposes to purchase this plant in the IRP, but these data highlight the significant equity concerns associated with this purchase. While this plant is already operating, Consumers' proposed purchase of this plant ensures ongoing operation and financial support of a facility whose shutdown would benefit public health and reduce impacts on an overburdened community. As described in Kelsey Bilsback's testimony, this plant has higher total public health impacts than any other gas plant and even than the D.E. Karn coal facility historically. DIG is also located in an area designated as being in nonattainment with National Ambient Air Quality Standards.[18] Meeting electricity demand with alternative cleaner resources would likely provide public health and equity benefits. It is also worth noting that *all* the proposed gas plant purchases — DIG, New Covert Generating Facility, Livingston Generating Station, and Kalamazoo

[18] U.S. Environmental Protection Agency. "Green Book: Michigan 8-hour Ozone Nonattainment Areas (2015 Standard). 2021. Available at: https://www3.epa.gov/airquality/greenbook/mi8_2015.html"

River Generating Station—are located in communities above the 60th percentile for low-income population, and three of four above the 60th percentile for populations of color living nearby.

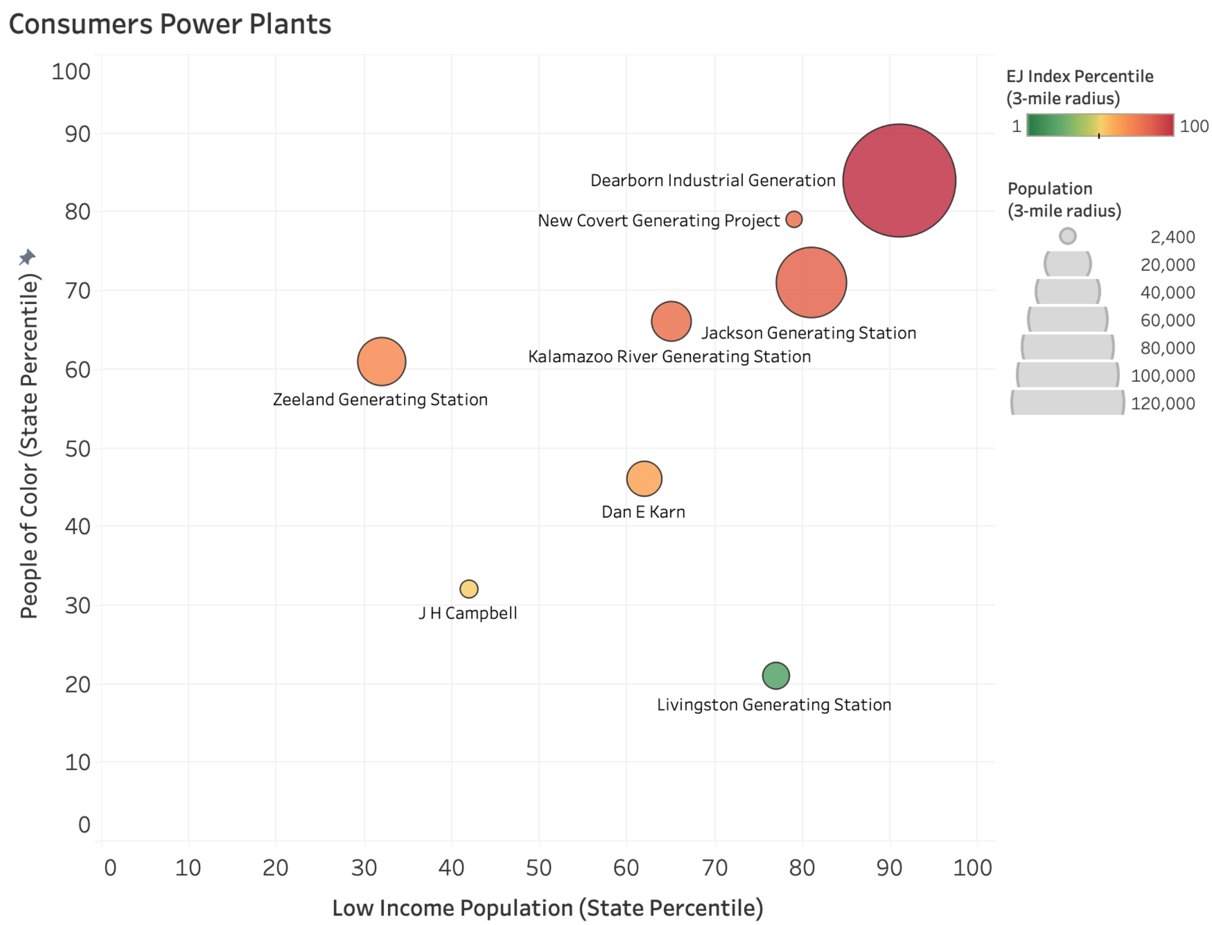

Figure 2: Demographics of populations living within three miles of coal and gas plants Consumers owns or plans to purchase.

Q: Did you also look at the plants from which Consumers purchases power?

A: Yes. Consumers also has power purchase agreements with nine gas- and biomass-fired power plants that it does not own. Some of these plants co-fire tire-derived fuels, and most of them have *higher emission rates* of $PM_{2.5}$ and NO_x than even the coal plants, as described in Kelsey Bilsback's testimony. Moreover, eight of nine plants are located in areas considered more low-income than the state median. The 38,000 people living near one plant in particular—Genesee—rank in the 89th percentile for low-income populations, 86th percentile for populations of color, and 83rd percentile on the EJ Index.

Q: Based on your analysis, have you reached any conclusions about Consumers' proposed plan?

A: Consumers should consider the public health impacts and environmental equity metrics for each plant individually when developing its plan to determine which plants should be phased out and retired first as it transitions to clean energy and develops its greenhouse gas strategy. These individual metrics can help balance the portfolio in such a way that Consumers can reduce mortality impacts and reduce historic disparities in environmental public health impacts of the power plants in its portfolio, the power plants it plans to purchase, and the power plants with which it contracts.

Q: What non-energy benefits of expanding utility-scale and distributed energy storage should be considered in Consumers' resource portfolio?

A: The increased adoption of energy storage—including batteries, thermal storage (e.g., using ice for cooling or storing hot water for space and watering heating needs), and other technologies—can hold public health, resilience, and economic benefits for Consumers' customers, depending in part on the scale and location of these technologies. Both utility-scale and distributed energy storage can help reduce power plant pollutant emissions, and storage can be *stacked* to provide numerous services across the grid. These services can be provided by individual large utility-scale storage installations, or by aggregated distributed energy storage at homes, businesses, and industrial facilities. In particular, energy storage is well-suited to meet peak electricity demand in lieu of peaker power plants, which tend to be less efficient and have higher emission rates than other gas plants on the grid. Energy storage can provide a wide range of additional grid benefits, such as ancillary services and avoided transmission and distribution upgrades as well, but in my testimony here I focus primarily on the non-energy benefits of these resources except for specific examples of how these align with grid benefits (as in the case of peaker power plants).

Q: Does Consumers' proposed plan include any peakers that are good candidates for replacement with storage or solar-plus-storage?

A: Yes. One peaker in particular, the Livingston Generating Station, has low total emissions but the highest rates of NO_x emissions per megawatt-hour of any plant in Consumers' portfolio (see Kelsey Bilsback's testimony). This plant is not located in an environmental justice community (see Figure 1); nevertheless replacing a plant with high emission rates such as this one with storage will help reduce some of the highest marginal emissions on the grid, and this energy storage can provide additional services beyond meeting this peak demand.[19] Storage, along with other distributed resources such as energy efficiency and demand response, can also be used to simply reduce reliance on high-emitting plants and reduce the capacity factor at which they operate. Energy storage and distributed resources can also help reduce the need to start-up plants and ramp them up and down, which is associated with higher emission rates than operation at constant generation levels.[20] And distributed energy storage at commercial and industrial facilities can help reduce the need for diesel generators—which produce health-damaging air pollutants such as diesel particulate matter—while simultaneously being aggregated to provide grid services.

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[19] Emission reductions can be ensured by putting measures in place such that batteries are charged at times of low emissions to preclude a situation where, for example, coal generation is being stored in a battery to displace a gas plant.

[20] Katzenstein, Warren, and Jay Apt. "Air emissions due to wind and solar power." (2009): 253-258.

Finally, for peaker plants (or any plants) serving transmission-constrained load pockets in disadvantaged communities, investments in low-income energy waste reduction programs, energy storage, and solar in these very communities can help simultaneously reduce reliance on those plants located in and polluting those communities, thus reducing pollutants while providing co-benefits to those who most need them.

Q: Does battery storage have a role to play in resiliency?

A: Yes. Distributed battery storage, as well as hybrid solar-plus-storage facilities, can provide resilience to customers during grid outages. Consumers customers have experienced numerous long-duration outages in recent years, including a nearly 45-hour outage in summer 2020 that affected over 57,000 customers[21] and two-multi-day outages in August 2021 that affected 85,000 customers in one instance and nearly 400,000 in another.[22] Of course, storage resources should be deployed in a reasoned and thoughtful way. The Michigan Public Service Commission's recent directive for electric utilities to provide zip code outage data[23] can help identify the communities where investments in solar-plus-storage to provide resilience may be most beneficial by providing backup to vulnerable households and those who have historically faced frequent or long-duration grid outages. Given projected increases in total rainfall, heavy downpours, and other climate change impacts across the state,[24] this resilience will be increasingly valuable in the coming years. Solar-plus-storage may also be particularly valuable at critical facilities (e.g., hospitals,

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[21] U.S. Energy Information Administration. "Electric Power Monthly: Table B2. Major Disturbances and Unusual Occurrences, 2020." https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=table_b_2

[22] U.S. Energy Information Administration. "Electric Power Monthly: Table B1. Major Disturbances and Unusual Occurrences, Year-to-Date 2021."https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=table_b_1

[23] MPSC. "MPSC launches inquest into power outages, electric utility reliability; plans technical conference Oct. 22." 2021. Available at: https://www.michigan.gov/mpsc/0,9535,7-395-93253_93280-566566--,00.html

[24] GLISA. "Great Lakes Climate Change Maps." Available at: https://glisa.umich.edu/great-lakes-regional-climate-change-maps/

clinics, substations, and grocery stores), resilient community sites (e.g., cooling centers or schools), and homes with sensitive populations, such as the elderly and those with underlying medical conditions. For example, 93,525 Medicare customers across Michigan require electricity to power medical devices.[25] If each of these vulnerable households had an 8kW[26] backup battery, that would result in nearly 750 MW of energy storage. Assuming 40 percent of these customers are in Consumers' territory, proportional to the number of Michigan households in Consumers' territory, the region would need to adopt 300 MW of battery storage to provide resilience for electricity-dependent Medicare customers alone.

Q: Does Consumers include battery storage in its proposed plan?

A: Consumers does not include any battery storage in its proposed plan beyond pilot projects until 2032 and only 475 MW by 2050. This is a surprising result given that standalone energy storage, and distributed solar-plus-storage systems, are being built across the country to replace fossil generation. Underlying assumptions by Consumers, such as the inclusion of storage as a generation-only resource, may be leading to this result for utility-scale storage; and Consumers omitted any distributed resources whatsoever in its Aurora modeling inputs. Examples of recent storage additions range from 20 MW of aggregated residential solar-plus-storage systems being built to meet capacity needs in New England[27] to 400 MW of utility scale storage system now operating at the Moss Landing site in California.[28] Distributed storage and solar-plus-storage resources can also provide

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[25] U.S. Department of Health and Human Services. "HHS emPOWER Map." 2021. https://empowermap.hhs.gov/

[26] Approximately the size of a Tesla Powerwall: https://www.tesla.com/powerwall

[27] Weaver, John Fitzgerald. "Distributed residential solar+storage takes a seat at the adult table." *PV Magazine.* 2019. https://pv-magazine-usa.com/2019/02/08/distributed-residential-solarstorage-takes-a-seat-at-the-adult-table/

[28] Herrera, James. "World's largest energy storage system completes Phase II in Moss Landing." *Monterey Herald.* 2021. Available at: www.montereyherald.com/2021/08/19/worlds-largest-energy-storage-system-completes-phase-ii-in-moss-landing

economic benefits. For example, energy storage can enable customers to participate more actively in the Dynamic Peak Pricing Program to shift loads away from peak hours and enable participation in demand response programs. If the *benefits* of this storage were considered, such as emission reductions and resilience, energy storage would likely be selected in the Aurora model at an earlier year. Even if other future proceedings support the expansion of distributed energy storage for resilience, economics benefits such as reduced demand charges, deferral of transmission and distribution upgrades, and load shifting, these resources will not have been accounted for in the IRP and Consumers could potentially over-build utility-scale capacity that this storage could otherwise meet. It therefore behooves Consumers to integrate both utility-scale and distributed battery storage in its near-term planning to enable these benefits to be achieved and to reduce unnecessary capacity investments.

Q: What additional opportunities are there for solar adoption to provide community benefits?

A: There are numerous brownfields across Michigan that hold potential for remediation as solar or solar-plus-storage sites. According to the EPA's RE-Powering Datatset,[29] Michigan has 2,867 brownfield sites with as much as 14.4 GW of solar potential. NREL estimates that Michigan has 34 GW of total urban utility-scale solar potential.[30] Not all of these sites will be viable, and site remediation and reuse plans should be developed in partnership with communities to determine land use priorities. However, these data suggest that Consumers could meet significant demand with community-scale solar systems,

[29] U.S. Environmental Protection Agency. "RE-Powering America's Land." Available at: https://www.epa.gov/re-powering

[30] Lopez, Anthony *et al.* "U.S. Renewable Energy Technical Potentials: A GIS-Based Analysis." *National Renewable Energy Laboratory.* 2012. Available at: https://www.nrel.gov/docs/fy12osti/51946.pdf

inclusive of those that provide additional community benefit through polluted site remediation. These community solar sites can simultaneously provide bill savings and consistency for households facing barriers to solar adoption, such as renters and those with limited access to capital.

Q: What additional data collection and aggregation would improve the ability to incorporate public health and equity metrics into IRPs in the future?

A: The State of Michigan is already requiring increased data reporting or developing specific datasets that will improve the ability for health and equity metrics to be incorporated into IRPs. Examples include zip-code level outage data, which can inform the need for resilient distributed energy storage, and the development of the Michigan Environmental Justice Screening Tool. In addition, data on solar and energy waste reduction measure adoption at a high spatial granularity can inform whether these resources are being accessed equitably and reaching those who struggle with energy cost burdens.

Q: Please summarize your recommendations based on your analysis.

A: I recommend that the Commission consider detailed and quantifiable energy and environmental equity metrics in addition to qualitative measures when it evaluates the Consumers IRP, and that it approach this analysis with the goal of *improving* public health and equity outcomes rather than just ensuring the proposed plan does not increase environmental justice impacts. These application of this equity framework to the Consumers IRP supports that rapid retirement of coal plants to improve public health, but highlights the equity and public health concerns of purchasing new gas plants, in particular DIG. The Commission should also consider the potential benefits that certain resources can provide to historically underserved populations across the state, such as the potential for efficiency resources to enable more low-income energy waste reduction programs and improve energy affordability, and the inclusion of additional distributed solar-plus-storage to provide resilience to vulnerable populations and those facing frequent electricity outages. This approach to evaluating the IRP can help reduce public health impacts of the existing power generation system and support energy equity and access for disadvantaged communities across the state.

Q: Does this complete your testimony?

A: Yes.

STATE OF MICHIGAN
MICHIGAN PUBLIC SERVICE COMMISSION

In the matter of the application of **CONSUMERS ENERGY COMPANY** for Approval of an Integrated Resource Plan under MCL 460.6t, certain accounting approvals, and for other relief.	)))))))	 Docket No. U-21090 Administrative Law Judge Sally L. Wallace

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DIRECT TESTIMONY OF

KELSEY BILSBACK, PHD

ON BEHALF OF

THE ENVIRONMENTAL LAW & POLICY CENTER,
THE ECOLOGY CENTER,
THE UNION OF CONCERNED SCIENTISTS,
AND VOTE SOLAR

October 28, 2021

Table of Contents

I. Name and Qualifications

Q. Please state your name, business name, and address.

A. My name is Kelsey Bilsback. I am a senior scientist at Physicians, Scientists, and Engineers for Healthy Energy. My business address is 1440 Broadway, Suite 750, Oakland, California, 94612.

Q. On whose behalf are you testifying in this case?

A. The Environmental Law & Policy Center, the Ecology Center, the Union of Concerned Scientists, and Vote Solar.

Q. Can you please summarize your educational background?

A. I received a BA in Physics from Boston University and a PhD in Mechanical Engineering from Colorado State University. My PhD dissertation was focused on characterizing emissions from residential cookstoves.

Q. Can you please summarize your work experience?

A. My work experience is outlined in detail in my resume, Exhibit CEO-6 (KB-1). Briefly, I am a senior scientist at PSE Healthy Energy with a background in mechanical engineering and atmospheric science. My expertise is in emissions, aerosols, air pollution, air quality measurements, atmospheric modeling, and data and statistical analyses. Prior to joining PSE, I was a postdoctoral researcher in Atmospheric Science at Colorado State University, where my work was focused on implementing process-level models for secondary organic aerosol in atmospheric models and using chemical-transport models to assess the air quality, health, and climate impacts of energy transition policies. Additionally, as a graduate researcher at Colorado State University, I characterized the health- and climate-relevant properties of smoke from the solid-fuel cookstoves, which are primarily used in low- and middle-income countries. This research included a series of large-scale laboratory- and field-testing campaigns. I have authored 17 peer-reviewed publications, reviewed journal publications and scientific proposals for funding agencies, and presented at various national and international scientific conferences such as the American Association for Aerosol Research, the American Geophysical Union, and the International Society for Environmental Epidemiology.

Q. Have you ever testified before this Commission?

A. No.

Q. Have you testified in other proceedings?

A. No.

Q. Are you sponsoring any exhibits?

A. Yes, I am sponsoring the following exhibits:

- Exhibit CEO-6 (KB-1) – Resume of Kelsey Bilsback
- Exhibit CEO-6 (KB-2) – COBRA metrics for Karn, JH Campbell, and Dearborn

II. Purpose and Summary

Q. What is the purpose of your Testimony?

A. The purpose of my testimony is to quantify the public health and equity dimensions of gas, coal, and biomass-fired power plants in Consumers Energy Company's ("Consumers" or the "Company") Integrated Resource Plan (IRP). Specifically, I estimated the *total* emissions, *rate* of emissions, and fine particulate matter ($PM_{2.5}$)-related health impacts of nine total plants. These included the existing Dan E Karn, JH Campbell, Jackson Generating Station, and Zeeland Generating Station plants as well as the plants that Consumers has proposed buying (i.e., Kalamazoo River Generating Station, Livingston

Generating Station, New Covert Generating Project, and Dearborn Industrial Generation). Further, I estimated the emissions and health impacts of Midland Cogeneration Venture, since Consumers has a significant purchasing agreement with this plant. Finally, I calculated the *total* emissions and emissions *rates* for the following biomass plants that Consumers has a purchasing agreement with: Cadillac Renewable Energy, Genesee Power Station, Grayling Generating Station, Viking Energy of Lincoln, and Hillman Power Company.

Q: What process do you use to reach these estimates?

A: First, I compiled emissions of fine particulate matter ($PM_{2.5}$) and $PM_{2.5}$ precursors from each of the power plants from various sources. Then, I used two different scientific models to translate the emissions from each of these plants to the $PM_{2.5}$-related health impacts. I analyzed *total* health impacts, the *rate* of health impacts, and the *spatial* distribution of the health impacts from each of the power plants. The latter provides insights into whether certain communities may be disproportionately impacted by air pollution from the nine plants discussed above (see Elena Krieger's testimony). Finally, based on these analyses, I discuss the potential benefits and risks of the Consumers IRP.

Q. Please summarize your conclusions.

A. My conclusions are summarized below:

- Retiring the Campbell and Karn coal plants will save 40 to 90 lives per year and $430-$972 million per year. Campbell is particularly important to retire because it leads to greater total health impacts than any other individual plant.
- Dearborn, Kalamazoo, Livingston, and Covert—plants Consumers plans to purchase—lead to 9-19 mortalities per year ($93-209 million per year). Dearborn is particularly

harmful, because it is responsible for most of these mortalities (7.5-17 premature mortalities per year) and Dearborn leads to *per capita* health impacts that are 2.5 times higher for Black people than the overall population.

- All nine of the plants examined in detail here have substantial health impacts. The only way to eliminate the health impacts of these plants is to rapidly transition to zero-emissions energy sources (e.g., solar, wind, hydroelectric) coupled with energy storage. The health metrics described above are given on an annual basis. Thus, for every year that these fossil fuel power plants are retired early, health benefits are realized.
- Finally, biomass power plants are likely to have higher air pollutant emissions *rates* per unit energy produced. Thus, while these plants may be considered to have climate benefit under certain policies, they may have substantial health impacts and should be considered from a public health perspective.

III. Background and Methods

Q: What are the public health hazards, risks, and impacts associated with fossil fuel combustion in power plants?

A: Fossil fuel combustion in power plants emits air pollutants that have negative impacts on air quality and human health.[1,2,3] Air pollutants from fossil fuel plants include primary air pollutants, i.e., constituents that are emitted directly by the power plant, and precursors of

[1] Murray, C. J., Aravkin, A. Y., Zheng, P., Abbafati, C., Abbas, K. M., Abbasi-Kangevari, M., ... & Borzouei, S. (2020). Global burden of 87 risk factors in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. *The Lancet*, *396*(10258), 1223-1249. https://doi.org/10.1016/S0140-6736(20)30752-2

[2] Vohra, K., Vodonos, A., Schwartz, J., Marais, E. A., Sulprizio, M. P., & Mickley, L. J. (2021). Global mortality from outdoor fine particle pollution generated by fossil fuel combustion: Results from GEOS-Chem. *Environmental Research*, *195*, 110754. https://doi.org/10.1016/j.envres.2021.110754

[3] Thurston, G. D., Burnett, R. T., Turner, M. C., Shi, Y., Krewski, D., Lall, R., ... & Pope III, C. A. (2016). Ischemic heart disease mortality and long-term exposure to source-related components of US fine particle air pollution. *Environmental health perspectives*, *124*(6), 785-794. http://dx.doi.org/10.1289/ehp.1509777

secondary air pollutants, i.e., constituents that react chemically in the atmosphere and form harmful air pollutants downwind from the power plant. Primary air pollutants addressed here include $PM_{2.5}$ and $PM_{2.5}$ precursors include nitrogen oxides (NO_x), sulfur dioxide (SO_2), and volatile organic compounds (VOCs), which can chemically react to form ozone and $PM_{2.5}$. Some of these air pollutants—including SO_2, NO_2, ozone, and $PM_{2.5}$—are Criteria Air Pollutants that are regulated by the U.S. Environmental Protection Agency (U.S. EPA) to protect human health and the environment.

Certain sensitive populations are particularly susceptible to the effects of air pollution. These groups include children, the elderly, people with underlying health conditions (such as asthma), and people with higher cumulative socioeconomic, health, and environmental burdens, among others (see Elena Krieger's testimony).

Air pollution can be transported over long distances before it is deposited on the Earth's surface either directly or through precipitation.[4] Thus, air pollution from power plants will impact both people who live near an emission source, such as a power plant, and people who live downwind from the source. This can include people living over a relatively large geographic area. Furthermore, because air pollution may travel far downwind, power plants can impact populated areas even if they are far away from the source.

Q: How do you evaluate the health impacts of power plants?

A: Air quality models are used to represent the transport and chemical fate of emissions in the atmosphere as well as the impacts of changes in emissions on human health. Our modeling efforts focused on $PM_{2.5}$ because there are numerous models that are widely used to

[4] National Research Council. (2010). *Global sources of local pollution: An assessment of long-range transport of key air pollutants to and from the United States*. National Academies Press. https://doi.org/10.17226/12743

represent atmospheric $PM_{2.5}$[5] and there is overwhelming epidemiological evidence that supports the relationship between $PM_{2.5}$ and human health.[6,7,8] The air quality models employed here use scientific methods to estimate the air quality and health impacts of emissions sources (such as a power plant). Air quality models take into account factors including the amount of emissions from a source, the physical characteristics of the emissions source, meteorology, atmospheric chemistry, and the epidemiological relationship between $PM_{2.5}$ and human health.

Q: Can you describe the models you used?

A: Two models were used to evaluate the $PM_{2.5}$-related health impacts of the power plants in the Consumers IRP. The first model was the U.S. EPA's CO-Benefits Risk Assessment Health Impacts Screening and Mapping Tool, or COBRA.[9] This model was first released in 2001, has precedent for use in policy decisions, and has been implemented widely in the scientific literature.[10] COBRA uses emissions data for pollutants that include $PM_{2.5}$, NO_x, SO_2, and VOCs and physical information about a source (e.g., stack height, fuel type) as inputs. Then, COBRA conducts a series of scientific calculations to translate the information about the source and emissions to a marginal change in annual-averaged

[5] Tessum, C. W., Hill, J. D., & Marshall, J. D. (2017). InMAP: A model for air pollution interventions. *PloS one*, 12(4), e0176131. https://doi.org/10.1371/journal.pone.0176131
[6] Dockery, D. W., Pope, C. A., Xu, X., Spengler, J. D., Ware, J. H., Fay, M. E., ... & Speizer, F. E. (1993). An association between air pollution and mortality in six US cities. *New England Journal of Medicine*, *329*(24), 1753-1759.
[7] Krewski, D., Jerrett, M., Burnett, R. T., Ma, R., Hughes, E., Shi, Y., ... & Tempalski, B. (2009). Extended follow-up and spatial analysis of the American Cancer Society study linking particulate air pollution and mortality. *Res Rep Health Eff Inst*(140), 5-114; discussion 115-136.
[8] Lepeule, J., Laden, F., Dockery, D., & Schwartz, J. (2012). Chronic exposure to fine particles and mortality: an extended follow-up of the Harvard Six Cities study from 1974 to 2009. *Environmental Health Perspectives*, *120*(7), 965-970.
[9] COBRA information page: https://www.epa.gov/cobra
[10] List of publications that cite COBRA: https://www.epa.gov/system/files/documents/2021-10/cobra-publications_9.14.21.pdf

atmospheric $PM_{2.5}$ (from both primary pollutants and secondary precursors). Finally, COBRA uses concentration-response relationships from the peer-reviewed epidemiological literature to translate changes in $PM_{2.5}$ to health and monetary impacts. Metrics from COBRA are given on a county basis and are presented both as the number and monetary value of each health outcome.

Q: What about the second model?

A: The second model was the Intervention Model for Air Pollution or InMAP. This model is an independent air quality model that has been published in the peer-reviewed scientific literature.[11] InMAP uses pre-processed chemical and meteorological information from a state-of-the-science atmospheric model to estimate the marginal impacts of an emissions source on annual-averaged atmospheric $PM_{2.5}$. Like COBRA, InMAP takes primary emissions, secondary precursor emissions, and physical information about the emissions source as inputs. However, compared to COBRA, InMAP provides increased spatial granularity (up to 1 kilometer resolution) and integrates demographic data, providing the opportunity to quantify the spatial and environmental justice impacts of emissions shifts.

Q: Are there any health impacts that these models do not account for?

A: Both COBRA and InMAP only capture the health impacts from atmospheric (or outdoor) $PM_{2.5}$ that is emitted directly or is formed as a secondary pollutant from other pollutants emitted directly from the power plant itself. However, there are many other aspects of these power plants that impact human health, meaning our models underestimate the health impacts of the power plants evaluated here. For example, these models do not capture the

[11] Tessum, C. W., Hill, J. D., & Marshall, J. D. (2017). InMAP: A model for air pollution interventions. *PloS One*, 12(4), e0176131. https://doi.org/10.1371/journal.pone.0176131

direct impacts of volatile organic compounds (VOCs), many of which are carcinogenic.[12] There is evidence that sources across the entire oil and gas supply chain emit health-damaging VOCs, including during extraction and transmission, but lifecycle emissions are not incorporated into our models.[13] These models also do not capture the impacts of ozone, which forms through atmospheric reactions with precursors such as VOCs and NO_x and is the second most harmful outdoor air pollutant after $PM_{2.5}$ in terms of total impact.[14,15] Further, our models also do not capture the health impacts of other factors such as the on-site disposal of toxic materials or additional hazardous air pollutants near plants (see Elena Krieger's testimony).

Q: Are the models still valuable if they don't capture all of the health impacts?

A: While our models do not capture all health impacts, there is still sufficient evidence to make conclusions about which plants impact outdoor air quality the most and how the impacts of the plants are distributed spatially. Further, these models are frequently used in modeling, analysis, and decision making.

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[12] U.S. Enivronmental Protection Agency's National Air Toxics Assessment (NATA): https://www.epa.gov/national-air-toxics-assessment

[13] Drew R. Michanowicz DR, Eric D. Lebel ED, Domen JK, Hill LAL, Jaeger, JM, Schiff JE, Krieger EM, Banan Z, Goldman JSW, Nordgaard CL, Shonkoff SBC. 2021. Methane and Health-Damaging Air Pollutants From the Oil and Gas Sector: Bridging 10 Years of Scientific Understanding. PSE Healthy Energy. Available at: https://www.psehealthyenergy.org/our-work/publications/archive/methane-and-health-damaging-air-pollutants-from-the-oil-and-gas-sector-bridging-10-years-of-scientific-understanding/.

[14] Lelieveld, J., Evans, J. S., Fnais, M., Giannadaki, D., & Pozzer, A. (2015). The contribution of outdoor air pollution sources to premature mortality on a global scale. *Nature*, 525(7569), 367-371. https://doi.org/10.1038/nature15371

[15] Murray, C. J., Aravkin, A. Y., Zheng, P., Abbafati, C., Abbas, K. M., Abbasi-Kangevari, M., ... & Borzouei, S. (2020). Global burden of 87 risk factors in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. *The Lancet*, *396*(10258), 1223-1249. https://doi.org/10.1016/S0140-6736(20)30752-2

IV. <u>Power Plant Emissions</u>

Q: What is the magnitude of total pollutants emitted from coal plants in the Consumers IRP, and which plants have the highest emission rates?

A: The *total* emissions (tons) and emissions *rates* (tons per MWh or tons per MMBtu) for nine of the plants outlined in the Consumers IRP are given in Tables 1 and 2, respectively. Data were collated data from a variety of sources to compile these estimates. NO_x, SO_2, CO_2, gross load, and steam load data are primarily from the U.S. EPA's Air Markets Program Database (AMPD).[16] CO_2 data for Midland and Dearborn are from the U.S. Energy Information Administration (EIA).[17] $PM_{2.5}$ emissions factors for the plants are from the Michigan Department of Environment, Great Lakes, and Energy (EGLE)[18] or the U.S. EPA's Emissions and Generation Resource Integrated Database (eGRID).[19] Total emissions were calculated using the emissions factors and gross and steam load data. Similarly, VOC data were derived using gross and steam load data and emissions factors from the scientific literature[20] or the U.S. EPA's Compilation of Air Pollutant Emissions Factors.[21] Emission rates were calculated by dividing the total emissions by the gross load of the plant or the heat input (for both the electricity and steam producing units) in the case of steam producing plants.

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[16] U.S. EPA's Air Markets Program Database Tool (AMPD): https://ampd.epa.gov/ampd/
[17] U.S. Energy Information Administration (EIA): https://www.eia.gov/electricity/data.php
[18] Michigan Department of Environment, Great Lakes, and Energy (EGLE): https://www.michigan.gov/egle/
[19] U.S. EPA's Emissions and Generation Resource Integrated Database (eGRID): https://www.epa.gov/egrid
[20] Peng, Y., Yang, Q., Wang, L., Wang, S., Li, J., Zhang, X., ... & Fantozzi, F. (2021). VOC emissions of coal-fired power plants in China based on life cycle assessment method. *Fuel*, *292*, 120325.
[21] U.S. EPA's Compilation of Air Pollutant Emissions Factors: https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emissions-factors

Table 1: Total emissions per year of fine particulate matter ($PM_{2.5}$), sulfur dioxide (SO_2), nitrogen oxides (NO_x), volatile organic compounds (VOCs), and carbon dioxide (CO_2). Energy production per year in gross load and steam load. Emissions are from 2019 and are summed across units. Data are given in gigawatt-hours, 1,000 lbs, and metric tons.

Power Plant	Gross Load (GWh)	Steam Load (1,000 lbs)	$PM_{2.5}$ (tons)	VOCs (tons)	NO_x (tons)	SO_2 (tons)	CO_2 (megatons)
Dan E Karn[C, G]	1,976	690,359	47	2.9	557	516	2.0
J H Campbell[C]	9,025		538	13	2,918	5,244	8.2
Jackson Generating Station[G]	2,237		0.8	10	504	4.7	0.9
Zeeland Generating Station[G]	4,162		2.6	20	197	8.8	1.7
Midland Cogeneration Venture[G]	7,316	93,545	3.3	33	3,524	21	4.0
Kalamazoo River Generating Station[G]	60		0.6	0.5	17	0.2	0.04
Livingston Generating Station[G]	13		1.2	0.1	22	0.1	0.01
New Covert Generating Project[G]	7,616		71	34	177	14	2.8
Dearborn Industrial Generation[G,O]	3,665	4,614,373	70	20	535	610	1.9

C: Primary fuel is coal; G: Primary fuel is pipeline natural gas; O: Primary fuel is other gas

Total emissions (Table 1) indicate which plants have the highest overall pollutant emissions, while the emissions *rates* (Table 2, below) reflect which plants have the highest emissions per unit of energy generated or heat input (for the steam producing plants). Plants that have lower total emissions may have higher emissions rates, indicating that taking that plant offline would displace a larger proportion of overall emissions per energy produced.

Table 2: Emissions rates of fine particulate matter ($PM_{2.5}$), volatile organic compounds (VOCs), nitrogen oxides (NO_x), sulfur dioxide (SO_2), and carbon dioxide (CO_2). Data are from 2019 and are summed across units. Values are in metric tons per terawatt hour of gross load or metric tons per metric trillion British thermal units (tons/MTBtu), to account for both electricity and steam production in the emissions rates.

Power Plant	$PM_{2.5}$ (tons/TWh)	VOCs (tons/TWh)	NO_x (tons/TWh)	SO_2 (tons/TWh)	CO_2 (megatons/TWh)
J H Campbell[C]	60	1.5	323	581	0.9
Jackson Generating Station[G]	0.3	5	225	2.1	0.4
Zeeland Generating Station[G]	0.6	4.8	47	2.1	0.4
Kalamazoo River Generating Station[G]	9.2	8.3	278	3.4	0.7
Livingston Generating Station[G]	93	8.5	1,724	4.3	0.8
New Covert Generating Project[G]	9.3	4.5	23	1.8	0.4
Power Plant	**$PM_{2.5}$ (tons/MTBtu)**	**VOCs (tons/MTBtu)**	**NO_x (tons/MTBtu)**	**SO_2 (tons/MTBtu)**	**CO_2 (megatons/MTBtu)**
Dan E Karn[C, G]	2.2	0.1	26	24	0.1
Midland Cogeneration Venture[G]	0.04	0.4	44.8	0.3	0.1
Dearborn Industrial Generation[G,O]	1.5	0.4	12	14	0.04

C: Primary fuel is coal; G: Primary fuel is pipeline natural gas; O: Primary fuel is other gas

Q: What are your findings with respect to emissions?

A: All nine power plants, including coal and gas plants, have health-damaging emissions (Table 1). The JH Campbell coal plant has the highest *total* emissions of $PM_{2.5}$ and SO_2. Retiring this plant would eliminate 538 tons of $PM_{2.5}$, 13 tons of VOCs, 2,918 tons of NO_x, 5,244 tons of SO_2, and 8.2 megatons of CO_2 per year. The Karn coal plant also had higher *total* $PM_{2.5}$ and SO_2 emissions than the natural gas plants that Consumers already owns or purchases power from (i.e., Jackson, Zeeland, Midland). This finding supports the plan outlined in the Consumer's IRP to retire the Karn and Campbell coal plants earlier than their rated lifetime.

Several gas plants also have high emissions. For example, Midland has the highest NO_x emissions overall—a pollutant that has both primary health impacts and contributes to the formation of ozone and $PM_{2.5}$. Covert and Dearborn have the highest emissions out of the four plants that Consumers has proposed purchasing. In fact, the Dearborn gas plant has higher annual emissions than the Karn coal plant for all pollutant types analyzed except NO_x and CO_2. Depending on how Dearborn is operated, this plant may offset much of the emissions benefits from retiring Karn early.

Q: What does Table 2 show?

A: The emissions *rates* for the nine plants are in Table 2. Comparing the emissions rates on a per MWh basis, the Livingston gas plant has the highest emissions rate for all pollutants except for SO_2, which is higher from JH Campbell. This indicates that for every MWh of energy generated by Livingston there will be higher emissions of these pollutants than from any of the other plants, including the coal plants. Furthermore, the Karn and JH Campbell coal plants had some of the highest emissions rates of $PM_{2.5}$ and SO_2, although the gas plants generally had higher emissions rates for NO_x and VOCs. The emissions rate metrics highlight that, from an emissions perspective, the procurement of gas plants outlined in the Consumers IRP will not necessarily offset coal co-pollutant emissions per MWh of energy produced. This could be problematic, depending on how the energy load is balanced across the gas plants when the coal plants are retired. A better option would be to accelerate the transition to zero-emissions energy production (e.g., wind, solar, hydroelectric) coupled with energy storage (see Elena Krieger's testimony) rather than purchasing new gas plants to ensure that emissions are not just shifted to a different plant.

Q: How can it be that a gas plant has as much emissions as a coal plant?

A: There are several ways a gas plant can have as much or more air pollutant emissions than a coal plant. For example, if a fuel other than natural gas is used at the facility this can increase *total* emissions or emissions *rates*. Dearborn uses waste gas from a steel plant in a blast furnace to produce steam in addition to pipeline natural gas. This blast furnace produces much higher emissions of $PM_{2.5}$ and SO_2 than the other pipeline natural gas units. Thus, using other fuels, in addition to natural gas, may increase emissions. Additionally, the chemical nature of the fuel and the conditions under which it is combusted (i.e., temperature, fuel-air ratio) can lead to changes in total emissions or emissions rates. For example, coal fuel itself contains sulfur, while natural gas only contains trace amounts of SO_2, unless sulfur-containing odorants are added. Meanwhile, there are several pathways that can lead to NO_x and VOCs being emitted when natural gas is combusted.[22] Depending on the combustion conditions and technology being used, VOCs or NO_x may be higher in natural gas combustion, relative to coal combustion. Finally, different plants may be outfitted with different emission control technologies at their stacks, leading to varying emission rates even for the same combustion technology and fuel type.

[22] Emissions from natural gas combustion: https://www.epa.gov/sites/default/files/2020-09/documents/1.4_natural_gas_combustion.pdf

V. Total Power Plant Health Impacts

Q: What are the overall public health impacts of these power plant emissions?

A: A summary of the annual $PM_{2.5}$-related health impacts from the nine plants in the Consumers IRP are given in Table 3. The full metrics given by COBRA are in Exhibit CEO-6 (KB-2) for Karn, JH Campbell, and Dearborn. Metrics are given for the total health impacts per plant and the health impacts per unit of energy generated or heat input (for the steam producing plants). These data are from the COBRA model, which uses a Source-Receptor Matrix to calculate the impacts of changes in emissions on $PM_{2.5}$ levels across the U.S.[23] COBRA then translates changes in $PM_{2.5}$ to health impacts using peer-reviewed epidemiological studies and population-level health metrics. The ranges given are the "low" and "high" estimates from COBRA, which capture the uncertainty associated with the relationship between $PM_{2.5}$ and health impacts. The two values are derived from two different epidemiological studies.

Table 3: National public health benefits of retiring power plants in 2019. Results are from COBRA using a 3% discount rate for the monetized health impacts.

[23] COBRA user manual: https://www.epa.gov/cobra/users-manual-co-benefits-risk-assessment-cobra-screening-model

Power Plant	Mortalities (cases, annual)	Mortalities (cases per TWh, annual)	Monetary Value of Total Health Impacts ($, annual)
J H Campbell[C]	36-81	4.0-9.0	$389-$879 million
Jackson Generating Station[G]	0.6-1.3	0.3-0.6	$6-14 million
Zeeland Generating Station[G]	0.2-0.5	0.05-0.12	$2-$5 million
Kalamazoo River Generating Station[G]	0.03-0.06	0.4-0.9	$0.27-$0.62 million
Livingston Generating Station[G]	0.02-0.05	1.6-3.5	$0.22-$0.50 million
New Covert Generating Project[G]	1.0-2.2	0.1-0.3	$11-$24 million
Power Plant	**Mortalities (cases, annual)**	**Mortalities (cases per MTBtu, annual)**	**Monetary Value* ($, annual)**
Dan E Karn[C, G]	3.8-8.6	0.2-0.4	$40-$92 million
Midland Cogeneration Venture[G]	2.5-5.7	0.03-0.07	$27-$62 million
Dearborn Industrial Generation[G,O]	7.5-17	0.2-0.4	$82-$184 million

C: Primary fuel is coal; G: Primary fuel is pipeline natural gas; O: Primary fuel is other gas

Q: Can you summarize your findings, as represented in the tables?

A: All nine plants evaluated here lead to premature mortalities, respiratory and cardiovascular impacts, and a substantial financial burden associated with these impacts (Table 3 and Exhibit CEO-6 (KB-2)). Further, all the plants have non-fatal respiratory and cardiovascular health impacts, affecting people's lives and livelihood both near and downwind from the plant. Greatly reducing, if not eliminating these impacts by converting to zero-emissions energy sources (e.g., wind, solar, hydroelectric) as soon as possible should be prioritized.

Q: Can you summarize the impact of Consumers retiring their coal plants?

A: Retiring the Karn and JH Campbell coal plants, as described in the Consumers IRP, will save approximately 40 to 90 lives per year and save $430-$972 million per year. JH Campbell is particularly important to retire as soon as possible because it has the highest total health impacts and the highest impacts on a per-MWh basis. Thus, converting the energy production of JH Campbell to zero-emission energy sources will lead to the most health benefit per MWh converted.

Q: Can you summarize the impact of the purchase of the gas plants?

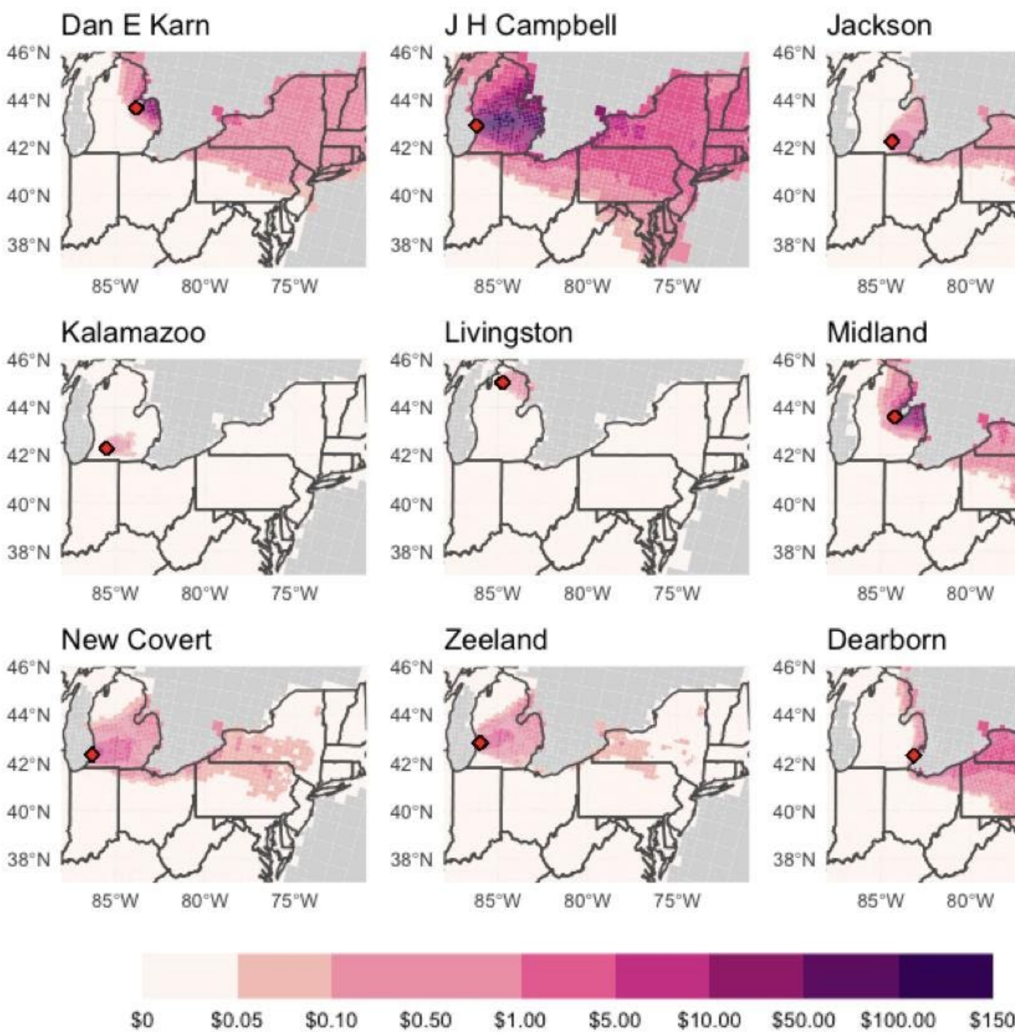
A: Operating Dearborn, Covert, Kalamazoo, and Livingston, the gas plants Consumers plans to purchase, at current levels, contributes to 9-19 premature mortalities per year and costs $93-209 million per year. Dearborn has the highest total health impacts of these four plants (7.5-17 mortalities per year) and cases per-MMBtu that are similar to the Karn coal plant. This is due in part to the disproportionately high levels of primary and secondary precursor pollutants—such as SO_2—being emitted from Dearborn and its proximity to high-density populations. Purchasing Dearborn to offset coal power in the near term could potentially counteract some of the benefits of retiring the Karn and JH Campbell plants early. Even though some of the fuel consumed at Dearborn is used to co-produce steam, rather than just electricity, purchasing the electricity produced at this plant will support its ongoing operation—and ongoing health impacts. Livingston has particularly high impacts per-MWh of energy produced (1.6-3.5 mortalities per-MWh per year), and any increase in operation at this plant would therefore have a higher impact on public health than a commensurate increase in generation at many other plants.

VI. Spatial Health Impacts

Q: Who is most affected by the emissions from these power plants?

A: Maps showing the spatial distribution of the public health impacts of nine of the power plants outlined are given below (Figures 1 and 2). Like COBRA, InMAP estimates the changes in primary and secondary $PM_{2.5}$ on an annual basis and uses a concentration-response function derived from epidemiological data to relate marginal changes in $PM_{2.5}$ to health impacts. Compared to COBRA, the InMAP modeling was conducted at a higher spatial resolution and incorporated demographic information; however, the InMAP modeling only included mortality as a health outcome.

Figure 1: Per capita public health impacts of each of the nine power plants. Values are given in $ per 100 people. The location of each plant is shown as a red dot. Health impacts were only evaluated in the contiguous U.S. Grid cells. Cells outside of the U.S. are shaded in gray. (Note: Data are from InMAP model runs. The analysis only included mortality as a health outcome and did not include a discount rate in the economic valuation.)



Q: What does Figure 1 show?

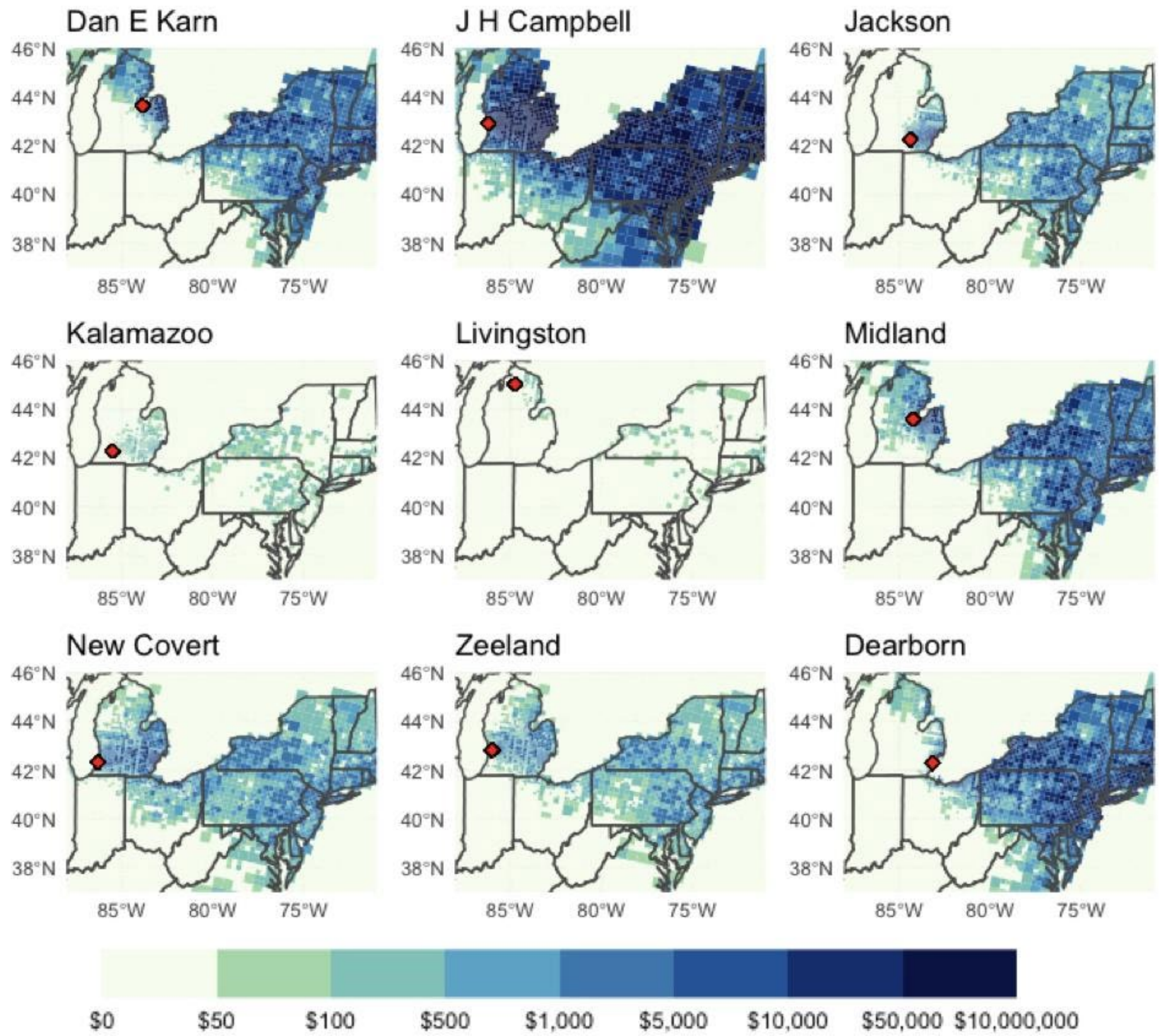
A: Figure 1 illustrates the fate of $PM_{2.5}$ in the atmosphere, both from primary $PM_{2.5}$ emissions and secondary precursors that react chemically in the atmosphere to form $PM_{2.5}$. The data are normalized by population (e.g., $ per 100 people), so the health impacts scale with changes in atmospheric $PM_{2.5}$. The largest per-capita health impacts are near and directly downwind of the plants, because that is where the emissions from each plant impact air quality the most. However, $PM_{2.5}$ may stay suspended in the atmosphere for an extended period, travelling long distances downwind in the process. This is demonstrated by health effects experienced in outside of Michigan (e.g., New York and Pennsylvania). Although the impacts of the power plants on atmospheric $PM_{2.5}$ are lower downwind, there is still enough change in power-plant derived $PM_{2.5}$ to see health impacts.

Q: Where are the largest total impacts of the emissions from the power plants?

A: The largest *total* impacts from the power plants tended to be in the most densely populated areas that are typically downwind from each plant (Figure 2). Because these areas have larger populations, there is a higher statistical probability that someone will be impacted by $PM_{2.5}$ from a particular power plant. Even though states like New York are farther away from the Michigan-based power plants, they are heavily populated. Therefore, even small changes in $PM_{2.5}$ can have meaningful health impacts in this region.

The Karn and JH Campbell coal plants have far-reaching impacts, including substantial impacts outside of Michigan (e.g., in New York and Pennsylvania). Therefore, retiring these plants early, as proposed in the Consumers IRP, would have substantial public health benefits. The Midland gas plant, which Consumers purchases power from, also has substantial *total* health impacts, in part due to its proximity to populous areas. Following the Consumers IRP and retiring this plant early would have substantial public health benefits.

Figure 2: Cumulative public health impacts of each of the nine power plants in the Consumers IRP. Values are given in \$. The location of each plant is shown as a red dot. Health impacts were only evaluated in the contiguous U.S. Grid cells outside of the U.S. are shown as zero. (Note: Data are from InMAP model runs. The analysis only included mortality as a health outcome and did not include a discount rate in the economic valuation.)



Q: What do you recommend based on your analysis of total health impacts?

A: As described earlier, the Dearborn gas plant has high *total* health impacts, likely because of the plant's proximity to Detroit and because the plant contributes to $PM_{2.5}$ in populated states such as New York. As mentioned in response to the previous question, depending on how Dearborn is operated, acquiring Dearborn (as suggested by the Consumers IRP) could offset some of the benefits of retiring other plants early due to the higher emissions of Dearborn compared to the other plants. Thus, in addition to retiring the JH Campbell and Karn coal plants early, I recommend that Consumers does not purchase the Dearborn gas plant to offset energy production. Instead, better options from a public health perspective could include accelerating the zero-emissions energy sources or improving energy efficiency (see Elena Krieger's testimony).

Q: Do any of the power plants pose environmental justice concerns?

A: Per capita health impacts across race and ethnicity are given in Table 4. These data can be used to demonstrate the potential inequity of $PM_{2.5}$ exposures and related health impacts from the Michigan power plants. However, these metrics do not capture how these inequities will manifest themselves. For example, these data do not capture that people who have higher cumulative socioeconomic, health, and environmental burdens may be more sensitive to air pollution and poor air quality (see Elena Krieger's testimony).

Table 4: Per capita health impacts by race and ethnicity. Values given in $ per 100 people. (Note: Data are from InMAP model runs. The analysis only included mortality as a health outcome and did not include a discount rate in the economic valuation.)

Power Plant	Black	Latino	Native	Asian	White*	Overall
Dan E Karn[C,G]	2.5	2.0	1.8	2.9	4.8	3.9
J H Campbell[C]	153	58	67	97	180	150
Jackson Generating Station[G]	4.8	1.2	1.7	2.6	4.8	4
Zeeland Generating Station[G]	1.2	0.8	0.8	1.0	2.3	1.8
Midland Cogeneration Venture[G]	6.1	4.1	6.3	5.4	18	13
Kalamazoo River Generating Station[G]	0.1	0.05	0.07	0.08	0.2	0.2
Livingston Generating Station[G]	0.01	0.01	0.05	0.01	0.05	0.03
New Covert Generating Project[G]	3.4	1.4	1.8	1.9	4.2	3.5
Dearborn Industrial Generation[G,O]	57	18	9.4	14	18	23

* White, not including Latino
C: Primary fuel is coal; G: Primary fuel is pipeline natural gas; O: Primary fuel is other gas

Q: Can you summarize your findings in Table 4?

A: All the plants in Table 4 except Dearborn have moderately higher per-capita health impacts for White people than the overall population. Additionally, the JH Campbell, Jackson, and Dearborn plants have higher health impacts per capita for Black people than the overall population. Dearborn has especially disproportionate impacts for Black people (2.5 times higher impacts per capita than the overall population), likely due to the plant's location at the edge of Detroit (see Elena Krieger's testimony).

Q: Are there any public concerns related to the use of fuels other than coal and natural gas?

A: The Dan E Karn Units 1 and 2 burn diesel oil and units 3 and 4 burn residual oil fuel as secondary fuels. These fuels, in addition to coal, have been linked to adverse health outcomes[24] and emit harmful pollutants beyond those discussed earlier, such as heavy metals.

Consumers also has several power purchase agreements for biomass power plants that primarily burn wood-derived and burn some tire-derived fuels. The total emissions (tons) and emissions rates (tons per MWh or tons per MMBtu) for the plants outlined in the Consumers IRP are given in Tables 1 and 2, respectively. Data were collated from a variety of sources following the methods described earlier. Emissions for NO_x and SO_x for Cadillac, Genesee, and Grayling were obtained from the EPA's AMPD. For most plants, $PM_{2.5}$, CO_2, and load data were obtained from the EPA's Power Plants and Neighboring Communities Tool; however, $PM_{2.5}$ data for Genesee were from EGLE, while gross load data for Grayling was from the U.S. EIA and steam load for Grayling was from the EPA's AMPD. All emissions for Viking Energy of Lincoln and Hillman Power Station were from the Power Plants and Neighboring Communities Tool.[25] The total emissions and emissions rates were derived in the same way as the fossil fuel plants, described above.

[24] Casey, J. A., Karasek, D., Ogburn, E. L., Goin, D. E., Dang, K., Braveman, P. A., & Morello-Frosch, R. (2018). Retirements of coal and oil power plants in California: association with reduced preterm birth among populations nearby. *American Journal of Epidemiology*, *187*(8), 1586-1594.
[25] U.S. EPA's Power Plants and Neighboring Communities Tool: https://www.epa.gov/airmarkets/power-plants-and-neighboring-communities

Table 5: Total emissions per year of fine particulate matter ($PM_{2.5}$), sulfur dioxide (SO_2), nitrogen oxides (NO_x), and carbon dioxide (CO_2). Energy production in gross load and steam load per year. Emissions are from 2019 and are summed across units. Data are given gigawatt hours, 1,000 lbs, and metric tons.

Power Plant	Gross Load (GWh)	Steam Load (1,000 lb)	$PM_{2.5}$ (tons)	NO_x (tons)	SO_2 (tons)	CO_2 (megatons)
Cadillac Renewable Energy	96		3.1	119	39	0.19
Genesee Power Station	97		48	121	27	0.15
Grayling Generating Station	171	1,645,376	9.4	135	8.0	0.26
Viking Energy of Lincoln	144		20	191	18	0.18
Hillman Power Company	94		14	53	14	0.13

Table 6: Emissions rates of fine particulate matter ($PM_{2.5}$), nitrogen oxides (NO_x), sulfur dioxide (SO_2), and carbon dioxide (CO_2). Values are in metric tons per terawatt hour of gross load or metric tons per metric trillion British thermal units (tons/MTBtu), to account for both electricity and steam production in the emissions rates.

Power Plant	$PM_{2.5}$ (tons/TWh)	NO_x (tons/TWh)	SO_2 (tons/TWh)	CO_2 (megatons/TWh)
Cadillac Renewable Energy	32	1,249	404	2.0
Genesee Power Station	496	1,242	282	1.6
Viking Energy of Lincoln	174	1,675	155	1.6
Hillman Power Company	150	565	152	1.3
Power Plant	**$PM_{2.5}$ (tons/MTBtu)**	**NO_x (tons/MTBtu)**	**SO_2 (tons/MTBtu)**	**CO_2 (megatons/MTBtu)**
Grayling Generating Station	3.7	53	3.2	0.1

Q: What conclusions do you reach from Tables 5 and 6?

A: The emissions *rates* of the biomass plants are comparable to the fossil-fuel power plants. For example, Genesee, Viking, and Hillman have higher $PM_{2.5}$ emissions than the JH Campbell coal plant per MWh generated. Although these fuels may be considered "renewable" they could have important health impacts. This could be because biomass tends to have lower heating values compared to other types of generation, which leads to less energy produced, as well as the fact the biomass is more likely to combust under poor fuel-oxygen conditions. Thus, transitioning to "renewable" fuel sources rather than zero-emissions energy production may still be problematic from a public health perspective.

VII. Benefits and Risks of the Consumers IRP

Q: From a public health standpoint, what are the public health risks and benefits of the proposed Consumers IRP?

A: I will summarize the risks and benefits of the Consumers IRP below:

Benefits:

- Rapidly retiring the Karn and JH Campbell coal plants as proposed will have substantial health benefits, saving approximately 40 to 91 lives and $430-$972 million for every year that the coal plants are retired early. JH Campbell especially should be prioritized, because it has the highest total health impacts of the coal and gas plant investigated here.
- The plan to transition fossil-fuel plants to zero-emissions energy sources (e.g., wind, solar) ahead of their rated lifetimes is a strong health benefit of the Consumers IRP.

Risks:

- All coal and natural gas plants have emissions resulting in $PM_{2.5}$-related health risks, hazards, and impacts. These impacts range from premature mortality to shorter term impacts on the respiratory and cardiovascular health of people living near and downwind from the power plants. Only a swift and complete transitioning to zero-emissions energy (e.g., wind, solar, hydroelectric) coupled with energy storage, will eliminate potential air quality and public health impacts.

- Procuring new gas plants will increase the public health impacts of Consumers as compared to meeting this electricity demand with zero-emissions energy production. Purchasing Dearborn, Kalamazoo, Livingston, and Covert will increase the health burden of Consumers by 9-19 annual premature mortalities per year ($93-209 million per year).
- Procuring Dearborn, in particular, will have substantial health and equity impacts (7.5-17 annual premature mortalities). In fact, depending on how Dearborn is operated, this plant could potentially counteract some of the benefits of retiring the coal plants early. Furthermore, Dearborn poses substantial environmental justice and equity concerns. For example, Dearborn leads to *per capita* health impacts that are 2.5 times higher for Black people, compared to the overall population.
- Finally, the biomass plants that Consumers purchases power from have high emissions *rates*, which may lead to substantial health impacts.

Q: Is there anything else you would like to add to your testimony?

A: Recent epidemiological studies have identified health impacts at very low atmospheric concentrations of $PM_{2.5}$ as low as 2 μg m^{-3}.[26] The more quickly Consumers transitions to zero-emissions energy production coupled with battery storage, the more quickly the public health benefits described above can be realized. While the rapid retirement of the Karn and

[26] Christidis, T., Erickson, A. C., Pappin, A. J., Crouse, D. L., Pinault, L. L., Weichenthal, S. A., ... & Brauer, M. (2019). Low concentrations of fine particle air pollution and mortality in the Canadian Community Health Survey cohort. *Environmental Health*, *18*(1), 1-16.

JH Campbell coal plants aims to achieve this goal, the continued use of natural gas and the procurement of any new natural gas plants will continue to impact public health. Finally, biomass plants tend to have high emissions *rates*. Thus, while biomass plants may have climate benefits, if they have neutral or negative CO_2 emissions over the entire lifecycle, they are likely to have substantial health impacts due to their high emissions *rates*.

Q: Does this complete your testimony?

A: Yes.

STATE OF MICHIGAN
MICHIGAN PUBLIC SERVICE COMMISSION

In the matter of the application of	)	
CONSUMERS ENERGY COMPANY	)	
for Approval of an Integrated Resource Plan	)	Docket No. U-21090
under MCL 460.6t, certain accounting	)	
approvals, and for other relief.	)	Administrative Law Judge
	)	Sally L. Wallace
	)	

DIRECT TESTIMONY OF

BORIS LUKANOV, PHD

ON BEHALF OF

THE ENVIRONMENTAL LAW & POLICY CENTER, THE ECOLOGY CENTER, THE UNION OF CONCERNED SCIENTISTS, AND VOTE SOLAR

October 28, 2021

Q. Please state your name, business name and address.

A. My name is Boris Lukanov. I am a Senior Scientist at Physicians, Scientists, and Engineers for Healthy Energy (PSE). My business address is 1440 Broadway, Suite 750, Oakland, California, 94612.

Q. On whose behalf are you testifying in this case?

A. The Environmental Law & Policy Center, the Ecology Center, the Union of Concerned Scientists, and Vote Solar.

Q. Can you please summarize your educational background?

A. I have a BA in Physics and Astronomy from Wesleyan University, and a PhD in Mechanical Engineering and Materials Science from Yale University, where my dissertation research focused on the atomic-scale characterization of surfaces and thin films, with applications in photovoltaics and photoelectrochemistry.

Q. Can you please summarize your work experience?

A. I joined PSE in 2017 to develop analyses on energy transition pathways that maximize health, equity, and environmental co-benefits. My research focuses on energy equity, energy efficiency, air quality and energy resource modeling and optimization. I have recently co-authored technical reports and peer-reviewed papers on equity-focused climate strategies, equitable access to clean energy, and energy transition pathways for various US states. I am currently leading a technical analysis on energy cost burden and energy affordability for the Colorado Energy Office. My work experience is set forth in more detail in my resume, which is attached as Exhibit CEO-7 (BL-1).

Q. Have you ever testified before this Commission?

A. No.

Q. Have you testified in other proceedings?

A. No.

Q. Are you sponsoring any exhibits?

A. Yes, I am sponsoring the following exhibits:

- Exhibit CEO-7 (BL-1) – Curriculum Vitae of Boris Lukanov

Q. What is the purpose of your Testimony?

A. The purpose of my testimony is to discuss the equity dimensions of Consumers Energy Company's ("Consumers" or the "Company") Integrated Resource Plan. More specifically, my goal is to: 1) provide a framework for evaluating energy cost burden across Consumers utility service territory and discuss why energy cost burden and energy affordability should be important considerations in Integrated Resource Planning (IRP); 2) highlight which socio-demographic groups within Consumers territory could benefit the most from enhanced energy affordability measures; and 3) discuss possible interventions to increase residential energy affordability and lower energy cost burdens.

Q. Please summarize your conclusions.

A. Energy cost burden analyses can be incorporated explicitly into the IRP process and should be required of Consumers to evaluate and submit for approval. Consumers Energy Company has access to detailed energy use data at the customer level that can be aggregated on the census tract level and used to evaluate the landscape of energy cost burden across the utility service territory in greater detail than presented below.

- Energy cost burdens are distributed unevenly across the state of Michigan and Consumers territory. Rural communities, low-income communities, communities of color, and communities with a high concentration of renters face higher energy cost burdens on average relative to other neighborhoods in Michigan.

- Resources in the IRP can enable energy cost burden reductions. Such interventions may include low-income energy waste reduction, low-income and community solar, and provisions such as additional capacity to enable the electrification of rural propane-using households.
- While not all of these measures can be addressed directly in an IRP, the IRP enables these resources to be targeted in other proceedings without over-building supply-side resources that can be offset by these programs.

Q: What are energy cost burdens and why do they matter?

A: Energy cost burden is defined as the percentage of household income spent on residential energy needs. According to the U.S. Department of Energy, the average household energy cost burden nationally is 8.6 percent for low-income households and 3 percent for non-low-income households,[1] though this figure can vary widely from region-to-region and household-to-household. Typically, a household spending 6 percent or more of its income on energy is considered energy cost burdened. Affordable energy is necessary to perform essential functions such as cooling and heating one's home, preparing food, refrigerating medicine, and accessing information. Cost-burdened households may have to forgo some of these functions to be able to afford their energy bills. Roughly one in ten American households reports keeping their home at an unhealthy or unsafe temperature due to inability to afford their energy bills.[2] Conversely, should households consume energy

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[1] *U.S. Department of Energy. "Low-Income Community Energy Solutions." https://www.energy.gov/eere/slsc/low-income-community-energy-solutions*

[2] *U.S. Energy Information Administration. "Today in Energy" September 2018. https://www.eia.gov/todayinenergy/detail.php?id=37072*

beyond what they can afford, they face difficult tradeoffs in paying for other goods and services. One in five American households forgoes or reduces necessities such as food and medicine to make sure they can pay their energy bills.[3]

Q: What factors contribute to energy cost burdens?

A: A number of factors contribute to high energy cost burdens. Some of these are straightforward — families that consume more energy, pay higher fuel prices, and have lower incomes will face higher energy cost burdens. Additional factors underlie these considerations, however. These include home size and age, appliance efficiency, clean energy access, renter or homeowner status, and other external factors that may play into energy consumption such as geography and climate.

Q: How do you calculate energy cost burdens?

A: Energy cost burden is calculated using a simple equation: household annual fuel consumption is multiplied by fuel prices to calculate household energy spending, which is divided by the household income to obtain the fraction of household income spent on residential energy needs. Residential energy consumption data, however, are not readily available at geographic scales conducive to highly granular spatial or demographic analysis. To estimate average residential energy use by census tract and fuel type, I utilize a regression model based on a variety of geographic, demographic, housing-related, and climate variables. The model uses previously-developed methods to estimate average

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[3] *U.S. Energy Information Administration. "Today in Energy" September 2018. https://www.eia.gov/todayinenergy/detail.php?id=37072*

household electricity, natural gas, and propane consumption by census tract.[4,5] Predictive variables for each census tract were extracted from the 2015 Residential Energy Consumption Survey[6] and matched with data in the U.S. Census Bureau's 2015-2019 American Community Survey to estimate fuel-specific energy consumption for the average household in each census tract. This output was then used to develop a weighting factor for each tract's share of statewide or utility territory energy consumption, which was then applied to EIA's estimate of annual fuel consumption in Michigan[7] and electricity consumption estimate for Consumers territory available in supplementary materials to this IRP. I used supplemental data to the IRP to obtain electricity rates within Consumers Territory. Each census tract was also assigned a natural gas price based on Department of Homeland security data.[8] Where these data were unavailable, I used the statewide average price from the Energy Information Administration (EIA).[9] For other fuels, such as propane and fuel oil, each tract was similarly assigned the EIA statewide average price.

The primary drivers of energy cost burdens include household income, utility rates, and overall energy consumption. Energy cost burdens are calculated using a simple equation

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[4] *Jihoon Min, Zeke Hausfather, and Qi Feng Lin. "A High Resolution Statistical Model of Residential Energy End Use Characteristics for the United States." Journal of Industrial Ecology. October 2010. https://onlinelibrary.wiley.com/doi/full/10.1111/j.1530-9290.2010.00279.x?__cf_chl_jschl_tk__=pmd_uQhfEROeYX2Mhps3jDjWyBfD2GsgJFU92yiVDQMmt8Q-1635271855-0-gqNtZGzNAjujcnBszQk9*

[5] *Jones, C. and Kammen, D. M. "Spatial Distribution of US Household Carbon Footprints Reveals Suburbanization Undermines Greenhouse Gas Benefits of Urban Population Density." Environmental Science & Technology 48.2 (2014): 895-902*

[6] *U.S. Energy Information Administration. "Residential Energy Consumption Survey 2015." https://www.eia.gov/consumption/residential/data/2015/*

[7] *U.S. Energy Information Administration. "U.S. States State Profiles and Energy Estimates." https://www.eia.gov/state/seds/data.php?incfile=/state/seds/sep_fuel/html/fuel_te.html&sid=US*

[8] *U.S. Department of Homeland Security. "Homeland Infrastructure Foundation-Level Data: Natural Gas Service Territories". August 2017. https://hifld-geoplatform.opendata.arcgis.com/datasets/natural-gas-service-territories/explore*

[9] *U.S. Energy Information Administration. "Michigan State Profile and Energy Estimates". https://www.eia.gov/state/seds/data.php?incfile=/state/seds/sep_sum/html/sum_pr_res.html&sid=MI*

integrating these three considerations: price multiplied by consumption gives average household energy spending, and dividing this number by household income gives the approximate percent of income spent on energy in a year.

Q: What are the energy cost burdens faced by Consumers customers, and which populations face the highest energy cost burdens?

A: Various types of spatial and demographic energy cost burden analyses can be developed using census tract-level fuel-specific residential energy consumption and socio-demographic data. Some example analyses are illustrated below. I examine combined energy cost burdens to include all residential fuels (electricity, natural gas, and propane) – this reflects total household energy burden and allows for a fair comparison between fully electrified households and those with mixed fuel and electricity use.

Figure 1 shows the geographic distribution of energy cost burdens across Consumers' electricity service territory. Energy cost burdens are not evenly distributed throughout the territory; and various geographic areas and demographic groups face higher energy cost burdens than others. For example, rural census tracts in the Upper Peninsula tend to see higher average energy cost burdens than other areas, though there are notably several cities such as Flint, Saginaw, and Mt. Pleasant that also face high average energy cost burdens.

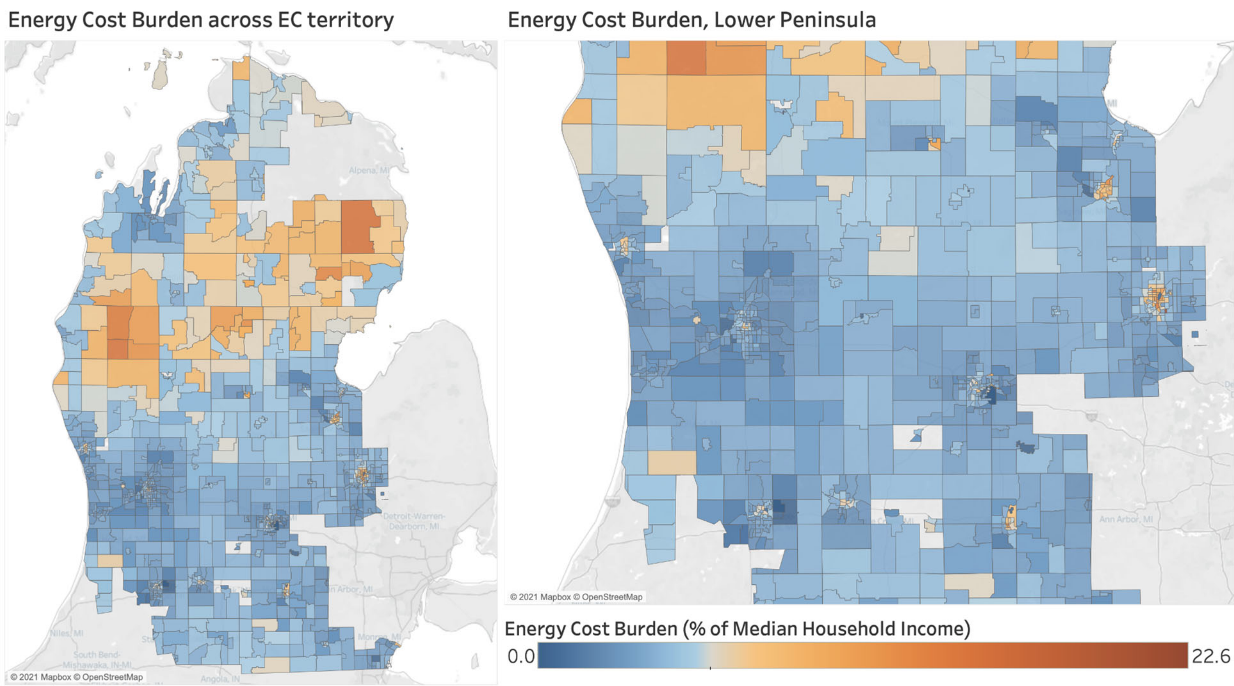

Figure 1. Average household energy cost burden by census tract. Shown on a blue-to-orange color divergent map, with orange color indicating higher average household energy cost burden. The color transition point in the legend is set at 6 percent. Left: Consumers territory. Right: zoom-in on the Lower Peninsula.

Notably, energy cost burdens are highest in rural areas when all fuels are considered but when this is restricted to electricity alone, urban areas tend to be the most burdened. This is shown in **Figure 2**, where I map only electricity cost burden by census tract, with a color transition point set at 3 percent to account for the fact that we are looking at electricity only.

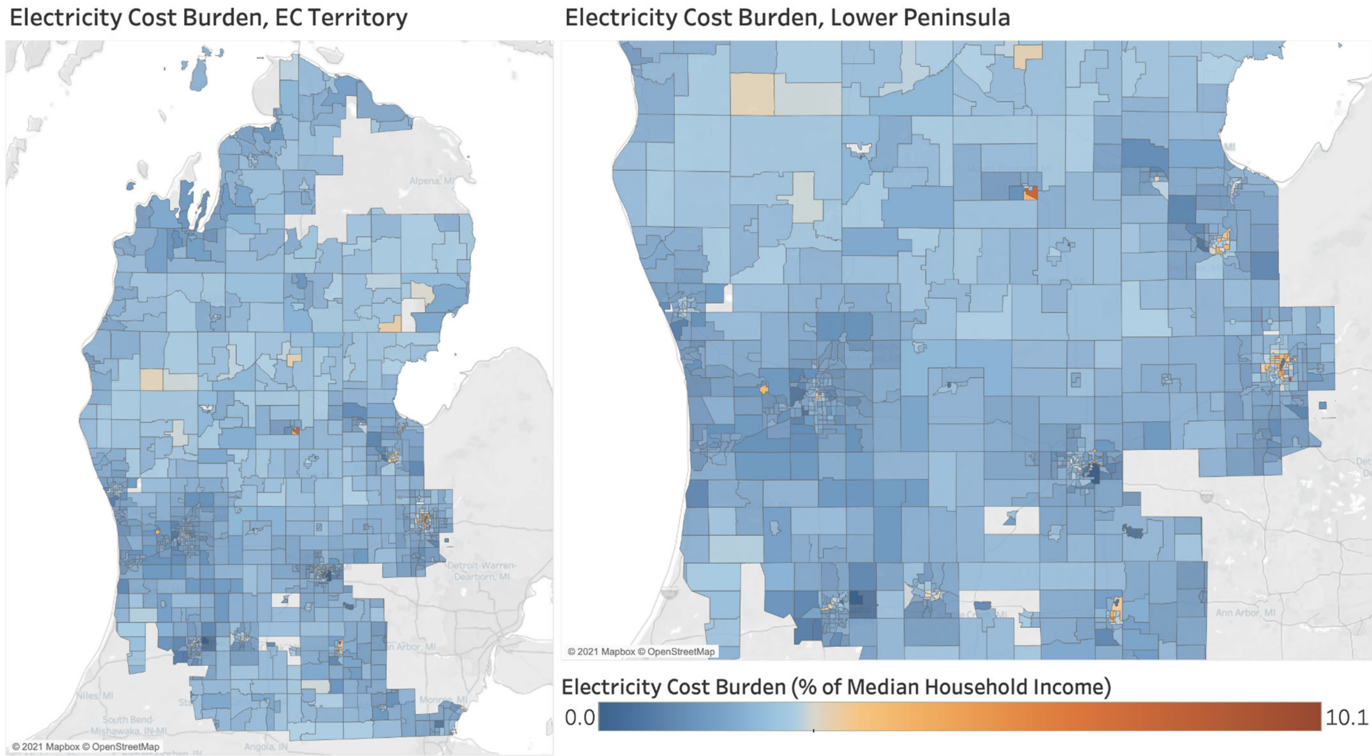

Figure 2. Average household electricity cost burden by census tract. Shown on a blue-to-orange color divergent map, with orange color indicating higher average household electricity cost burden. The color transition point in the legend is set at 3 percent. Left: Consumers territory. Right: zoom-in on the Lower Peninsula.

In addition to the urban/rural disparities discussed above, energy cost burden disparities exist along socioeconomic lines—low-income Michiganders have elevated cost burdens relative to their higher income counterparts. **Figure 3** shows that on average, households in the lowest income census tracts spend a significantly higher percentage of their income on energy bills.

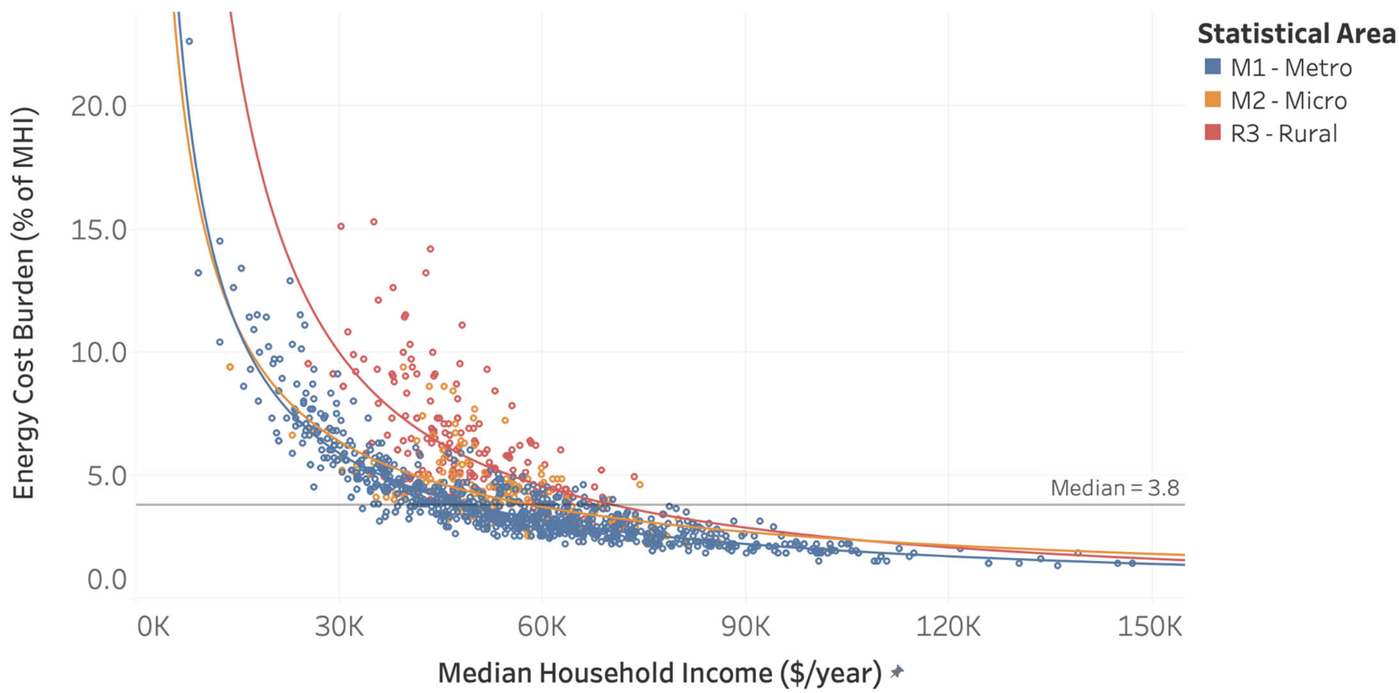

Figure 3. Census tract average energy cost burden. Lower income households tend to spend a much greater proportion of their income on energy bills. Rural areas generally have higher energy cost burdens than urban areas. Colored by Census Bureau-designated core-based statistical area (metropolitan, micropolitan, and rural).[10]

The median census tract average energy cost burden within the Consumers Electric territory is 3.8 percent, although for rural areas the median is substantially higher: 5.8 percent. The highest estimated average energy cost burden for an individual census tract within Consumers is 22.6 percent. This includes spending on electricity in addition to other fuels such as natural gas and propane. For reference, the national average is 3.0 percent, and the typical benchmark for a household to be considered cost-burdened is 6.0 percent. Although rural areas tend to have the highest average burdens, the inverse relationship between income and cost burden holds within rural areas, small cities, and large cities alike. These data also only reflect *average* cost burdens in a census tract.

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10 *https://www.census.gov/topics/housing/housing-patterns/about/core-based-statistical-areas.html*

Individual households, therefore, may spend a significantly higher portion of their income on energy.

Q: Are there other household characteristics that are associated with high energy cost burdens?

A: **Figure 4** offers a more detailed breakdown of household energy cost burdens by statistical area, fuel type, income group, percent renter population, and percent population of color. To account for differences in energy use between different categories, Figure 4 also displays household fuel consumption by demographic category and statistical area.

While energy cost burdens tend to increase significantly for lower income groups, urban energy use does not vary as dramatically by income—urban energy use is only slightly higher in the lowest and highest income groups. On average, energy cost burdens also tend to be higher in urban areas where a greater proportion of the population rents. In contrast, energy consumption is slightly lower in those same areas, likely due to the fact that energy use is also a function of housing size. Similar patterns to those for low-income households and renters hold for communities of color: urban energy cost burden tends to be higher in areas with higher fraction communities of color, and urban energy use tends to not vary as much. Rural areas tend to have both higher energy cost burdens and higher energy consumption overall.

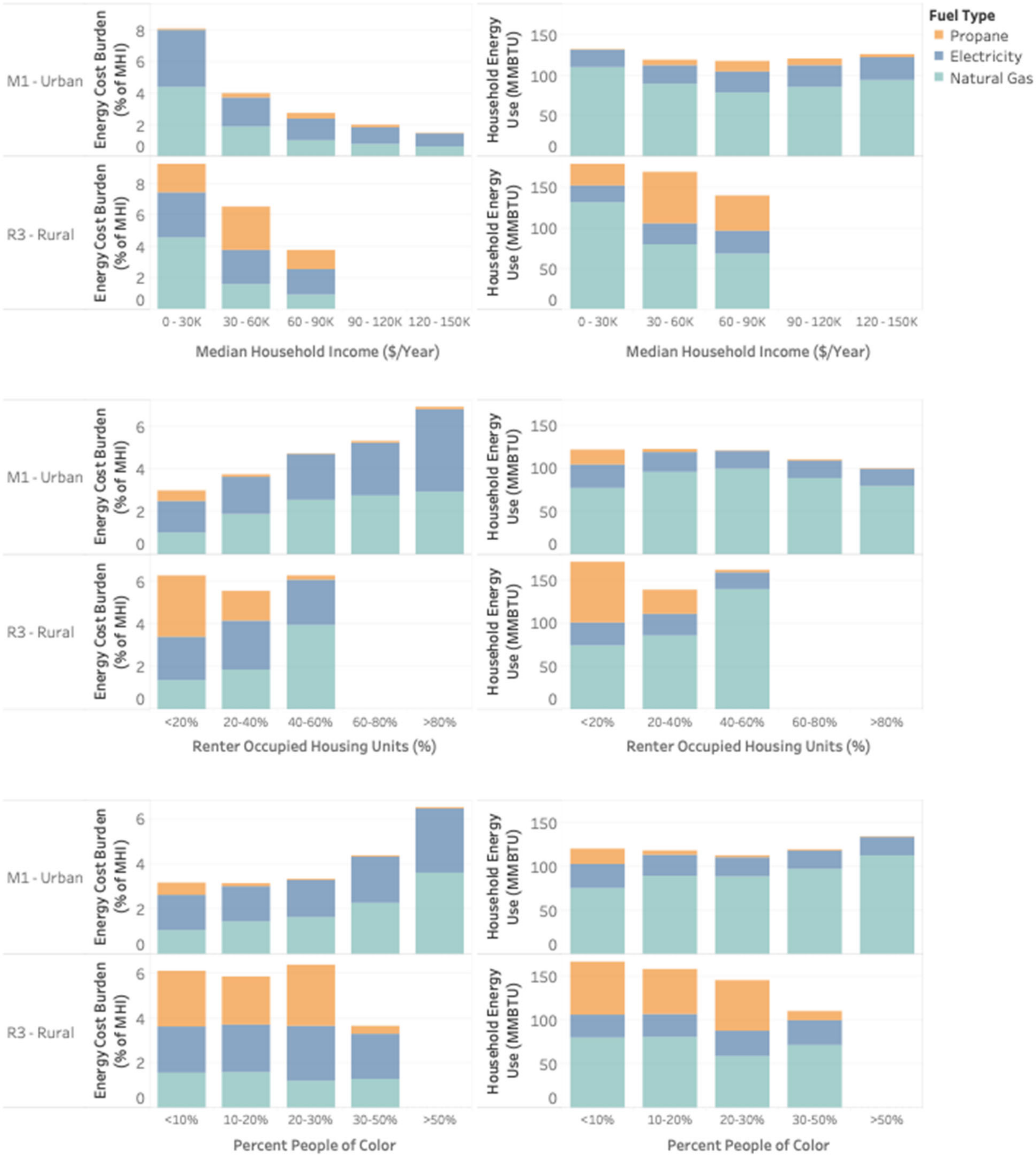

Figure 4. Average household energy cost burden and fuel use breakdown by income, race, renter population.

While natural gas use accounts for a large fraction of overall energy use across all demographic categories, it comprises a significantly smaller fraction of energy cost burden due to the relatively lower cost of natural gas per MMBtu. In rural areas, propane tends to comprise a much larger fraction of both overall energy use and energy cost burden due to its higher cost per MMBtu.

Energy cost burden and demographic data can be sliced and diced in many ways, and the implications can be manifold. First, the above analysis implies that decarbonization pathways within IRPs that solely focus on greenhouse gas emissions reductions (i.e. on energy use and fuel type) and on total resource costs may end up benefiting less economically vulnerable (wealthier) populations if there are no provisions to explicitly target low-income households, renters, and people of color, and may therefore exacerbate existing inequities. Second, in Michigan's most energy-burdened urban communities, such as Flint and Saginaw, more energy bill assistance and investment in low-income energy waste reduction programs may be needed. Third, as appliances are electrified and the residential sector continues to decarbonize, electricity will supplant fossil fuels that presently may be more affordable (e.g. natural gas) or less affordable (e.g. propane). Rural low-income households in particular stand to benefit from electrifying propane heating, provided weatherization measures accompany fuel switching to ensure that electrification does not drive up system costs and can meet the heating requirements of rural households in Michigan. Provisions for load growth should be included in the IRP to enable the electrification of rural propane-using communities.

Additionally, Michiganders of Color tend to face significantly higher electricity cost burdens. This is particularly true of and predominantly driven by Black communities. There is a strong positive correlation between urban census tract percent Black population and electricity cost burden (i.e. the more Black residents a census tract has, the higher electricity cost burdens tend to be) and, conversely, an inverse correlation for White communities—the more White residents within a census tract, the lower the average electricity cost burden. This relationship is shown on the rightmost panel of **Figure 5** below. On the left side, I also show that urban renters tend to have higher average electricity cost burdens than urban homeowners.

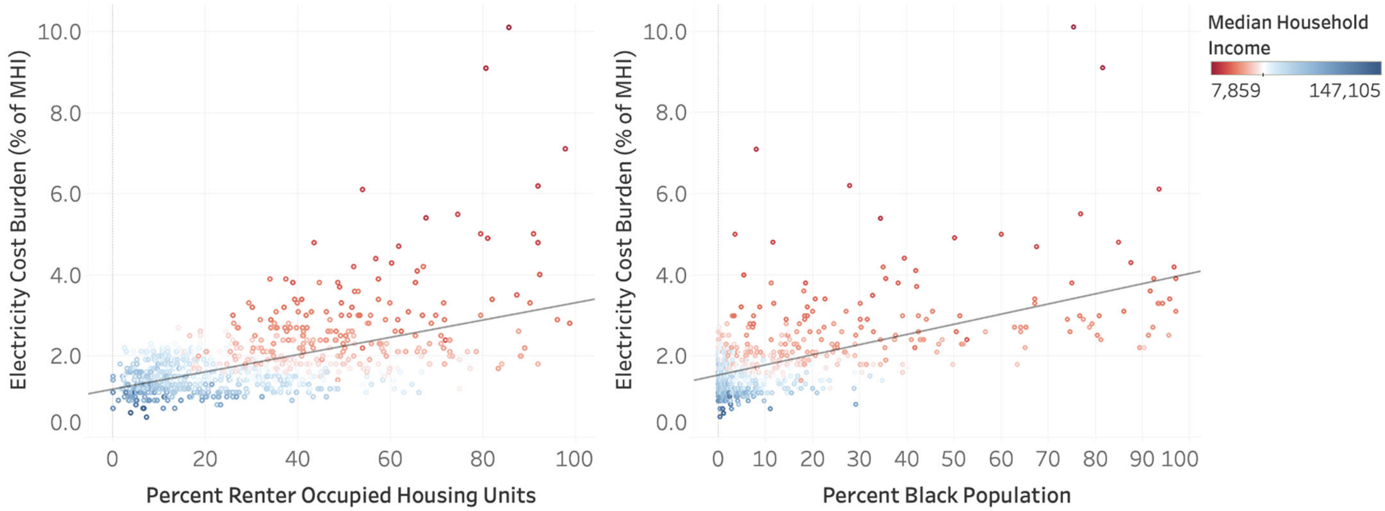

Figure 5. Electricity cost burden in urban census tracts as a function of homeownership and percent Black population.

As shown by the color gradient in Figure 5, Black communities and neighborhoods with low rates of homeownership both tend to be lower income. There are well-known correlations between income, race, homeownership, education, and other socioeconomic variables and environmental justice indicators.[11] Though income is a key driver of energy cost burdens, the relationship between people of color, renters, and energy cost burdens also holds when income is taken into account: studies have identified higher energy cost

[11] *Boris R. Lukanov and Elena M. Krieger. "Distributed Solar and Environmental Justice: Exploring the Demographic and Socioeconomic Trends of Residential PV Adoption in California." Energy Policy 134 (2019): 110935*

burdens within communities of color even when controlling for household income.[12,13] Systemic and structural inequities have historically contributed to disparities between racial and ethnic groups, ranging from federal government-sponsored segregation in housing to discriminatory lending practices and redlining. All this is to emphasize that aside from low-income households in general, renters and communities of color, particularly Black communities, would benefit from energy cost burden interventions being integrated into the Consumers IRP process. Given the multiple socioeconomic factors at play in energy cost burdens, it would behoove Consumers to conduct an analysis of energy cost burdens in relationship to cumulative socioeconomic indicators as well, such as the EJ Index presented in Elena Krieger's testimony or the environmental justice screening tool currently under development at the Michigan Department of Environment, Great Lakes, and Energy.

Q: What is the role of an IRP in addressing energy cost burdens?

A: The energy cost burden metric provides a useful, and quantifiable way of thinking about energy affordability. It is therefore critical for utilities to consider energy cost burden as part of their IRPs and analyze how the plan may impact energy cost burdens borne by various segments of their customer population. The IRP process is an opportune moment to do so.

Utility companies like Consumers have access to detailed energy use data at the customer level that can be aggregated on the census tract level and used to evaluate the landscape of energy cost burden across the utility service territory in a way that can be both more

[12] *Kontokosta, C., V. Reina, and B. Bonczak. 2019. "Energy Cost Burdens for Low-Income and Minority Households." Journal of the American Planning Association 86 (1): 89–105. doi.org/10.1080/01944363.2019.1647446*

[13] *Lyubich, E. 2020 "The Race Gap in Residential Energy Expenditures". Energy Institute at HAAS. WP-306*

accurate, and more detailed than the analysis presented above. The longer-term bill impacts and bill savings of various IRP scenarios and the projected impacts of additional low-income energy waste reduction efforts can also be modeled in a similar fashion. As such, energy cost burden analyses and considerations can be explicitly engineered into the IRP process and should be required of utilities to evaluate and submit for approval. The goal should be to incorporate energy cost burden analyses into the IRP process in such a way that would meaningfully reduce energy cost burden disparities over time and lead to a more equitable distribution of energy cost burden within the utility service territory.

While energy cost burdens cannot be addressed entirely through the IRP, the IRP will set the resource portfolio that includes multiple factors that can influence energy cost burdens. While energy cost burdens are also affected by rates cases, there are two additional factors to consider:

- Overall spending – while we do not always know the allocation of funds, using more expensive resources across the system will increase overall supply costs, will increase energy cost burdens on the customer base, and this will be worse for low-income households unless protections are in place;
- Certain measures, such as energy efficiency, weatherization, and distributed solar, can explicitly reduce energy cost burdens; efficiency is typically cheaper than other resources, and should reduce overall costs (and therefore those passed on to customers); and second, efficiency at homes can reduce individual bills. The IRP can open the door to more efficiency, enabling these resources to be coupled with stronger low-income programs in the future. Furthermore, they reduce the

investment in more expensive supply-side resources, or the amount of resources needed to fund bill assistance programs such as percent of income payment plans.

Q: What is the role of efficiency in reducing energy cost burdens?

A: Energy efficiency, in addition to reducing greenhouse gas emissions and providing positive environmental and public health co-benefits, is a useful instrument for reducing energy cost burdens. By reducing energy consumption, more efficient homes and appliances also reduce bills and consumer costs. However, the upfront costs associated with weatherization and energy efficiency, along with other barriers to adoption, can frequently limit access for low-income, renter, and BIPOC communities, leading to inequitable distribution of these resources. This is critical because simple efficiency measures can decrease a low-income household's energy consumption 13 to 31 percent.[14] These cost savings could be substantial for the most cost-burdened households, significantly improving energy affordability.

Low-income energy efficiency and weatherization can potentially be included as a separate resource in the IRP. Because it is generally a more expensive resource compared to non-low-income energy waste reduction measures, it can be argued that such an approach will result in a tradeoff between reducing energy cost burdens and achieving lower greenhouse gas emissions or lowering total resource costs. It is important to point out, however, that IRPs can serve the dual goal of meeting statutory climate objectives and reducing energy cost burden disparities within the utility service territory, and IRPs in Michigan are now specifically required to address environmental justice concerns through executive directive

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[14] *U.S. Department of Energy. "Low-Income Household Energy Burden Varies Among States — Efficiency Can Help in All of Them". December 2018. https://www.energy.gov/sites/prod/files/2019/01/f58/WIP-Energy-Burden_final.pdf*

2020-10. If requirements for energy cost burden disparity reductions are imposed as constraints within IRP modeling and optimization, then low-income energy efficiency and weatherization can serve as a viable resource to address these energy burden goals and simultaneously reduce societal costs, despite the higher resource cost. Ultimately, this is an ethical and environmental justice issue. In recent years, researchers have worked to develop a conceptual framework for energy justice and energy equity. This framework delineates a global energy system that distributes the benefits and costs of energy services and resources fairly, corrects for historic and systemic inequities, and contributes to a fully representative and impartial decision-making process.[15]

Q: What are the equity benefits of rooftop solar?

A: Net-metered rooftop solar can provide bill stability and electricity cost savings in addition to other benefits. Households with rooftop solar can generate part or all of their own energy, and under some circumstances, sell electricity back to the grid. This results in potential bill savings and stability for households with rooftop solar installations. However, rooftop solar has historically been disproportionately adopted by higher income households[16] due to high upfront costs and other barriers to entry. Consequently, the low-income, renter, and other cost-burdened households who could most benefit have historically not been able to reap the bill stability and cost reduction benefits enjoyed by higher-income, solar-adopting households. Increasing rooftop solar adoption among low-income households, including options such as community solar, could therefore prove a high-yield target for decreasing

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[15] *Sovacool, B. K., Heffron, R. J., McCauley, D., & Goldthau, A. (2016). Energy decisions reframed as justice and ethical concerns. Nature Energy, 1(5), 1-6.*

[16] *G. Barbose, et al. "Income Trends of Residential PV Adopters: An Analysis of household-level income estimates". April 2018. https://eta-publications.lbl.gov/sites/default/files/income_trends_of_residential_pv_adopters_final_0.pdf*

bill burdens as well as increasing clean energy access and reducing greenhouse gas emissions.

Additionally, as weather extremes become more common due to climate change, rooftop solar paired with battery storage may be valuable for conferring additional resilience. Solar-plus-storage can be used in lieu of polluting back-up generators to ensure reliable access to energy during disasters. This approach may be particularly impactful for groups that could benefit from bill stability for economic reasons as well as benefiting from enhanced resilience for demographic and health reasons. For example, low-income seniors may struggle to pay their bills and may be particularly vulnerable to weather extremes. Solar with battery storage may be particularly useful for them and other similarly climate-vulnerable and economically-disadvantaged groups.

Q: What are the impacts of a cap on rooftop solar, and what would be the benefits of increasing the amount of rooftop solar adopted?

A: Solar is oversubscribed; lower-income households lag behind in access and cannot participate with a cap; an increased cap with specific policies to support low-income solar adoption (e.g. on-bill or up-front financing) can help provide the above benefits to households who could most benefit.

Q: Does this complete your testimony?

A: Yes.

STATE OF MICHIGAN
MICHIGAN PUBLIC SERVICE COMMISSION

In the matter of the application of **CONSUMERS ENERGY COMPANY** for Approval of an Integrated Resource Plan under MCL 460.6t, certain accounting approvals, and for other relief.	)))))))	 Docket No. U-21090 Administrative Law Judge Sally L. Wallace

DIRECT TESTIMONY OF

SYNIA GANT-JORDAN

ON BEHALF OF

THE ENVIRONMENTAL LAW & POLICY CENTER, THE ECOLOGY CENTER, THE UNION OF CONCERNED SCIENTISTS, AND VOTE SOLAR

October 28, 2021

Q. Please state your name, business name, and address.

A. My name is Synia Gant-Jordan. I own and operate Samaria J's Salon at 701 Grandville SW, Grand Rapids, MI 49503. I am also a real estate agent.

Q. On whose behalf are you testifying in this case?

A. The Environmental Law & Policy Center, the Ecology Center, the Union of Concerned Scientists, and Vote Solar.

Q. Can you provide some background on your involvement in community issues in Grand Rapids?

A. I have spent my entire life advocating on behalf of communities in Grand Rapids, especially in my neighborhood on Grandville Avenue. I am the granddaughter of Synia McBride, who was a long-time resident in my neighborhood. My grandmother refused to sell property she owned on Division Avenue SE. Eventually my grandmother was forced to sell her property by eminent domain, but she died on the property fighting to keep it so that she could pass her legacy building down to her family. Her experience is a constant reminder to me of ways the black community in Grand Rapids has been and continues to be excluded from economic opportunities.

Q: Have you been involved in any advocacy related to environmental issues?

A: Yes. Among other things, I have participated in the Grand Rapids Community Collaboration on Climate Change (C4) as a member of the Steering Council. I also work with the West Michigan Sustainable Business Forum to be able to share information about climate change. I also work with the African American Taskforce, where I share information at a grassroots level on climate change.

Q: Are you aware that Consumers Energy has filed an Integrated Resource Plan?

A: Yes, though I have not read and reviewed the plan.

Q: Did you participate in any discussions related to the plan?

A: Yes. After the plan was filed, along with several of my colleagues who are active in our BIPOC communities, I participated in several phone calls led by the Environmental Law & Policy Center. These phone calls were also attended by Elena Krieger. They were an opportunity for me and others to generally discuss the issues that our communities were facing. We were able to talk about the struggles our communities faced and both asked and responded to questions. My understanding was that our input was being used to help Elena Krieger identify issues that were important to communities of color in Grand Rapids.

Q: Were you able to review Dr. Krieger's testimony when it was completed?

A: Yes. I was provided with a copy that I read.

Q: What was your reaction to Dr. Krieger's testimony?

A: I feel like she is on-point with so many of the concerns that we face on a day to day basis in our black and brown communities.

Q: Is there anything you want to make sure the Commission is aware of as they review the Consumers' plan?

A: To me a lot of issues stem from how historically certain neighborhoods have been overcharged for energy usage. I remember my mom complaining that the black people on our street paid more for their electricity, and I remember they held meetings about that back in the 1970s. Energy prices have been an ongoing issue in the black and brown community. It impacts the health of these communities, because it creates a lot of anxiety and a lot of work to try to keep utilities on in our households so that our families can thrive.

This is even harder for single parent households, like my mother. I want the Commission to understand that black and brown communities have been struggling for years on so many fronts, and that being able to afford energy should not be one of them. I want our black and brown communities to be able to participate and invest in energy efficiency programs, invest in more efficient appliances and homes, and have the opportunity to install solar panels. I don’t feel like our communities have had a real opportunity to engage in these programs and take advantage of clean energy and energy efficiency. The BIPOC communities should be the first to be invested in for solar, not the last. This investment needs to be something that benefits the community and is an investment in the community, not just the utility. As a real estate agent I know how important energy costs are for home buyers, and sometimes energy bills can be a barrier to home ownership.

Q: Does this complete your testimony?

A: Yes.

STATE OF MICHIGAN
MICHIGAN PUBLIC SERVICE COMMISSION

In the matter of the application of **CONSUMERS ENERGY COMPANY** for Approval of an Integrated Resource Plan under MCL 460.6t, certain accounting approvals, and for other relief.	))))))	Case No. U-21090

PROOF OF SERVICE

I hereby certify that a true copy of the foregoing *Direct Testimony on Behalf of The Environmental Law & Policy Center, Ecology Center, The Union of Concerned Scientists and Vote Solar* was served by electronic mail upon the following Parties of Record, this 28th of October, 2021.

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