



ENVIRONMENTAL LAW & POLICY CENTER

Protecting the Midwest's Environment and Natural Heritage

September 14, 2021

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

RE: MPSC Case No. U-20763

Dear Ms. Felice:

The following is attached for paperless electronic filing:

Direct Testimony and Exhibits ELP-1 through ELP-7 of Peter Erickson

Direct Testimony and Exhibits ELP-8 through ELP-10 of Peter Howard

**Direct Testimony and Exhibits ELP-11 through ELP-16 of Jonathan
Overpeck**

**Direct Testimony and Exhibits of ELP-17 through ELP-25 of Elizabeth
Stanton**

Proof of Service

Sincerely,

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

cc: Service List, Case No. U-20763

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**STATE OF MICHIGAN
MICHIGAN PUBLIC SERVICE COMMISSION**

In the matter of **ENBRIDGE ENERGY,**)
LIMITED PARTNERSHIP application for)
the Authority to Replace and Relocate the) Case No. U-20763
Segment of Line 5 Crossing the Straits of)
Mackinac into a Tunnel Beneath the Straits)
of Mackinac, if Approval is Required)
Pursuant to 1929 PA 16; MCL 483.1 et seq.)
and Rule 447 of the Michigan Public Service)
Commission’s Rules of Practice and)
Procedure, R 792.10447, or the Grant of)
other Appropriate Relief)

DIRECT TESTIMONY OF DR. ELIZABETH A. STANTON

ON BEHALF OF

**THE ENVIRONMENTAL LAW & POLICY CENTER, THE MICHIGAN CLIMATE
ACTION NETWORK, AND THE BAY MILLS INDIAN COMMUNITY**

September 14, 2021

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

2 A: My name is Elizabeth A. Stanton. I am the Director and a Senior Economist at the Applied
3 Economics Clinic. Our offices are located at 1012 Massachusetts Avenue, Arlington MA,
4 02476.

5 **Q: What is your educational background?**

6 A: I received a PhD in Economics from the University of Massachusetts-Amherst in 2007.
7 Prior to that, I received my Master of Arts in Economics from New Mexico State University
8 in 2000 and a Bachelor of International Studies at the School for International Training in
9 Brattleboro, Vermont.

10 **Q: Can you briefly describe your professional background?**

11 A: I am the founder and Director of the Applied Economics Clinic (“AEC”), a non-profit
12 consulting group. AEC provides expert testimony, analysis, modeling, policy briefs, and
13 reports for municipalities and other public interest groups on the topics of energy,
14 environment, consumer protection, and equity. AEC also provides training to the next
15 generation of expert technical witnesses and analysts through applied, on-the-job
16 experience for graduate students in related fields and works proactively to enhance
17 diversity among the people who do our jobs today and in the future. As a researcher and
18 analyst with two decades of professional experience as a political and environmental
19 economist, I have authored more than 155 reports, policy studies, white papers, journal
20 articles, and book chapters as well as more than 45 expert comments and oral and written
21 testimony in public proceedings on topics related to energy, the economy, the environment,
22 and equity. My articles have been published in Ecological Economics, Climatic Change,
23 Environmental and Resource Economics, Environmental Science & Technology, and other
24 journals. I have also published books, including Climate Change and Global Equity

1 (Anthem Press, 2014) and Climate Economics: The State of the Art (Routledge, 2013),
2 which I co-wrote with Frank Ackerman. I am also co-author of Environment for the People
3 (Political Economy Research Institute, 2005, with James K. Boyce) and co-editor of
4 Reclaiming Nature: Worldwide Strategies for Building Natural Assets (Anthem Press,
5 2007, with Boyce and Sunita Narain). My recent work includes review and analysis of
6 electric and gas sector planning in several states, Integrated Resource Plan (IRP) and
7 Demand-Side Management (DSM) planning review, analysis and testimony of state
8 climate laws as they relate to proposed capacity additions, and other issues related to
9 consumer and environmental protection in the electric and gas sectors. In my previous
10 position as a Principal Economist at Synapse Energy Economics, I provided expert
11 testimony in electric and gas sector dockets, and led studies examining environmental
12 regulation, cost-benefit analyses, and the economics of energy efficiency and renewable
13 energy. Prior to joining Synapse, I was a Senior Economist with the Stockholm
14 Environment Institute's (SEI) Climate Economics Group, where I was responsible for
15 leading the organization's work on the Consumption-Based Emissions Inventory (CBEI)
16 model and on water issues and climate change in the western United States. While at SEI,
17 I led domestic and international studies commissioned by the United Nations Development
18 Programme, Friends of the Earth-U.K., and Environmental Defense Fund, among others.
19 My Curriculum Vitae is attached as Exhibit ELP-17 (EAS-1).

20 **Q: Have you ever testified in front of the Michigan Public Service Commission?**

21 A: No.

22 **Q: Have you testified in other jurisdictions?**

23 A: Yes. I have testified in public utility and other related dockets in Massachusetts, New
24 Hampshire, South Carolina, District of Columbia, Pennsylvania, Indiana, Minnesota,

1 Louisiana, Florida, Illinois, Puerto Rico, and Vermont, and have submitted comments in
2 several federal dockets, including in front of the U.S. EPA.

3 **Q: On whose behalf are you submitting this testimony?**

4 A: I am submitting this testimony on behalf of the Environmental Law & Policy Center, the
5 Michigan Climate Action Network, and the Bay Mills Indian Community.

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

7 A: Yes. I am sponsoring the following exhibits:

- 8 • ELP-17 (EAS-1) – Curriculum Vitae of Dr. Elizabeth A. Stanton.
- 9 • ELP-18 (EAS-2) – Notice of Revocation and Termination of Easement.
- 10 • ELP-19 (EAS-3) – Governor Whitmer Executive Directive 2020-10.
- 11 • ELP-20 (EAS-4) – May 11, 2021, Letter from Governor Whitmer to Enbridge.
- 12 • ELP-21 (EAS-5) – Enbridge Response to Notification of Revocation and
13 Termination.
- 14 • Exhibit ELP-22 (EAS-6) MPSC. 2021. *MI Propane Security Plan: Ensuring*
15 *Resilience without Line 5.*
- 16 • Exhibit ELP-23 (EAS-7) Public Sector Consultants. 2020. *Analysis of Propane*
17 *Supply Alternatives for Michigan.* Prepared for Michigan DEP and PSC.
- 18 • Exhibit ELP-24 (EAS-8) Dynamic Risk’s 2017 *Alternatives Analysis for the Straits*
19 *Pipelines.*
- 20 • Exhibit ELP-25 (EAS-9) Executive Order No. 2020-182.

21 **Q: What materials did you review in preparing this testimony?**

22 A: Any document upon which I relied directly is cited in my testimony.

23 **Q: What is the purpose of your testimony?**

1 A: The purpose of my testimony is to determine whether “no-action” was considered by
2 Enbridge as an alternative that would meet the Company’s stated purpose for the Proposed
3 Project and whether such an alternative is feasible.

4 **Q: Can you summarize your conclusions?**

5 A: I conclude that Enbridge failed to consider a “no-action” alternative and that a “no-action”
6 alternative is feasible here. As I describe more fully below, Enbridge’s stated purpose is to
7 remove the threat of an oil spill from the existing pipelines in the Mackinac Straits.
8 Enbridge proposes shutting down the existing pipeline and considers three alternatives for
9 replacing the pipeline. However, Enbridge does not consider a “no action” alternative. A
10 “no action” alternative would be not constructing the tunnel and not continuing to operate
11 the existing dual pipelines. Not continuing to operate the dual pipelines, i.e., “shutting
12 down” Line 5, is a reasonable component of a no-action alternative because it is a likely
13 outcome even if the project is not approved. It is likely because it has already been ordered
14 by the State government, and also because it is another way to remove the threat of an oil
15 spill. A no-action alternative is feasible because Michigan’s energy needs can be met
16 without propane through electrification. During a transition to heating with modern electric
17 heat pumps, Governor Whitmer’s Upper Peninsula Energy Task Force Committee’s short-
18 and long-term recommendations lay out steps to securing energy supplies in the event of a
19 shutdown of Line 5.

20 **II. OVERVIEW OF ENBRIDGE’S PROPOSED PROJECT**

21 **Q: Please describe the project for which Enbridge seeks approval under Act 16.**

22 A: In Case No. U-20763, before the Michigan Public Service Commission (“MPSC” or the
23 “Commission”), Enbridge Energy is proposing to build a tunnel beneath the Straits of
24 Mackinac to house a new segment of its Line 5 oil and natural gas liquids pipeline (the

1 “Proposed Project”). This proposed segment would be a single 30-inch diameter pipeline
2 to replace current dual-pipelines, each with 20-inch diameters.

3 **Q: What is the purpose of the Proposed Project?**

4 A: Enbridge states in the testimony supporting its application that the purpose of the Proposed
5 Project is to alleviate environmental risk:

6 The purpose of the Project is to alleviate an environmental concern
7 to the Great Lakes raised by the State of Michigan relating to the
8 approximate four miles of Enbridge’s Line 5 that currently crosses
9 the Straits of Mackinac (“Straits”). Line 5 is a fully operational 645-
10 mile interstate pipeline, and the approximate four-mile segment that
11 crosses the Straits -- which is known as the “Dual Pipelines” – lies
12 on top of the lakebed with the exception of portions buried near each
13 shoreline. (Pastoor Direct at 3:25-4:5).

14 **Q. Who is Enbridge?**

15 A. Enbridge is a Canadian fossil fuel pipeline transport company. According to the
16 Company’s website, “We operate across North America, fueling the economy and people’s
17 quality of life. We move about 25% of the crude oil produced in North America, we
18 transport nearly 20% of the natural gas consumed in the U.S., and we operate North
19 America’s third-largest natural gas utility by consumer count.”¹

20 **Q: Do you have an understanding of the environmental concerns to which Enbridge
21 refers in its testimony?**

22 A: Yes. According to Michigan Governor Gretchen Whitmer’s November 2020 notice
23 terminating Enbridge’s Straits of Mackinac easement, the existing Line 5 pipeline is at risk
24 of leaking oil and natural gas liquids into the Straits of Mackinac and from there into the
25 Great Lakes:

26 Enbridge’s operation of the Straits Pipelines presents a substantial,
27 inherent and unreasonable risk of an oil spill and such a spill would
28 have grave ecological and economic consequences, severely
29 impairing public rights in the Great Lakes and their public trust

¹ <https://www.enbridge.com/about-us>

1 resources. While Enbridge has proposed to replace the existing
2 Pipelines with a new pipeline to be constructed in a tunnel beneath
3 the lakebed, that project is likely years away from completion at
4 best. For all these reasons, the Governor and the Director of the
5 Department of Natural Resources find that Enbridge's use of the
6 Straits Pipelines is contrary to and in violation of the public trust.²

7 These environmental concerns are also referenced in a number of documents that are
8 available on the Michigan Pipeline Safety Advisory Board website, which was created by
9 Michigan's previous Governor, Rick Snyder.³

10 **Q: Are you aware of any additional environmental concerns associated with the**
11 **Proposed Project?**

12 A: Yes. The existing pipeline transports hydrocarbons, which result in greenhouse gas
13 emissions that contribute to climate change. Shutting down the existing pipelines resolves
14 concerns about an oil spill in the Great Lakes, but it also reduces the emissions of
15 greenhouse gases. Michigan's Executive Directive No. 2020-10 states that:

16 The science is clear, and message urgent: the earth's climate is now
17 changing faster than at any point in the history of modern
18 civilization, and human activities are largely responsible for this
19 change. Climate change already degrades Michigan's environment,
20 hurts our economy, and threatens the health and well-being of our
21 residents, with communities of color and low-income Michiganders
22 suffering most. Inaction over the last half-century has already
23 wrought devastating consequences for future generations, and
24 absent immediate action, these harmful effects will only intensify.
25 But we can avoid some of the worst harms by quickly reducing
26 greenhouse gas emissions and adapting nimbly to our changing
27 environment.⁴

28 **Q: Does Enbridge take the negative environmental effects of greenhouse gas emissions**
29 **from the Proposed Project into account in its application?**

² Exhibit ELP-18 (EAS-2), Notice of Revocation and Termination of Easement at 9.

³ See <https://mipetroleumpipelines.org/resources-reports>

⁴ See Exhibit ELP-19 (EAS-3), Governor Whitmer Executive Directive 2020-10.

1 A: No, Enbridge does not address greenhouse gas emissions in its application. However, I am
2 aware that testimony from Expert Witness Pete Erickson discusses the greenhouse gas
3 emissions associated with Enbridge’s Proposed Project, and that Expert Witness Dr. Peter
4 Howard applies the Social Cost of Greenhouse Gases to Mr. Erickson’s estimates.

5 **Q: Is Enbridge currently authorized to run the dual pipelines across the Straits?**

6 A: No. Governor Whitmer revoked and terminated Enbridge’s easement, requiring the
7 pipelines across the Straits to be shut down.⁵ I understand Enbridge has refused to terminate
8 operation of the existing pipelines pursuant to the Governor’s notice, and is challenging
9 the revocation and termination of the 1953 easement in court.⁶ I am further aware that
10 Governor Whitmer has put Enbridge on notice that the State of Michigan considers the
11 Company’s continued operations in the Straits to be an intentional trespass.⁷

12 **Q. Are you aware of any alternatives that Enbridge has considered to alleviate**
13 **environmental risk instead of its proposed tunnel?**

14 A. Enbridge examined three alternatives to operating the existing dual pipelines. The first
15 alternative was the proposed tunnel, which is at issue in this case. The other two alternatives
16 were: “(ii) a new pipe installed across the Straits using an open-cut method that includes
17 secondary containment; or (iii) a new pipe installed below the Straits using the horizontal
18 directional drilling (HDD) method.” (Pastoor Direct at 15:22-25) All three alternatives
19 involve transporting hydrocarbon in a pipeline across the Straits. Enbridge did not consider
20 any alternative that involved not replacing the existing line, resulting in Line 5 ceasing
21 operations.

⁵ ELP-18 (EAS-2) “[t]he Easement is being revoked for violation of the public trust doctrine, and is being terminated based on Enbridge’s longstanding, persistent, and incurable violations of the Easement’s conditions and standard of due care.” p.20.

⁶ See *Michigan, State of et al v. Enbridge Energy, Limited Partnership et al*, 1:20CV01142

⁷ ELP-20 (EAS-4) May 11, 2021, Letter from Governor Whitmer to Enbridge.

1 **Q. Has Enbridge considered an appropriate range of alternatives?**

2 A. No. Enbridge has artificially limited its analysis of alternatives to include only methods
3 that involve (1) shutting down the existing dual pipelines, **and** (2) transporting hydrocarbon
4 in a pipeline across the Straits, allowing for continued operation of Line 5. Enbridge has
5 overlooked an essential alternative that would meet its stated purpose of alleviating
6 environmental risks to the Great Lakes: (1) shutting down the existing dual pipelines, **and**
7 (2) taking no action to replace the pipelines with a new segment.

8 **Q. Is that overlooked alternative what you refer to as the “no-action alternative”?**

9 A. Yes, although I recognize that this terminology can be somewhat awkward when applied.
10 In my experience, when alternatives analyses are undertaken, considering a “no-action
11 alternative” is best practice. The no-action alternative evaluates what would happen if the
12 proposed action were not to be undertaken. Here, the proposed action is the construction
13 of a tunnel. Enbridge should have included in its alternatives analysis an alternative in
14 which the existing pipeline no longer operates, but is not replaced with a new pipeline. In
15 short, the “no-action” alternative is to eliminate the environmental risk to the Great Lakes
16 by shutting down the existing pipeline, but take “no action” to construct a new pipeline
17 segment through the Straits.

18 **Q. Is the shut-down of the existing pipeline a necessary component of every alternative
19 in a proper alternatives analysis?**

20 A: Yes. Not only has Enbridge been ordered by the State to shut down the existing dual
21 pipeline segment in the Straits, the Company’s stated purpose is eliminating the
22 environmental threat of a spill from the existing dual pipelines. Continuing to operate the
23 existing pipelines would not achieve Enbridge’s stated purpose, and therefore cannot be
24 considered as a component of an alternative here. It is important to consider the no-action

1 alternative because, even if a tunnel reduced some of the threat of an oil spill in the Straits,
2 it would not eliminate the threat, and, when compared to discontinuing operation of Line
3 5, would exacerbate the harm to natural resources caused by climate change.

4 **Q: Is the shutdown of the existing line a certainty?**

5 A: No. I understand that Enbridge is contesting the shutdown order and says that it will
6 continue to operate the dual pipelines if it is not allowed to build the tunnel.⁸ By refusing
7 to comply with the Governor's order, Enbridge sets up a false choice between a pipeline
8 within the tunnel and a pipeline without a tunnel, thus avoiding discussion of a true no
9 action alternative.

10 **Q: Why do you say Enbridge set up a false choice?**

11 A: Enbridge has made clear that the purpose of the Proposed Project is to alleviate
12 environmental harm by shutting down the existing pipeline and must consider all available
13 alternatives that would serve this same purpose. Enbridge's testimony implies that the
14 choice in front of the Commission is between different methods of transporting
15 hydrocarbons across the Straits. But Enbridge has not presented the Commission with a
16 true no action alternative. Taking "no action" would be not developing a new method by
17 which to transport hydrocarbons across the Straits, regardless of the outcome of Enbridge's
18 contestation of the Governor's order to shut down the line.

19 **Q. Would it be feasible and prudent to shut down the existing line and not replace it with
20 a new line, resulting in the shutdown of Line 5 in its entirety?**

21 A: Yes.

22 **Q. What do you understand feasible and prudent to mean?**

⁸ ELP-21 (EAS-5) Enbridge Response to Notification of Revocation and Termination.

1 A: My understanding is that the words “feasible” and “prudent” are not defined in the
2 Michigan Environmental Protection Act. An acceptable method of determining intent is to
3 refer to a dictionary for the common usage of the words.⁹ A “feasible” alternative is one
4 that is “capable of being put into effect or accomplished; practicable” or “capable of being
5 successfully utilized; suitable.”¹⁰ “Prudent” is defined as “exercising sound judgment.”¹¹

6 **Q: What is the basis for your opinion that it would be feasible and prudent to shut down
7 the existing line and not replace it with a new line?**

8 A. Shutting down the existing line and taking no action to replace it is practicable and
9 represents the exercise of sound judgment.

10 A no-action alternative is practicable: Without Line 5 at the Straits of Mackinac current
11 consumers of propane and related products would either purchase fuels transported in a
12 different way (other pipelines, road and rail) or would switch to non-hydrocarbon fuels,
13 likely electrification via modern heat pumps. Michiganders would still have access to the
14 energy they need to heat their homes (see Section III). There are viable alternatives to
15 heating with propane (see Section IV). Michigan agencies are obligated to create policies
16 and incentives to reduce emissions, including in the building sector (see Section IV).

17 A no-action alternative represents the exercise of sound judgment: Taking no action to
18 build a tunnel for Line 5 would shut down one of many sources of energy while achieving
19 the express purpose of the Proposed Project: eliminating environmental risk to the Straits.
20 In my opinion this course of action represents sound judgment because it simultaneously
21 advances climate change goals established by the State of Michigan. Indeed, with
22 Michigan’s requirement to achieve a 28 percent reduction in emissions (from 2005 levels)

⁹ Nelson v. Grays, 209 Mich.App. 661, 664, 531 N.W.2d 826 (1995).

¹⁰ Funk & Wagnalls Standard Dictionary (1980).

¹¹ Funk & Wagnalls Standard Dictionary (1980).

1 by 2025 and carbon neutrality no later than 2050, investments in propane heating (and the
2 infrastructure to transport that propane) will become “stranded assets” by 2050 at the very
3 latest. These investments will lose all value, regardless of the age or condition of the
4 equipment. Investments that extend the life of propane heating and transmission equipment
5 do not seem to represent sound judgment whether for households or for energy companies
6 (see Section V).

7 **III. IN A NO-ACTION ALTERNATIVE, MICHIGANDERS WOULD STILL BE**
8 **ABLE TO HEAT THEIR HOMES**

9 **Q. Has there been any analysis of what Michigan consumers would do in the event that**
10 **Enbridge’s Line 5 supply were no longer available?**

11 A. Yes. Governor Whitmer’s Upper Peninsula Energy Task Force Committee (“UP Energy
12 Task Force”) published short- and long-term recommendations on securing energy supplies
13 in the event of a shutdown (accidental or by policy) of Line 5. The UP Energy Task Force
14 identified a number of policies that would mitigate the short-term energy supply
15 disruptions including evaluating potential changes in supply and distribution, investing in
16 the propane supply infrastructure, monitoring market conditions, addressing energy costs
17 in the Upper Peninsula, enabling state contracting of propane, and instituting consumer
18 protections. The UP Energy Task Force’s longer-term recommendations focus on creating
19 alternative supplies to meet consumer demand for heat. These policies include financing
20 energy waste reduction, supporting development of renewables and energy storage options,
21 promoting affordable electricity for consumers, and promoting environmental justice
22 actions.

23 **Q. How is propane currently used in Michigan?**

1 A. According to the U.S. Energy Information Administration’s (EIA) Residential Energy
 2 Consumption Survey most of Michigan’s residential propane sales are used for space and
 3 water heating.¹²

4 According to the U.S. Census Bureau, eight percent of Michigan households use some form
 5 of bottled fuel to heat their homes. In Detroit, less than 1 percent of homes heat with
 6 propane while in the Upper Peninsula the share rises to 19 percent (see Table 1).¹³ Three
 7 percent of homes in the Michigan region use propane to heat water.¹⁴

8 **Table 1. Michigan home heating fuels**

	MI		Detroit		UP	
	Homes	%	Homes	%	Homes	%
Bottled, tank, or LP gas	326,681	8%	2,168	1%	24,057	19%
Gas	3,006,749	76%	227,405	86%	71,353	57%
Electricity	385,768	10%	29,250	11%	12,947	10%
Fuel Oil	42,597	1%	641	0%	3,497	3%
Wood	116,756	3%	413	0%	11,281	9%
Other	37,784	1%	1,702	1%	1,211	1%

9
 10 **Q. What are the alternatives to propane in the Governor’s Upper Peninsula Energy Task
 11 Force Committee report?**

12 A. The UP Energy Task Force report suggests the following alternatives to propane supplies
 13 via Line 5: the increased use of rail infrastructure and the creation of new track capacity;
 14 improvement of transloading in the Upper Peninsula; new wholesale and retail storage
 15 capacity, maximizing propane injected into storage reserves; developing a “Strategic
 16 Propane Reserve;” requiring contracts with the state government to have an attestation that

¹² U.S. EIA. 2015 Residential Energy Consumption Survey (RECS). Available:
<https://www.eia.gov/consumption/residential/data/2015/#waterheating>. Data are for EIA’s East North Central
 region, which consists of Illinois, Indiana, Michigan, Ohio, and Wisconsin.

¹³ U.S. Census. 2019 ACS 5-Year Estimates Detailed Tables [Table: B25040]

¹⁴ U.S. EIA. 2015 Residential Energy Consumption Survey (RECS). Available:
<https://www.eia.gov/consumption/residential/data/2015/#waterheating>. Data are for EIA’s East North Central
 region, which consists of Illinois, Indiana, Michigan, Ohio, and Wisconsin.

1 companies will meet their supply obligations if Line 5 is shut down; pre-buying of propane
2 to lock-in supply; and removal of barriers to propane deliverability (land acquisition,
3 brownfield redevelopment assistance and permitting).¹⁵ The UP Energy Task Force’s
4 analysis of propane supply alternatives also considered trucking.¹⁶ Much of the 2020 report
5 by Michigan DEP and PSC’s Public Sector Consultants focused on “estimated commodity
6 costs at major hubs within the U.S. and Canada, costs of available transportation options,
7 and associated storage costs” based on a number of delivery points.¹⁷ The lowest-cost
8 option identified originates in Edmonton, Alberta and relies on a mixture of rail
9 transportation to deliver to a site in the vicinity and then rely on trucks for the remaining
10 short distance (trucking the whole way is cost prohibitive).¹⁸ The key limitation of this
11 option is that rail is relied upon for most of the distance.¹⁹ No options were identified for
12 pipeline transit and only one option using shipping from Western Canada to the United
13 States.²⁰

14 **Q: What scenarios for supply disruption have been examined by the Michigan PSC?**

15 A. The Public Sector Consultants report considered three scenarios from which it assessed
16 supply alternatives to Line 5: a supply disruption of the Lakehead System via Line 1; a
17 potential disruption in Line 5; and a weather-related disruption of propane supply and
18 consumption similar to the 2013-2014 winter season.²¹ The first scenario assumes Line 5
19 would not continue operating, removing 51 percent of Michigan’s propane supplies
20 because of the loss of crude and natural gas supplies to propane production facilities.²² The

¹⁵ Exhibit ELP-22 (EAS-6) MPSC. 2021. *MI Propane Security Plan: Ensuring Resilience without Line 5*.

¹⁶ Exhibit ELP-23 (EAS-7) Public Sector Consultants. 2020. *Analysis of Propane Supply Alternatives for Michigan*. Prepared for Michigan DEP and PSC.

¹⁷ *Ibid*, pg. 82.

¹⁸ *Ibid*.

¹⁹ *Ibid*.

²⁰ *Ibid*.

²¹ Exhibit ELP-23 (EAS-7) at 7.

²² *Ibid*.

1 second removes 46 percent of Michigan’s propane supplies.²³ Finally, a polar vortex
2 similar to 2013-2014 would result in sharply increased demand, associated price spikes,
3 and supply shortages as Michigan’s current supply options would be insufficient to meet
4 demand.²⁴

5 **IV. THERE ARE VIABLE ALTERNATIVES TO HEATING WITH PROPANE**

6 **Q. What alternatives to propane exist?**

7 A. Modern electric heat pumps are a practical and economic alternative to propane space
8 heating; electric hot water heaters (including heat pump hot water heaters), stoves and
9 dryers can replace propane water heaters, stoves and dryers. Propane has the advantage of
10 not requiring a transmission and distribution system in the ways that utility gas (local
11 distribution pipelines) or fuel oil (tanker trucks) do. That means that homes and businesses
12 can heat and serve other energy end uses with propane that they can self-deliver in bottles
13 or small tanks. Very nearly all Michigan properties, however, are already served by grid-
14 based electricity.²⁵ While old-fashioned electric resistance heating vies with propane for
15 the least economic space heating fuel source, modern electric heat pumps are among the
16 most economic heating sources to run and have the advantage of the same unit also
17 providing cooling at a lower cost than window air conditioners.

18 **Q. What are the cost impacts of propane usage versus electric heat pump usage?**

19 A. Electric heat pump usage is less expensive than propane for heating homes. According to
20 research by the Massachusetts Department of Energy, propane is far more expensive than
21 other forms of heating—its costs are exceeded only by old fashioned electric resistance

²³ *Ibid.*

²⁴ *Ibid.*

²⁵ U.S. EIA. 2015 Residential Energy Consumption Survey (RECS). Available:
<https://www.eia.gov/consumption/residential/data/2015/#waterheating>. Data are for EIA’s East North Central
region, which consists of Illinois, Indiana, Michigan, Ohio, and Wisconsin.

1 heating. For example, heating with air source heat pumps, which are all electric heating
2 and cooling systems designed for cold climates like Michigan, provides 44 percent
3 reduction in heating costs compared to heat pumps.²⁶ Research (of which I am an author)
4 from the AEC found that the relative costs of heating methods depend on fuel and electric
5 prices and that in Massachusetts air source heat pumps will have lower heating costs than
6 utility gas furnaces somewhere between 2026 and 2030 (depending on the cost to repair
7 the state's aging pipeline infrastructure).²⁷ Recent research from the Rocky Mountain
8 Institute showed modern air source heat pumps to have excellent efficiency in cold climate.
9 Air source heat pumps coefficient of performance (COP, a measure of efficiency where 0.0
10 to 0.9 is a loss of energy, 1.0 is no loss, and higher than one is a gain of energy above that
11 embedded in the fuel used) was 2.34 in Minneapolis, MN, compared to propane's COP of
12 around 0.8.²⁸ A study performed for the City of San Francisco found that heat pumps are
13 currently cost-effective as an end-of-life replacement for other heating sources.²⁹

14 **Q. What are the emission impacts of propane usage versus electric heat pump usage?**

15 A. Air source heat pumps are almost four times more efficient than propane heaters and today
16 Michigan's electric grid provides energy (MMBtus) at an emissions rate that is almost
17 double that of burning propane directly for heat. I have determined that these two facts
18 taken together result in propane heaters in Michigan emitting twice the greenhouse gases
19 than air source heat pumps do for the same amount of heat.

20 **Q. How will the emissions impacts of heat pumps and propane change over time?**

²⁶ <https://www.mass.gov/info-details/household-heating-costs>

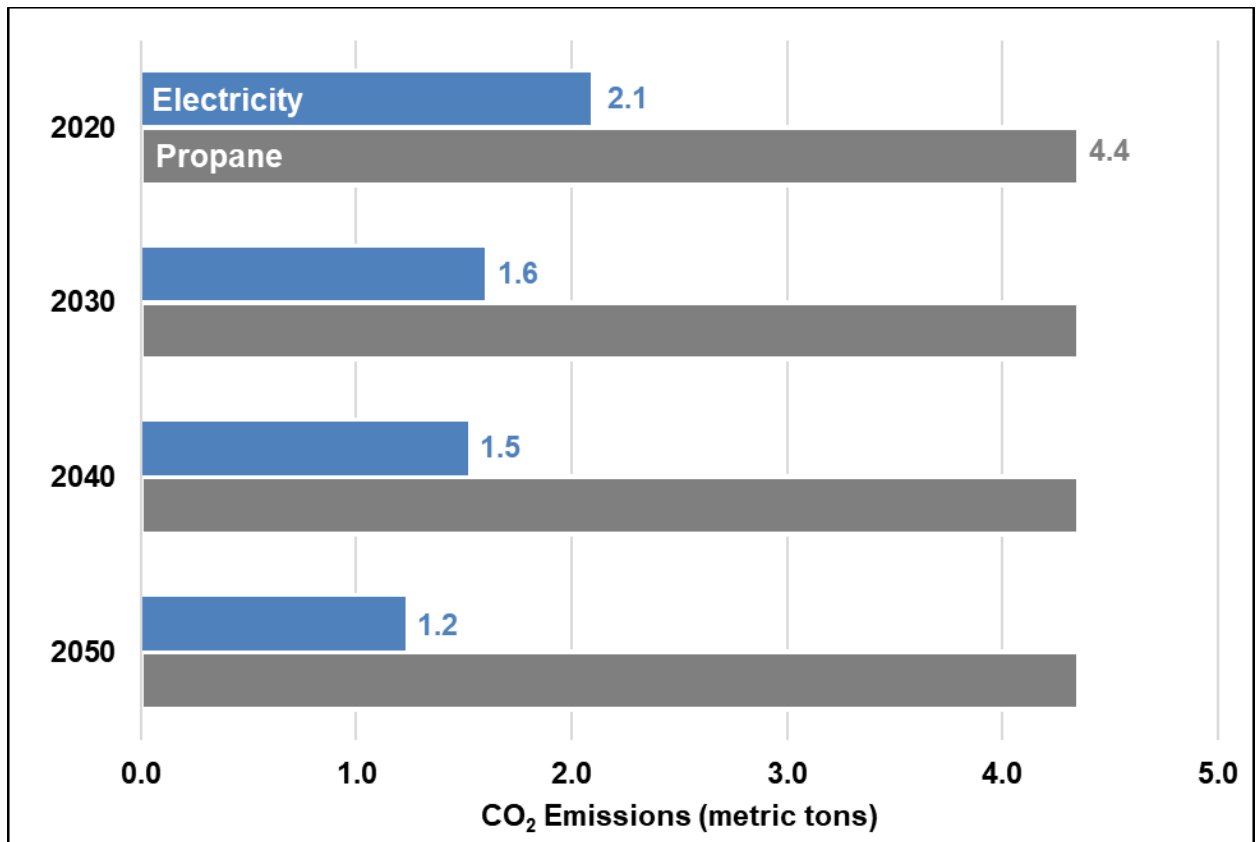
²⁷ <https://aeclinic.org/publicationpages/2021/01/13/inflexion-point-when-heating-with-gas-costs-more>

²⁸ <https://rmi.org/its-time-to-incentivize-residential-heat-pumps/> and U.S. EIA. June 2017. "Residential End Uses: Historical Efficiency Data and Incremental Installed Costs for Efficiency." Available at: https://www.eia.gov/analysis/studies/residential/pdf/res_ee_fuel_switch.pdf, p. 68

²⁹ https://sfenvironment.org/sites/default/files/fliers/files/sfe_cc_sustainable_future_siemens_climate_report.pdf, p25

1 A. While greenhouse gas emissions from propane heaters will stay constant, the emissions
2 from air source heat pumps will fall as Michigan’s electric grid becomes green (see **Error!**
3 **Reference source not found.**).

4 **Figure 1. Heat pump versus propane emissions from heating an average home in Michigan**



5
6 **Q. Are heat pumps available today in Michigan?**

7 A. Heat pumps are available today in Michigan³⁰ and the state’s utilities offer a small rebate
8 for their installation.³¹

9 **Q: Is converting to heat pumps cost-effective when equipment and installation costs are**
10 **included?**

³⁰ https://www.michigan.gov/documents/mpsc/MPG_New_Tech_Heat_Pumps_Full_Slides_717380_7.pdf

³¹ https://www.michigan.gov/documents/mdcd/Residential_Incentives_Flyer_2011_367083_7.pdf

1 A: Yes, heat pumps are less expensive to purchase, install and run over the course of their
2 lifetimes as compared to fossil fuel heating. However, any change in heating system
3 requires significant upfront costs. This disincentive can be addressed by state or utility
4 sponsored zero-interest loans for green energy investments and/or by rebates to offset
5 these costs (for example: [https://www.masssave.com/saving/residential-rebates/heat-loan-](https://www.masssave.com/saving/residential-rebates/heat-loan-program)
6 [program](https://www.masssave.com/saving/residential-rebates/heat-loan-program) and <https://michigansaves.org/>). Research by the American Council for an
7 Energy-Efficient Economy has found that median payback period for a heat pump is
8 about 5 years if the equipment is also used to provide central air conditioning and 15
9 years if it is not. ([https://www.aceee.org/blog/2016/05/should-we-promote-heat-pumps-](https://www.aceee.org/blog/2016/05/should-we-promote-heat-pumps-save)
10 [save](https://www.aceee.org/blog/2016/05/should-we-promote-heat-pumps-save)). Other potential obstacles in heat pump installation include the costs of
11 modernizing older electric systems to be able to support a heat pump (usually 200+
12 amps).

13 **III. OTHER POTENTIAL IMPACTS ON MICHIGAN CAN BE RESOLVED**

14 **Q: Are you aware of any concerns with the no-action alternative other than the**
15 **availability of propane for heating homes?**

16 A: Yes. I am aware of Enbridge's argument that failing to transport hydrocarbons across the
17 Straits will have negative impacts on Michigan oil producers, Michigan refineries, and
18 consumers of jet fuel and other fuels in Michigan.³²

19 **Q: Have you formed any opinions about whether those concerns make the no-action**
20 **alternative infeasible?**

21 A: Yes. I have not done an independent analysis on each of these issues, but I have reviewed
22 a variety of analyses and information on these issues, and I do not believe that these
23 concerns render the no-action alternative either unreasonable or imprudent. Some

³² See Enbridge. *The impact of a Line 5 shutdown*. Available at:
https://www.enbridge.com/~media/Enb/Documents/Factsheets/FS_Without_Line5_econ_impact.pdf

1 businesses with investments concentrated in fossil fuels may see reduced profits with a
2 transition to electrification, while other businesses (electric utilities and generators,
3 manufacturers and installers of heat pumps, efficiency measures and other electric
4 equipment) will prosper. The State of Michigan does not have a role to play in choosing
5 winners and losers among particular business actors in the economy. The fact that a
6 particular alternative to a risky pipeline in a critical water body may benefit some
7 businesses more than others makes no difference to a determination of whether it is
8 reasonable and prudent.

9 **Q: Can you explain the likely impact on jet fuel in Michigan?**

10 A: Enbridge claims a Line 5 shutdown would impact half of jet fuel supplies to Detroit
11 Metropolitan Wayne County Airport.³³ Enbridge also argues that Michigan would have to
12 find alternative crude oil to supply refined products like jet fuel, but does not provide
13 specific analysis or sources for third-party verification.³⁴ Enbridge’s claim echoes that of
14 Ohio Governor Mike DeWine who argued Line 5 supplies 40 percent of the jet fuel in
15 DTW.³⁵ However, a recent “fact check” assessment suggests that Line 5 only provides 10
16 percent of DTW’s jet fuel, from the following refineries: PBF, Husky, and Marathon.³⁶
17 (Note however that 2020 fuel consumption numbers at DTW for this assessment were
18 based on numbers from the 2010 DTW Master Plan.³⁷) While I have not independently
19 verified the methods or results of this fact check, it does suggest that Enbridge has provided
20 insufficient evidence to back up its claims.

³³ Enbridge. *The impact of a Line 5 shutdown*. Available at:
https://www.enbridge.com/~media/Enb/Documents/Factsheets/FS_Without_Line5_econ_impact.pdf

³⁴ *Ibid.*

³⁵ FLOW. 2021. “Fact Check: When Line 5 Shuts Down, Detroit Jets Will Still Fly and Union Refinery Jobs Will Still Exist.” Available at: <https://forloveofwater.org/fact-check-when-line-5-shuts-down-detroit-jets-will-still-fly-and-union-refinery-jobs-will-still-exist-3/>

³⁶ *Ibid.*

³⁷ *Ibid.*

1 **Q. Can you explain the likely impact on Michigan refineries?**

2 A. In the event of a Line 5 shutdown, the industry association Consumer Energy Alliance's
3 (CEA) 2021 report suggests that two refineries in Ohio (PBF Energy and BP Husky) would
4 cease operation while the Marathon Refinery near Detroit and refineries in Indiana and
5 Pennsylvania will remain open but operate at reduced levels; overall, CEA estimates that
6 refineries in Michigan, Ohio, Pennsylvania, Ontario, and Quebec would lose 45 percent of
7 their crude oil input with a Line 5 disruption.³⁸ Another 2021 assessment by IHS Markit
8 notes that there are nine refineries affected by the Line 5 and Line 78 system that have the
9 collective potential to refine 1 million b/d, including 150,000 b/d of jet fuel.³⁹ Line 5 ships
10 540,000 b/d of light crude and natural gas, while the remaining (excluding Line 5) mainline
11 capacity starting at the Wisconsin border is 2 million b/d, suggestion an impact on area
12 refineries closer to 20 percent. Again, Enbridge has not provided analysis, sources, or data
13 for third-party verification of any negative impacts on Michigan refineries

14 **Q. Overall, in your opinion, what impacts would a closure of Line 5 have on the Michigan**
15 **economy?**

16 A. Overall, I would expect a closure of Line 5 to have a positive or neutral effect on the
17 Michigan economy. Certainly, there would be losses to some businesses that have
18 concentrated all of their investment in fossil fuel-related activities. But losses and gains in
19 business sectors are the normal workings of a capitalist economy; and losses to businesses
20 with concentrated investments in greenhouse-gas emitting fuels and technologies are
21 inevitable as Michigan, the United States, and the world decarbonize.

³⁸ Consumer Energy Alliance. 2021. *The Regional Economic and Fiscal Impacts of an Enbridge Line 5 Shutdown*. Available at: https://consumerenergyalliance.org/cms/wp-content/uploads/2021/05/CEA_LINE5_REPORT_2021_DIGITAL_FINAL.pdf. Pg. 3; 7; 9.

³⁹ Bradley, A. 2021. "Line 5 shutdown could create a logistical scramble, reducing competitiveness of crude oil producers and refiners." HIS Markit. Available at: <https://ihsmarkit.com/research-analysis/line-5-shutdown-could-create-a-logistical-scramble-reduci.html>.

1 Businesses with diverse investments that include some fossil fuels and other non-energy
2 businesses should experience a neutral impact from a Line 5 closure, while businesses with
3 investments in electric supply, electric equipment manufacture and installation, and other
4 “green” goods and services should benefits from a Line 5 closure.

5 Workers in these industries would experience related impacts, with jobs added in
6 electric supply and equipment manufacture and installation, and some job losses in
7 businesses with concentrated investments in fossil fuel-related activities. State policy to
8 support retraining fossil-fuel-related workers for skills in zero-carbon industries could play
9 an important role in smoothing the decarbonization transition for workers, while insuring
10 that a loss of worker income (while limited to a small set of workers) does not negatively
11 impact on the economy as a whole.

12 Energy consumers (households and businesses) may need state assistance in the
13 form of rebates and no-interest loans to transition to heat pumps and other electric
14 equipment. But after this transition is complete will benefit from lower energy bills.

15 Overall, while the closure of Line 5 (and the greater project of Michigan
16 decarbonization) will cause some shift in consumer expenditures I see no reason to believe
17 that it will be a detriment to consumers or the economy as a whole.

18 **Q. Are your conclusions consistent with other analyses that you have reviewed?**

19 A. Yes. As I discussed above, Governor Whitmer’s Upper Peninsula Energy Task Force
20 Committee’s report provide detailed plans for addressing a temporary energy shortfall from
21 a Line 5 closure. Dynamic Risk’s 2017 *Alternatives Analysis for the Straits Pipelines* (on
22 behalf of the State of Michigan) includes a no action alternative (Alternative 6) that
23 “Eliminate[s] the transportation of all petroleum products and natural gas liquids...through
24 the Straits of Mackinac segment of Enbridge’s Link 5 and then decommission[s] that

1 segment.”⁴⁰ This alternative eliminates all risks to the Straits and results in increases to
2 some fossil fuel prices and decreases to other prices. The report does not examine impacts
3 on other related industries or non-fossil-fuel energy alternatives.

4 Similarly, London Economics’ analysis of alternatives to Line 5 found that losses to
5 Michigan refineries would be limited to 15 percent of supply (much lower than Enbridge’s
6 estimate) and that the related increase in gasoline prices would be lower than 1 cent per
7 gallon. London Economics’ also suggests that Enbridge has the capacity to increase
8 supplies using its existing Line 78, reducing economic impacts still further.⁴¹

9 **IV. MICHIGAN AGENCIES ARE OBLIGATED TO REDUCE EMISSIONS,**
10 **INCLUDING IN THE BUILDING SECTOR**

11 **Q. Is public policy relevant to the future demand for fossil fuels and related products in**
12 **Michigan?**

13 A. Yes. Michigan’s energy plans and policies, climate plans and policies, and environmental
14 standards and regulations all impact on the future demand for fossil fuels, today and in the
15 future. As an economist, I am aware of the importance of considering costs and benefits
16 throughout (and often beyond) a project’s lifetime. For energy projects, that includes
17 consideration of demand for the type of energy in question over the lifespan of the project
18 and the lifetime of the projects impacts on local communities, local environments and the
19 climate. In other words, an appropriate alternatives analysis must consider whether demand
20 for fossil fuel will be the same or different in 10 years, 25 years, and 100 years.

⁴⁰ Exhibit ELP-24 (EAS-8) Dynamic Risk’s 2017 *Alternatives Analysis for the Straits Pipelines* at p.ES-2.

⁴¹ http://blog.nwf.org/wp-content/blogs.dir/11/files/2018/09/LEI-Enbridge-Line-5-Michigan-Refining_9_12_2018.pdf

1 Climate forecasts, regulations, and policies, like those being undertaken in the State of
2 Michigan today, suggest that it is not sensible to assume that fossil fuel demand will be the
3 same or higher in future years.

4 **Q. What efforts is the State of Michigan undertaking to reduce Michigan’s carbon
5 footprint?**

6 A. Michigan’s EO 2020-182 requires the Department of Environment, Great Lakes, and
7 Energy to “develop, issue, and oversee the implementation of the MI Healthy Climate
8 Plan..., which will serve as the action plan for this state to reduce greenhouse gas emissions
9 and transition towards economywide carbon neutrality.”⁴² The MI Healthy Climate Plan
10 must be submitted to the Governor by December 31, 2021.⁴³ ED 2020-10 requires the
11 Department of Environment, Great Lakes, and Energy to oversee the Plan’s
12 implementation. In addition, the Department of Treasure is charged with developing and
13 implementing an Energy Transition Impact Project to identify and minimize impacts of
14 clean energy transition on vulnerable communities.⁴⁴

15 **Q. How will the states’ actions towards carbon neutrality impact the use of fossil fuels in
16 Michigan?**

17 A. To achieve carbon neutrality, Michigan must transition away from fossil fuel energy
18 towards zero-emitting energy resources like wind and solar. The forthcoming MI Healthy
19 Climate Plan will likely set out an expected pace for this transition. Within the next two to
20 three decades, operating fossil fuel-fired equipment will not be permitted in the State of
21 Michigan.

⁴² Exhibit ELP-25 (EAS-9) Executive Order No. 2020-182.

⁴³ Exhibit ELP-19 (EAS-3), Executive Directive 2020-10.

⁴⁴ *Ibid.*

1 **Q. Are you aware of any efforts by the U.S. federal government to reduce the national**
2 **carbon footprint?**

3 A. The Biden Administration has promised to rejoin the Paris Agreement and achieve
4 nationwide carbon neutrality by 2050. Biden’s National Climate Task Force is in the
5 process of setting a new 2030 emission target and develop a detailed plan for lower
6 emissions while improving environmental justice outcomes.⁴⁵

7 **V. INVESTMENT THAT EXTENDS THE LIFE OF PROPANE HEATING AND**
8 **TRANSMISSION EQUIPMENT IS NOT PRUDENT**

9 **Q. What is a stranded asset?**

10 A. A stranded asset is an investment in equipment or infrastructure that is no longer of use
11 before it has been paid off. For example, fossil fuel heaters built today may have a 30-year
12 economic life and their financing decision will be made on that basis: 30 years of revenues
13 (or value) to cover the initial cost, plus upkeep. If greenhouse gas emissions limits or other
14 zero emission energy requirements (such as a renewable portfolio standard) require
15 substantial emission reductions before the end of those 30 years, use of the fossil fuel
16 equipment will no longer be permitted and the value of the asset will become “stranded”:
17 the equipment is there but it cannot be used, and it cannot generate value for its owner.

18 **Q. Why are fossil-fuel heaters, water heaters, dryers and stoves likely to become**
19 **stranded assets in Michigan?**

20 A. Michigan’s ED 2020-10 requires agencies to achieve a statewide 28 percent reduction in
21 emissions (from 2005 levels) by 2025 and carbon neutrality no later than 2050.⁴⁶ EIA

⁴⁵ <https://www.whitehouse.gov/briefing-room/statements-releases/2021/04/22/fact-sheet-president-biden-sets-2030-greenhouse-gas-pollution-reduction-target-aimed-at-creating-good-paying-union-jobs-and-securing-u-s-leadership-on-clean-energy-technologies/>

⁴⁶ Exhibit ELP-19 (EAS-3), Executive Directive 2020-10.

1 assumes a lifetime for a propane furnace of between 16 and 27 years.⁴⁷ That means that a
2 propane furnace installed today has the potential—with appropriate maintenance—to
3 continue to provide heat through the year 2048. But by 2050 at the latest, Michigan will no
4 longer permit carbon emissions. Furthermore, it is likely that many carbon reduction goals
5 will not permit any significant number of emissions “offsets,” requiring true and significant
6 reductions in greenhouse gas emissions. With every passing year, new purchases of fossil
7 fuel heaters and new investments in pipelines and related infrastructure become less likely
8 to remain operational throughout their economic lifetimes.

9 VI. CONCLUSIONS

10 **Q. Can you please summarize your conclusions?**

11 A. In its application to build a tunnel beneath the Straits of Mackinac to house a new segment
12 of its Line 5 oil and natural gas liquids pipeline, Enbridge has failed to consider and present
13 a reasonable and prudent no-action alternative to shut down Line 5 (thus achieving the
14 stated purpose of eliminating environmental risk) and not building a new pipeline or tunnel
15 to replace it.

16 The closure of Line 5 would accelerate Michigan’s transition to a zero-carbon economy,
17 benefit “green” and electric-related businesses, and reduce consumer energy costs—
18 important positive effects on Michigan’s economy. Governor Whitmer’s task force
19 provides detailed plans for addressing temporary energy supply concerns from a closure,
20 and any more permanent shift away from spending on fossil fuel-related business towards
21 green and electric businesses is inevitable given the state’s greenhouse gas emission
22 requirements.

⁴⁷ <https://www.eia.gov/outlooks/aeo/assumptions/pdf/residential.pdf>

1 A no action alternative eliminates environmental (including climate) risks, moves
2 Michigan forward in its climate goals, and does not prevent consumers from getting the
3 energy supply that they need.

4 **Q. Does this conclude your testimony?**

5 A. Yes.