ENVIRONMENTAL LAW & POLICY CENTER
Protecting the Midwest's Environment and Natural Heritage

November 6, 2020

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:

*Application for Leave to Appeal Ruling*
*Brief in Support of Application to Appeal Ruling*
*Declaration of Peter. A. Erickson*
*C.V. of Peter A. Erickson*
*Declaration of Dr. Peter H. Howard, Ph.D.*
*C.V. of Dr. Peter H. Howard, Ph. D.*

Sincerely,

Margrethe Kearney

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

cc: Service List, Case No. U-20763

**STATE OF MICHIGAN**
**MICHIGAN PUBLIC SERVICE COMMISSION**

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| In the matter of **Enbridge Energy, Limited Partnership's** declaratory request that it has the requisite authority needed from the Commission for the proposed Line 5 pipeline Project. | ) ) ) ) ) | Case No. U-20763 |

**APPLICATION BY THE ENVIRONMENTAL LAW & POLICY CENTER AND MICHIGAN CLIMATE ACTION NETWORK FOR LEAVE TO APPEAL OCTOBER 23, 2020 RULING EXCLUDING EVIDENCE**

1. The Environmental Law & Policy Center ("ELPC") and Michigan Climate Action Network ("MiCAN") (collectively, "Climate Organizations") pursuant to Rule 792.10433 of the Commission's Rules of Practice and Procedure, respectfully file this application for leave to appeal Administrative Law Judge ("ALJ") Dennis W. Mack's October 23, 2020 ruling on Enbridge Limited Partnership's Motion *in Limine* (the "Ruling"), which excludes any evidence relating to the environmental effects of greenhouse gas (GHG) emissions and climate change from the scope of review in the above-captioned case. This application is timely filed within 14 days after the Ruling.

2. The Climate Organizations' application meets the requirements of Rule 792.10433 because a decision on the Ruling before submission of the full case to the Commission for final decision will (1) materially advance a timely resolution of the proceeding, and (2) prevent substantial harm to the appellant and the public-at-large.[1] No party will be prejudiced by the Commission's consideration of the Climate Organizations' application. Staff and Intervenor testimony is due on February 12, 2021, and discovery has begun. Provided all

[1] Rule 433(2)(b), R 792.10433(2)(b).

parties continue to participate in good faith in discovery, the Commission's review of the Ruling should not delay the progress of the contested case.

3. A prompt Commission decision on the Ruling will materially advance a timely resolution of the proceeding because it will prevent discovery disputes over permissible subjects for discovery. Given the timing of Enbridge's Motion *in Limine*, the primary function of the Ruling is to limit discovery, and as a result limit the information presented to the Commission for consideration. The Ruling purports to exclude evidence about greenhouse gas emissions directly related to the construction and operation of the Proposed Project while simultaneously recognizing that review under the Michigan Environmental Protection Act ("MEPA") applies to the construction and operation of the Proposed Project. The Ruling concluded that consideration of any environmental impacts under the MEPA was limited to the construction and operation of the Proposed Project, not the "extraction, refinement, or consumption of the oil transported on Line 5," and therefore "any evidence in that regard, including the environmental effect of greenhouse gas emissions and climate change, is irrelevant." (Ruling at 19). The Judge then expanded upon this conclusion, granting Enbridge's motion to exclude all evidence related to greenhouse gas emissions, stating that "review of the project under MEPA does not entail the environmental effects of greenhouse gas emissions and climate change." (Ruling at 20). As written, the Ruling would prevent any discovery seeking evidence relevant to greenhouse gas emissions related to the construction of the pipeline or the operation of the pipeline.

4. A prompt Commission decision on the Ruling will prevent substantial harm to the appellant and the public-at-large. In its June 30, 2020 Order concluding that the Proposed Project is not authorized by the Commission's original 1953 approval of Line 5, this Commission concluded that "due to the significant public interest and concern regarding the Line

5 Project's potential environmental impact on the Great Lakes, the Commission finds that it is in the public interest to conduct a contested case proceeding." [Order at 69-70] The public interest and concern regarding the Proposed Project's potential environmental impact on the case is not served by a contested case proceeding in which evidence relevant to the environmental impacts of greenhouse gasses is excluded in its entirety. If the Commission delays consideration of the Ruling until the case is submitted for final conclusion, information regarding the environmental impact will not be discovered and the public interest and concern regarding environmental impacts will not be taken into account in the Commission's decision.

5. The Commission also concluded that "[o]pportunities for interested parties and members of the public to participate and present evidence, arguments, and comments in this proceeding are of utmost importance to the Commission." [Order at 70] The Ruling is directly in opposition to the Commission's conclusion, and injures both the Climate Organizations and the public-at-large by limiting the opportunity for interested parties to present evidence and set forth arguments regarding a key environmental impact of the Proposed Project – increased greenhouse gas emissions.

6. The Commission further instructed potential intervenors that "[t]he quality of the evidence and argument (i.e., ***depth and breadth of issues addressed and the support given to expert opinion and analyses***), rather than the quantity of intervenor support, is most important for the Commission to make an informed decision." [Order at 71] The Ruling injures the Climate Organizations and undermines the Commission's directive by erroneously limiting both the depth and breadth of issues and by excluding the testimony of experts who are uniquely able to estimate and value the greenhouse gas emissions associated with Enbridge's construction and operation of the Proposed Project. The Ruling is not limited to a narrow subset of evidence, but

rather excludes a broad swath of evidence from being presented in this case, including any evidence related to the environmental effect of greenhouse gas emissions and climate change.

7. As required by Rule 792.10433(4), this application is accompanied by a supporting brief stating the basis for the appeal and demonstrating that the appeal complies with the provisions the Rule. The Climate Organizations also submit an offer of proof pursuant to Rule 792.10433(3), consisting of: (1) a statement within the accompanying brief of the substance of the evidence excluded by the Ruling, and (2) expert witness declarations stating the substance of the evidence that would be established by the testimony excluded by the Ruling.

**WHEREFORE** the Climate Organizations respectfully request that the Commission:

(1) Grant this Application for Leave to Appeal the Ruling, and

(2) Reverse the Ruling for the reasons provided in the accompanying brief.

November 6, 2020

Respectfully Submitted

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**STATE OF MICHIGAN**
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| In the matter of **Enbridge Energy, Limited Partnership's** declaratory request that it has the requisite authority needed from the Commission for the proposed Line 5 pipeline Project. | ) ) ) ) ) | Case No. U-20763 |

**BRIEF IN SUPPORT OF**
**APPLICATION BY THE ENVIRONMENTAL LAW & POLICY CENTER**
**AND MICHIGAN CLIMATE ACTION NETWORK**
**FOR LEAVE TO APPEAL OCTOBER 23, 2020 RULING EXCLUDING EVIDENCE**

The Environmental Law & Policy Center ("ELPC") and Michigan Climate Action Network ("MiCAN") (collectively, "Climate Organizations") pursuant to Rule 792.10433 of the Commission's Rules of Practice and Procedure, respectfully appeal Administrative Law Judge ("ALJ") Dennis W. Mack's October 23, 2020, ruling on Enbridge Limited Partnership's Motion *in Limine* (the "Ruling"), which excludes any evidence relating to the environmental effects of GHG emissions and climate change from the scope of review in case U-20763. The Commission should reverse the Ruling, deny the relief requested in Enbridge's Motion *in Limine*, and hold that evidence regarding greenhouse gas emissions from Enbridge's Proposed Project are relevant to the Commission's determination of Enbridge's Application.

## I. PROCEDURAL BACKGROUND

On April 17, 2020, Enbridge Energy, Limited Partnership ("Enbridge" or "the Company"), filed an application and supporting exhibits pursuant to 1929 PA 16, MCL 483.1 *et seq*. ("Act 16"), and the Commission's Rules of Practice and Procedure, Mich. Admin. Code, R. 792.10447 ("Rule 447"), requesting that the Commission grant Enbridge the authority to rebuild

a segment of its Line 5 pipeline, removing two 20-inch diameter dual pipelines that currently traverse the lakebed of the Straits of Mackinac and building an underground tunnel containing a replacement 30-inch diameter pipeline that will be primarily located underneath the lakebed of the Straits of Mackinac (the "Proposed Project").

Enbridge sought to bypass a contested case proceeding, seeking relief in the form of a declaratory ruling that the Commission's March 31, 1953 order in Case No. D-3903-53.1 ("1953 Order") already gave Enbridge the authority to undertake the Proposed Project without need for a contested case. (Application at 15). On June 30, 2020, the Commission denied Enbridge's request for a ruling that the Proposed Project was authorized under the 1953 Order, finding instead that "Enbridge's Line 5 Project involves significant factual and policy questions and complex legal determinations that can only be resolved with the benefit of discovery, comprehensive testimony and evidence, and a well-developed record in a contested case proceeding." (June 30, 2020 Order at 69).

Administrative Law Judge Dennis Mack held a prehearing conference on August 12, 2020, to rule on petitions for intervention and to set a schedule for the contested case. Enbridge objected to several petitions for intervention, including that of the Climate Organizations, and Judge Mack heard oral argument on those objections at the August 12 prehearing conference. During oral argument, Enbridge framed many of its arguments against intervention as related to the proper "scope" of the proceedings, including arguing that "climate change issues are clearly beyond the scope of this case." (1 TR 13:5-6). Commission Staff also raised questions of scope, but suggested that parties could separately brief that issue, though requested a "speedy resolution" to prevent delays in discovery. (1 TR 21:1-8).

Following oral argument, Judge Mack granted all petitions for intervention, finding that the Climate Organizations had established grounds for intervention by right. (1 TR 74:21-75:3). Judge Mack set an uncontested schedule for the case, with February 12, 2021, as the deadline for Staff and Intervenor testimony. (1 TR 87:7-23). Judge Mack also set a schedule for the filing of Motions *in Limine*, which are motions intended to decide the admissibility of specific items or categories of evidence. *See Lapasinskas v. Quick*, 17 Mich. App 733 (1969); *see also* § 2:6 Motions in limine, Trial Handbook for Michigan Lawyers § 2:6 (4th); (Scheduling Memo, Aug. 13, 2020). While Motions *in Limine* are normally filed after discovery is complete, and are intended to determine whether evidence obtained in discovery is admissible at trial, Judge Mack appeared to contemplate these motions as best considered prior to extensive discovery in this case. *See* Larry J. Saylor, *Motions in Limine*, Mich. B.J., January 2017, at 40. Given the early filing of Motions *in Limine* in this case, the primary function of such a motion is to limit discovery, which has the result of also limiting the information presented to the Commission for review.

Enbridge timely filed a Motion in *Limine* on September 2, 2020, seeking to exclude a broad swath of evidence from being discovered or presented in this case including (1) any consideration of the construction of the tunnel itself, (2) any consideration of the impact of the Proposed Project on the continued operation of the pipeline, and (3) any consideration of greenhouse gas emissions resulting from the construction or operation of the Proposed Project. The Climate Organizations timely filed a response on September 23, 2020, focusing on Enbridge's efforts to exclude evidence related to greenhouse gas emissions resulting from the Proposed Project, while referencing and endorsing the responses of other intervenors. The

Climate Organizations and other interested parties participated in oral argument on September 30, 2020.

On October 23, 2020, Judge Mack issued a Ruling denying in part and granting in part Enbridge's Motion *in Limine*. Judge Mack's discussion of the Michigan Environmental Protection Act ("MEPA") begins on page 16 of the Ruling. The Commission is supposed to consider the applicable provisions of MEPA. (Ruling at 3) (citing MCL 324.1701, et. seq; *State Highway Commission v. Vanderkloot*, 329 Mich. 159, 167-68 (1974). Judge Mack noted that MEPA requires an examination of the "conduct" to determine its effect on natural resources. (Ruling at 18). Judge Mack concluded that consideration of any environmental impacts under MEPA was limited to the construction and operation of the Proposed Project, not the "extraction, refinement, or consumption of the oil transported on Line 5," and therefore any evidence related to the environmental effect of greenhouse gas emissions and climate change "is irrelevant." (Ruling at 19). The Judge granted in full Enbridge's motion with respect to greenhouse gas emissions, excluding a broad category of evidence by making the sweeping ruling that "review of the project under MEPA does not entail the environmental effects of greenhouse gas emissions and climate change." (Ruling at 20).

## II. Appellants' Offer of Proof

As described in the attached declarations of expert witnesses Pete Erickson and Peter Howard the Climate Organizations seek to offer evidence into the record that estimates the impact of the conduct for which Enbridge seeks approval in this case—the relocation and replacement of a **key portion** of its Line 5 pipeline.

As described more fully in his declaration, attached as Exhibit A, Peter Erickson has over a decade of experience in GHG emissions accounting and the role of policy mechanisms in

reducing GHG emissions. Should ELPC be permitted to seek relevant information in discovery, Mr. Erickson will use that information to provide testimony and analysis that (1) counts total greenhouse gas emissions from the Proposed Project, including both construction and operation, (2) estimates the increase in greenhouse gas emissions from the Proposed Project compared to a counterfactual, no-action scenario, and (3) places that estimated volume of greenhouse gas emissions into the context of global and state public policy goals.

The Climate Organizations will also present the testimony of expert Peter Howard, described more fully in Exhibit B. Mr. Howard will quantify the environmental, public health, and social welfare costs associated with the emission of greenhouse gases estimated by Mr. Erickson using the social cost of greenhouse gases. Mr. Howard's attached declaration describes how monetizing greenhouse gas emissions resulting from the Proposed Project will assist the Commission in its decision-making.

In order to present this testimonial and documentary evidence, the Climate Organizations seek the opportunity to discover information relevant to Enbridge's proposed conduct—an examination required under MEPA—such as information on the materials and methods used in construction of the tunnel and pipeline, the known sources of the petroleum to be transported through the Proposed Project, the known end-uses of that petroleum, the operational and economic life of the Proposed Project, and whether the Proposed Project is expected to extend the time period over which petroleum products will be transported by Enbridge through the Straits of Mackinac. The Ruling prevents the Climate Organizations from discovering this information, analyzing its, and submitting expert testimony regarding its relevance to the Commission's MEPA determination. The Climate Organizations also seek to discover

information on the alternative to the Proposed Project, and to understand what alternatives to the Proposed Project Enbridge has considered and how those impact greenhouse gas emissions.

The Climate Organizations do not seek to litigate in this case whether or not Enbridge's existing dual pipelines should be shut down, and will not offer evidence to that effect. Nor do the Climate Organizations intend to offer proof in this case to support an argument that Line 5, as approved by the Commission in 1953, violates MEPA because of the impact of the line's existing greenhouse gas emissions on climate change. While those arguments have merit, the Climate Organizations will not offer evidence to support them in this case.

## III. ARGUMENT

As explained in the Climate Organizations' response to Enbridge's Motion *in Limine*, greenhouse gas emissions must be included in the Commission's MEPA determination because by contributing to climate change, greenhouse gas emissions pollute, impair, and destroy the environment. *See* MCL 324.1705(2). Judge Mack erred in excluding such evidence on the basis that some greenhouse gas emissions caused by the Proposed Project arise from activities outside of the direct jurisdiction of the Commission, such as the extraction or end use of transported petroleum. MEPA clearly requires consideration of both direct emissions from the construction of the Proposed Project as well as indirect emissions resulting from the operation of the pipeline as contemplated by the Proposed Project. The Commission has the ability and discretion to evaluate and weigh evidence related to greenhouse gas emissions and it is inappropriate to exclude this evidence in its entirety at the outset of the case.

### A. Greenhouse Gas Emissions Must be considered under MEPA

MEPA requires state agencies—including the MPSC—to determine whether the conduct to be approved will pollute, impair, or destroy the air, water or other natural resources or the public trust in those resources. (MCL 324.1705(2)). While Michigan courts have had little occasion to consider what constitutes "pollute," "impair," or "destroy" under MEPA, the Climate Organizations' response to Enbridge's Motion *in Limine* explains that existing case law and well-worn canons of statutory construction clearly include greenhouse gas emissions as conduct that will, or is likely to, "pollute," "impair," and "destroy" Michigan's natural resources. (Climate Organizations' Response to Enbridge's Motion *in Limine* at 10-14). It is well accepted that carbon dioxide, the most prevalent of the greenhouse gases, threatens Michigan's natural resources. *See* Global Climate Change: Legal Summary, SN044 ALI-ABA 275, 280 (Feb. 2008); *see also* U.S. Energy Information Administration, Emissions of Greenhouse Gases in the United States 2004 (December 2005) at 12 (based on Intergovernmental Panel on Climate Change IPCC Third Assessment Report). "[W]hen carbon dioxide is released into the atmosphere, it acts like the ceiling of a greenhouse, trapping solar energy and retarding the escape of reflected heat. It is therefore a species—the most important species—of a "greenhouse gas." *Massachusetts v. Envtl. Prot. Agency*, 549 U.S. 497, 505 (2007). Greenhouse gas emissions, in turn, accelerate climate changes that adversely impacts the air, water, and other natural resources. *See* Intergovernmental Panel on Climate Change, *Global Warming of 1.5°C, An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty*, Chapter 3, (2018), *available at* https://perma.cc/3ZTQ-ABTV.

Greenhouse gas emissions are pollutants that impact Michigan's environment. *See* U.S. Global Change Research Program, *Climate Science Special Report: Fourth National Climate Assessment*, Vol. II, 88 (2018), *available at* https://perma.cc/QYN8-DW5K; Environmental Law & Policy Center, *An Assessment of the Impacts of Climate Change on the Great Lakes*, 7 (2019), *available at* https://elpc.org/glclimatechange/; U.S. Army Corps of Engineers Detroit Dist., *High Water Impacts on Coast Erosion*, (2020) *available at* https://perma.cc/JLS4-SDEK. The magnitude of that impact must be determined by the Commission under MEPA, and failure to do so would be clear legal error. The impact of greenhouse gases on the environment as a result of climate change is real and immediate and creates significant environmental and societal costs that can be analyzed and evaluated by agencies when weighing the impact of agency action. *See generally* Burger, Michael and Horton, Radley and Wentz, Jessica, *The Law and Science of Climate Change Attribution* (April 5, 2019), Forthcoming, Columbia Journal of Environmental Law (January 2020), *available at* https://perma.cc/L779-2XDB.

### B. The Conduct at Issue in this Case Requires the Commission to Determine Both Direct Emissions that Impact the Environment and Indirect Emissions that Are Likely to Impact the Environment

Judge Mack's Ruling erred by both (1) excluding from these proceedings evidence and testimony estimating and valuing greenhouse gas emissions directly resulting from construction of the tunnel, and (2) concluding that indirect emissions from the Proposed Project's likely and quantifiable upstream and downstream impacts are not relevant to this case.

First, Judge Mack erroneously excluded any evidence related to greenhouse gas emissions from the construction of the tunnel, even though he held that MEPA applied to the Commission's review of the tunnel under Act 16. (Ruling at 17). Judge Mack correctly determined that:

> Because the Utility Tunnel must be considered in determining whether the project can be approved under Act 16, it is necessarily part of the "conduct" in a licensing proceeding subject to review under MEPA.

(Ruling at 17). Because Judge Mack concluded that MEPA applies to the tunnel construction, he erred in excluding evidence of greenhouse gas emissions from the tunnel construction. As explained above and in the Climate Organization's response to Enbridge's Motion *in Limine*, MEPA requires consideration of greenhouse gas emissions. The Ruling did not hold to the contrary and the Commission should clarify that the agency's MEPA determination includes consideration of greenhouse gas emissions.

Second, Judge Mack erroneously excluded any evidence related to greenhouse gas emissions from the operation of the Proposed Project, even though he correctly concluded that the Commission has jurisdiction over both the construction and the operation of pipelines under Act 16. (Ruling at 9-10). Judge Mack's decision hinged on his interpretation of the word "conduct" under MEPA. In relevant part, MEPA states:

> In administrative, licensing, or other proceedings, and in any judicial review of such a proceeding, the alleged pollution, impairment, or destruction of the air, water, or other natural resources, or the public trust in these resources, shall be determined, and **conduct shall not be authorized or approved that has or is likely to have such an effect** if there is a feasible and prudent alternative consistent with the reasonable requirements of the public health, safety, and welfare.

MCL 324.1705(2) (emphasis added). Judge Mack framed the inquiry as follows: "whether the 'conduct' reviewed under MEPA entails the environmental effects of the use of the fossil fuels, specifically greenhouse gas emissions that the intervening parties contend contribute to climate change." (Ruling at 17). Judge Mack ultimately concluded that greenhouse gas emissions were not relevant to this case because the "conduct" for which Enbridge seeks approval does not extend to the extraction, refining, and end use of the oil transported in the pipeline. (Ruling at 18).

Judge Mack incorrectly analogizes Climate Organizations' argument and evidence to Case No. U-17195/17196 (the "*Ecana*" case), where "the parties challenging the application argued the pipelines would serve as 'bait' for new production wells in the area that would use hydraulic fracking and cause forest fragmentation, and the environmental harms from both must be considered under MEPA." (Ruling at 18-19). The Ruling cites a footnote from a Commission Order in *Ecana* entered on remand from a Court of Appeals decision. The footnote "noted" that the Commission did not have jurisdiction over the construction of new production wells, and that the Commission's "sole concern on remand is the effect of the pipelines' construction and operation on the environment and the state's natural resources." (Order at page 7, FN 2).

Not only is the Commission's footnote not controlling precedent, it is factually distinct from the instant case. Whether the proposed pipeline in *Ecana* would encourage the development of additional pipelines was speculative and unquantifiable. Perhaps more importantly, those additional pipelines would be subject to additional review by regulatory bodies, requiring a MEPA analysis before approval. Given that future approval was required, consideration of environmental impacts in the case before the Commission was not yet ripe. Here, the Climate Organizations seek to introduce evidence that estimates greenhouse gas emissions resulting from the Commission's approval of the construction and operation of the pipeline proposed ***in this case*** using well-established methodologies and relying on information currently in Enbridge's possession. (*See infra* at Section II and Exhibits A and B).

It is also incorrect as a matter of law and inconsistent with Judge Mack's own reasoning that MEPA does not require the Commission to consider environmental impacts of activities over which the Commission does not have direct regulatory authority. Judge Mack

recognizes that the construction of the tunnel is subject to Commission review under MEPA, even though the Commission does not have regulatory authority over all aspects of tunnel construction. (Ruling at 17). Judge Mack properly recognizes that "EGLE and the Army Corps of Engineers will also review the construction of the Utility Tunnel under the respective substantive resource protection statutes they administer, and some degree of deference must be afforded those determinations." (Ruling at 17). This is not to say that the Commission need only reference and defer to the findings of other agencies, but that agencies may concurrently evaluate environmental impacts under MEPA regardless of whether jurisdiction for regulating or permitting those impacts lies with a different agency. The Commission does not have the authority to issue wetlands permits, air permits, or to authorize discharges from point sources into Lake Michigan. Yet Enbridge here asks the Commission to authorize conduct that the Company itself recognizes will have impacts on wetlands, result in air emissions, and discharge water into Lake Michigan. (*See* Enbridge Motion *In Limine* at 6). All of this conduct is part of the Commission's MEPA determination, even though the Commission does not have jurisdiction to grant those particular permits or approve that particular conduct. (*See, e.g.*, the Commission's Order in U-20471, considering the environmental impact of air emissions that are under the jurisdiction of EGLE).

MEPA requires analysis of both direct and indirect environmental impacts, because it instructs agencies to consider both conduct that ***has*** and conduct that is ***likely to have*** the effect of polluting, impairing, or injuring the environment. (MCL 324.1705(2)). Because the Ruling focuses on the meaning of the term "conduct" in the statute, it overlooks the statutory directive to consider impacts that are not only a direct result of the conduct, but also impacts that are likely to result from that conduct. MEPA's requirement that agencies determine whether approval of

conduct is likely to have the effect of polluting, impairing, or inuring the environment is a clear statutory mandate to include indirect environmental impacts in an agency MEPA determination. This requirement also sets a clear boundary preventing agencies from too broadly construing the scope of impacts. While an agency must consider conduct impacts that are "likely" – *i.e.* impacts that are capable of estimation, quantifiable, and reasonably foreseeable – agencies are not required to consider those impacts that are not likely to occur. (MCL 324.1705(2); *see generally Nemeth v. Abonmarche Dev., Inc.*, 457 Mich. 16, 34 (1998).

Judge Mack's Ruling improperly excludes evidence that is relevant to the environmental impacts likely to result from the relocation and replacement of the portion of the line that runs through the Straits of Mackinac. While the Commission does not have jurisdiction over under Act 16 over the extraction of oil in Canada, or the refinement of oil in Detroit, the Commission does have the discretion under MEPA and Act 16 to evaluate credible expert testimony on the likely impact the Proposed Project will have on the amount of greenhouse gas emissions resulting from the known uses of the petroleum products that are transported through the replaced section of pipeline in the Straits of Mackinac.

The Commission should reject Enbridge's argument that even if such an analysis were permissible under MEPA, it would be fruitless because the Company will transport the same amount of oil whether or not the pipeline is relocated either through the existing pipeline or via some other means. The Company's allegation is a disputed question of fact that cannot be used to prevent discovery of the very information that can controvert it. The Climate Organizations and other intervening parties have alleged that the Proposed Project will extend the useful and economic life of the pipeline. (Petition to Intervene of ELPC and MiCAN at 5-8). Enbridge has stated that the pipeline will be designed for a life of no less than ninety-nine years

and claimed (although Climate Organizations dispute this) that the pipeline will eliminate the risk of spills from the pipeline. (*See e.g.*, Application at 9, 11). This extended life and presumption that there will be no spills from the pipeline in the Straits helps extend the useful and economic life of the pipeline. To the extent the Commission interprets the Ruling on Enbridge's Motion *in Limine* as the summary disposition of an issue of law, it should do so considering all alleged facts in the light most favorable to appellants.

### C. Exclusion of All Evidence Regarding Greenhouse Gas Emissions Through a Motion *in Limine* Is Improper at This Stage of the Proceedings.

Given the importance of this case to the public interest and the benefits that can be provided by robust discovery and expert analysis, the Commission should reverse Judge Mack's Ruling broadly excluding from discovery or testimony a key subject relevant to the Commission's MEPA determinations. The scope of discovery under MCL 2.302(B) is broad:

> (1) In General. Parties may obtain discovery regarding any non-privileged matter that is relevant to any party's claims or defenses and proportional to the needs of the case, taking into account all pertinent factors, including whether the burden or expense of the proposed discovery outweighs its likely benefit, the complexity of the case, the importance of the issues at stake in the action, the amount in controversy, and the parties' resources and access to relevant information. Information within the scope of discovery need not be admissible in evidence to be discoverable.

Here, the direct and indirect emissions that result from Enbridge's conduct in this case – the construction and operation of the Proposed Project – are relevant to their request that the Commission approve the Act 16 Application. As Michigan caselaw establishes and Judge Mack recognized, the Commission must make a MEPA determination before approving the Proposed Project. (Ruling at 3) (citing MCL 324.1701, et. seq; *State Highway Commission v. Vanderkloot*, 329 Mic. 159, 167-68 (1974)). The burden and expense of discovery and testimony lies largely with the Climate Organizations, not with Enbridge. Having compiled significant documentation

regarding the Proposed Project for submission to not only this Commission but also the Army Corps of Engineers and the Michigan Department of Environment, Great Lakes, and Energy ("EGLE"), Enbridge already has in its possession the information the Climate Organizations will seek in discovery and discuss in their Offer of Proof.

The complexity and importance of the case also mitigates against exclusion of discovery and analysis of greenhouse gas emissions. As demonstrated in the Offer of Proof and expert declarations, the Climate Organizations will provide testimony that assists the Commission in quantifying greenhouse gas emissions resulting from the Proposed Project and translates those emissions into a monetized value that will assist the Commission in its review. There is no risk of confusion of the issues or prejudicing the decisionmaker because the Commission has chosen to read the record in this case "[g]iven the significance of this proceeding and the novel legal questions that may arise." (June 30, 2020 Order at 79). Rather than excluding testimony and documents relevant to both direct and indirect greenhouse gas emissions, the Commission should receive the Climate Organizations' evidence into the record and weigh that evidence as appropriate under the broad discretion granted to the Commission under MEPA and Act 16. *See In Re Wolverine Pipe Line Co.*, No. U-12334, 2001 WL 306697 (Mar. 7, 2001).

## IV. CONCLUSION

MEPA's requirement that the Commission determine whether the Proposed Project will impair, injure, or destroy the environment includes an evaluation of the direct and indirect climate-causing greenhouse gas emissions from the Proposed Project. Both the direct emissions from construction and the indirect emissions from the downstream and upstream impacts of the Proposed Project must be considered because MEPA requires evaluation of conduct that ***has*** and conduct that is ***likely to have*** the effect of polluting, impairing, or injuring the environment. The

Climate Organizations have provided an offer of proof explaining how testimonial evidence will demonstrate that the Proposed Project is likely to impact both direct and indirect emissions in ways that are estimable and quantifiable. Allowing this testimony does not prejudice Enbridge, nor does it risk confusing the decision-makers.

The Commission should (1) reverse the Ruling, (2) deny the relief requested in Enbridge's Motion *in Limine*, and (3) hold that evidence regarding greenhouse gas emissions from Enbridge's Proposed Project are relevant to the Commission's determination of Enbridge's Application.

November 6, 2020

Respectfully submitted,

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**STATE OF MICHIGAN**
**MICHIGAN PUBLIC SERVICE COMMISSION**

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| In the matter of **ENBRIDGE ENERGY, LIMITED PARTNERSHIP** application for the Authority to Replace and Relocate the 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 | ) | Case No. U-20763 |

## DECLARATION OF PETER A. ERICKSON

1. My name is Peter A. Erickson. I have worked in environmental research and consulting for 20 years. During the last twelve years, my professional focus has been on greenhouse gas (GHG) emissions accounting and the role of policy mechanisms in reducing GHG emissions. Specifically, I have conducted and led research projects on these topics on behalf of numerous partners and clients, including international institutions (e.g., the United Nations Framework Convention on Climate Change, the World Bank), the U.S. government (U.S. Environmental Protection Agency), state governments (e.g., State of Washington, State of Oregon), and local governments (e.g., City of Seattle, City of Chicago). These and other projects are documented in my curriculum vitae, attached hereto as Exhibit A.

2. I am currently a Senior Scientist with Stockholm Environment Institute – U.S., a 501(c)(3) organization based in Somerville, Massachusetts, where I have been employed since 2008. Stockholm Environment Institute – U.S. is affiliated with the Stockholm Environment Institute (SEI) based in Stockholm, Sweden. My office is in Seattle, Washington.

3. I have been retained by the Environmental Law & Policy Center ("ELPC") to provide testimony in the above-captioned case. I understand that the Administrative Law Judge has issued an opinion limiting the scope of the issues and the evidence that will be considered relevant to the Michigan Public Service Commission (the "Commission") in this case. I am providing this declaration to describe the type of analysis that I am qualified to conduct in this case, subject to Enbridge's good faith production of documents and information during discovery. My work in this case is ongoing and I will provide testimony and respond to discovery in accordance with the timelines established by the court and as advised by ELPC.

4. I am aware that Enbridge Energy, Limited Partnership ("Enbridge") currently operates an oil pipeline called Line 5, which transports oil and Natural Gas Liquids ("NGL") from western Canada to eastern Canada. A portion of Line 5 currently consists of two 20-inch diameter pipelines that run through the Straits of Mackinac in Michigan. In the above-captioned case, Enbridge is seeking approval to build an underground tunnel, and to replace and relocate into that tunnel the portion of the Line 5 petroleum pipeline that currently sits on the bottom of the Straits (the "Proposed Project").

5. I expect to submit testimony in this case that would describe my analysis of the greenhouse gas emissions and climate impact of the Proposed Project. I anticipate testifying regarding three different analyses, all of which the Commission could rely upon to inform their understanding of the environmental impact of the Proposed Project.

6. First, I will estimate all the greenhouse gas emissions associated with the Proposed Project. This will include the greenhouse gas emissions directly resulting from the construction and operation of the Proposed Project as well as the greenhouse gases contained in or associated with the oil and NGL fuel carried by the pipeline. This would produce an estimate

of the greenhouse gas emissions resulting from the Proposed Project that will be measured in metric tons (Mt) $CO_2$-equivalent annually. In my experience, this accounting is fairly straightforward and has commonly been conducted for other pipeline projects, including the replacement of Enbridge's Line 3 pipeline in Minnesota and the proposed Keystone XL pipeline through Montana, South Dakota, and Nebraska.

7. Second, I will count only the ***increase*** in greenhouse gas emissions attributed to the Proposed Project ***relative*** to a counterfactual, no-action scenario. Again, this will consider both the greenhouse gas emissions directly resulting from the construction of the Proposed Project as well as the greenhouse gases contained in or associated with the oil and NGL fuel carried by the pipeline. This approach would evaluate likely changes to global oil supply and demand as a result of the pipeline being replaced and would also be measured and presented in Mt $CO_2e$. I have used this methodology in other cases, such as the Keystone XL pipeline case, and it is similar to the approach used by federal agencies when conducting Environmental Impact Statements under the National Environmental Policy Act ("NEPA").

8. Third, I will contrast the flow of oil through the pipeline to the oil phase-down rates required to meet the globally agreed temperature limits (i.e., in the Paris Agreement) of well below 2 degrees C or 1.5 degrees C. This approach would draw from the oil phase-down rates published in the *Production Gap Report* and also by the Intergovernmental Panel on Climate Change. I understand that Michigan's Governor Gretchen Whitmer has initiated the MI Healthy Climate Plan aimed at protecting public health and the environment and helping to develop new clean energy jobs by putting Michigan on a path towards becoming carbon-neutral, meaning net-zero greenhouse gas emissions, by 2050. The initiative further aims to reduce greenhouse gas emissions in the state to 28% below 1999 levels by 2025. I am hopeful that my

third approach may be helpful to the Commission in contextualizing the impact of the construction of the Proposed Project on the MI Healthy Climate Plan.

9. My ability to conduct these three analyses is dependent on Enbridge's good faith production of documents and information in response to discovery requests. I will also use publicly available information and studies, such as the alternatives analysis commissioned by the State of Michigan.

10. The facts provided and statements made in this declaration are true and accurate to the best of my knowledge and belief.

11. In accordance with Executive Order 2020-23 and due to the Coronavirus 2019 (COVID-19), this declaration has not been notarized. Should the Commission require additional attestation, declarant will certainly comply.

Dated: November 6, 2020

Respectfully Submitted,

**Peter Erickson**
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# Peter A. Erickson

Senior Scientist
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## Professional Summary

- Broad expertise in greenhouse gas abatement and policy analysis. Published first-author research articles in prominent journals, including *Climatic Change, Climate Policy, Energy Policy, Environmental Research Letters, Environmental Science and Technology, Nature, Nature Climate Change,* and *Nature Energy.*
- Twenty years experience in environmental policy research and consulting, supported by funders such as UNFCCC, European Commission, World Bank, U.S. EPA, Bloomberg Philanthropies, Energy Foundation, KR Foundation, Schmidt Family Foundation, C40 Cities, World Resources Institute, NRDC, SIDA, U.S. states of Washington and Oregon, Western Climate Initiative, City of Seattle, City of Chicago
- Outstanding skills in economic and financial analysis, modeling, writing, public speaking, project management, communication

## Professional Experience

**2008-Present STOCKHOLM ENVIRONMENT INSTITUTE – U.S., SEATTLE, WA**
**Staff Scientist 2008-2011; Senior Scientist 2012-2020**

**Selected Projects and Research**

- **Oil market economics.** Leading long-term research into how supply and demand in oil markets interact, and with what $CO_2$ emissions implications. Major research publications in *Nature, Nature Climate Change, Nature Energy, Climatic Change,* and others. Popular commentary in the *New Yorker, Scientific American, Seattle Times, Salt Lake Tribune, Texas Tribune,* others.
- **Emissions implications of new fossil fuel supply infrastructure.** Researching the GHG implications and lock-in of investments in new infrastructure for supplying fossil fuels, such as oil pipelines, coal export facilities, and chemical facilities.
- **GHG emissions abatement potential of the world's cities.** Led a research effort, funded by Bloomberg Philanthropies, on the GHG emissions abatement potential of urban-scale policy levers worldwide.
- **Net emissions impact of the CDM.** Lead researcher for the UNFCCC's High Level Panel on the CDM Policy Dialogue focused on additionality and over- or under-crediting in the CDM. Contributed chapter to major research report.
- **Implications of international offsets on global climate mitigation.** Researched and modeled the supply and environmental efficacy of alternative sources and methods of crediting greenhouse gas offsets from developing countries.
- **Scenarios of domestic offset supply in a U.S. cap-and-trade system.** Lead researcher, with Michael Lazarus, on a partnership between SEI and the World Resources Institute on the economics and emissions implications of domestic greenhouse gas offsets.
- **Embodied emissions in international trade.** Led a research initiative on the embodied emissions in international trade and assessing opportunities to shift trade for both emissions and development benefits.
- **Emissions leakage and the CDM.** With Michael Lazarus, conducted an assessment of the potential for the CDM to induce activity or emissions leakage in the cement, steel, and aluminum sectors.

- **King County (WA) consumption-based GHG inventory and GHG measurement framework**. Led effort to conduct geographic and consumption-based greenhouse gas inventories and recommend a new measurement framework for King County.
- **Role of behavior and consumption in global climate mitigation.** Developed a method to estimate the GHG reductions for a nation or community due to shifts in consumption behaviors. Working paper published summer 2012.
- **City of Seattle (WA) carbon neutral scenario analysis**. Contributing to a technical scenario analysis of how the Seattle community could reduce greenhouse gas emissions to near zero in the next few decades, with a focus on the buildings and transportation sectors.
- **State of Oregon consumption-based GHG inventory**. Peter was the project manager on this effort to develop a consumption-based (rather than production- or geographic-based) GHG inventory for the State of Oregon. Published in *Environmental Science and Technology* in 2012.
- **Europe deep GHG emissions reduction scenario.** Peter developed a deep greenhouse gas reduction scenario for the EU-27's transportation, buildings, and agriculture sectors – the deepest reduction scenario proposed EU-wide at the time of its publication.
- **Greenhouse gas mitigation potential in developing countries (US EPA).** Peter was the lead researcher on a study of greenhouse gas mitigation potential and policies in six developing countries for the U.S. EPA. Published as working paper, June 2009.
- **Industry greenhouse gas benchmarking**. Peter led an assessment of benchmarking as a policy tool for reducing industrial GHGs. Funded by the Washington Department of Ecology and the Energy Foundation.
- **GHG and green energy planning in Mongolia.** Researcher on alternative scenarios of Mongolia's energy development.

**2000-2008 CASCADIA CONSULTING GROUP, SEATTLE, WA**
Senior Associate (2006-2008); Associate (2002-'05); Project Assistant ('00-'01)

**Selected Projects - 2008**

- **Climate Change Policy Initiatives (Seattle City Council).** Peter led the development of a legislative agenda to address climate change
- **Energy Efficiency Policy Study (Seattle Office of Sustainability and Environment).** Led a study of energy efficiency policies for existing buildings in Seattle to support Mayor Greg Nickels' Green Building Task Force.
- **Carbon Footprint Calculator (Seattle Office of Sustainability and Environment)** Updated the City of Seattle's greenhouse gas footprint tool for businesses to include a greater focus on business supply chain (included upstream, embedded emissions) and year-to-year tracking.
- **Greenhouse Gas Inventory (Pierce County, Washington).** Oversaw Pierce County's greenhouse gas inventory process.

**Selected Projects – Pre-2008**

- **Carbon Footprint Calculator (Seattle Office of Sustainability and Environment)** Peter created the City of Seattle's greenhouse gas footprint tool for businesses
- **Other Carbon Footprint Calculators (Various clients).** Peter adapted the Seattle carbon footprint calculator for use by several other state and local jurisdictions
- **Oregon Waste Prevention Strategy (Oregon Department of Environmental Quality).** Peter contributed to research in support of DEQ's Waste Prevention Strategy.
- **Zero Waste Plan (City of Chicago).** Led several tasks of the development of a Zero Waste Plan for the City of Chicago.

## Committees

**2015** Compact of Mayors, City Mitigation Goals – Member of aggregation technical advisory group.

**2012-2014** WRI GHG Protocol Mitigation Accounting Initiative. Member of the mitigation goals accounting technical working group.

**2010-2012** ICLEI-US Community Greenhouse Gas Protocol. Member of the lifecycle technical advisory committee

## Education

**1994-1998** Carleton College, Northfield, Minnesota, USA
B.A with major in geology and extensive studies in mathematics, studio art
*Magna Cum Laude*, *Phi Beta Kappa*, with distinction in major*;* GPA: 3.83

## Selected Recent (2009-2020) Publications

**Erickson, P.** and Lazarus, M. (2020). Examining Risks of New Oil and Gas Production in Canada. SEI report. Stockholm Environment Institute, US Center, Seattle. https://www.sei.org/publications/examining-risks-of-new-oil-and-gas-production-in-canada/

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SEI, IISD, ODI, Climate Analytics, CICERO, & UNEP. (2019). The Production Gap Report 2019. Retrieved from http://productiongap.org/ [I was the lead author of Chapter 2 and contributing author to other chapters.]

Koski, J., Kartha, S., & **Erickson, P**. (2019). Principles for aligning US fossil fuel extraction with climate goals. https://www.sei.org/publications/principles-for-aligning-fossil-fuel-extraction-with-climate-limits/

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**Erickson, P**., Lazarus, M., & Piggot, G. (2018). Limiting fossil fuel production as the next big step in climate policy. *Nature Climate Change*, 8, 1037–1043. https://doi.org/10.1038/s41558-018-0337-0

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**Erickson, P**. (2018). One of Trump's biggest scandals is happening in Utah. *Salt Lake Tribune*. Retrieved from

https://www.sltrib.com/opinion/commentary/2018/03/08/commentary-one-of-trumps-biggest-scandals-is-happening-in-utah/

**Erickson, P**., & Lazarus, M. (2018). How limiting oil production could help California meet its climate goals. Stockholm Environment Institute. Retrieved from https://www.sei.org/publications/limiting-oil-production-california/

**Erickson, P**., & Lazarus, M. (2018). Towards a climate test for industry: Assessing a gas-based methanol plant. Seattle, WA: Stockholm Environment Institute. Retrieved from https://www.sei.org/publications/assessing-gas-methanol-plant/

**Erickson, P.**, & Lazarus, M. (2018). One way to break oil dependence: don't drill. *Los Angeles Times.* Retrieved from http://www.latimes.com/opinion/readersreact/la-ol-le-california-oil-20180817-story.html

**Erickson., P** (2018). Global impact of oilsands growth could counteract Canada's promised carbon cuts. *National Observer*. Retrieved from https://www.nationalobserver.com/2018/06/13/analysis/global-impact-oilsands-growth-could-counteract-canadas-promised-carbon-cuts

Piggot, G., **Erickson, P**., van Asselt, H., & Lazarus, M. (2018). Swimming upstream: Addressing fossil fuel supply under the UNFCCC. *Climate Policy*, 18(9), 1189–1202. https://doi.org/10.1080/14693062.2018.1494535

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**Erickson, P.** (2017). Norway's elections put oil in the spotlight – now what? Retrieved September 21, 2017, from https://energiogklima.no/kommentar/norways-elections-put-oil-in-the-spotlight-now-what/

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**Erickson, P**., Down, A., Lazarus, M., & Koplow, D. (2017). Effect of government subsidies for upstream oil infrastructure on U.S. oil production and global CO2 emissions (Working Paper). Seattle, WA: Stockholm Environment Institute (U.S.). Retrieved from https://www.sei-international.org/publications?pid=3036

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York, NY: Stockholm Environment Institute - U.S. for C40 Cities Climate Leadership Group. http://www.c40.org/research.

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**Erickson, Peter**, Michael Lazarus, and Hauke Hermann. (2010). Issues and Options for Benchmarking Industrial GHG Emissions. White Paper. SEI with support from Öko-Institut and Ross & Associates Environmental Consulting Ltd. for the Washington Department of Ecology, June 30. http://www.ecy.wa.gov/climatechange/docs/Benchmarking_White_Paper_Final.pdf.

**Erickson, Peter,** Michael Lazarus, and Alexia Kelly. 2010. Estimates of future supply of international greenhouse gas offsets: a critical review. Project Report. SEI, August. http://sei-international.org/publications?pid=1583.

**Erickson, Peter,** Charles Heaps and Michael Lazarus (2009). *Greenhouse Gas Mitigation in Developing Countries: Promising Options in China, Mexico, India, Brazil, South Africa, and South Korea*. SEI, Somerville (U.S.). 116 pp. SEI Working Paper WP-US-0903. http://www.sei-us.org/WorkingPapers/WorkingPaperUS09-03.pdf

**Erickson, Peter**, Michael Lazarus, and Alexia Kelly (2009). *How Realistic Are Expectations for the Role of Greenhouse Gas Offsets in U.S. Climate Policy? An Examination of Offset Supply Analyses.* WRI, Washington D.C. (U.S.). 8 pp. World Resources Institute Working Paper. http://pdf.wri.org/working_papers/greenhouse_gas_offsets_in_us_climate_policy_phase1.pdf

Heaps, Charles, **Peter Erickson**, Sivan Kartha, and Eric Kemp-Benedict (2009). *Europe's Share of the Climate Challenge: Domestic Actions and International Obligations to Protect the Planet.*

**STATE OF MICHIGAN**
**MICHIGAN PUBLIC SERVICE COMMISSION**

| | | |
|---|---|---|
| In the matter of **ENBRIDGE ENERGY, LIMITED PARTNERSHIP** application for the Authority to Replace and Relocate the 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 | ) | Case No. U-20763 |

**DECLARATION OF DR. PETER H. HOWARD, Ph.D.**

1. My name is Peter H. Howard. I am the Economics Director at New York University School of Law's Institute for Policy Integrity, a nonpartisan think tank dedicated to improving the quality of government decision-making through advocacy and scholarship in the fields of administrative law, economics, and public policy. My fields of expertise include climate economics and natural resource economics. I received my Ph.D. in Agricultural and Resource Economics from University of California–Davis. I have published in academic journals on the social cost of greenhouse gases, including in *Science*, *Nature*, *Environmental and Resource Economics*, *Climatic Change*, *Harvard Environmental Law Review*, and the *Columbia Journal of Environmental Law*. My curriculum vitae is attached for a full description of my professional background, experience, and relevant publications.

2. On behalf of the Environmental Law & Policy Center ("ELPC") and the Michigan Climate Action Network, I will provide testimony in the above-captioned case. I understand that the Administrative Law Judge has issued an opinion limiting the scope of the issues and the evidence that will be considered relevant to the Michigan Public Service Commission (the "Commission") in this case. I am providing this declaration to describe the type of analysis that I am qualified to conduct in this case, subject to Enbridge's good faith production of documents and information during discovery. My work in this case is ongoing, and I will provide testimony and respond to discovery in accordance with the timelines established by the court and as advised by ELPC.

3. I am aware that Enbridge Energy, Limited Partnership ("Enbridge") currently operates an oil pipeline called Line 5, which transports oil and Natural Gas Liquids ("NGL") from western Canada to eastern Canada. A portion of Line 5 currently consists of two 20-inch diameter pipelines that run through the Straits of Mackinac in Michigan. In the above-captioned case, Enbridge is seeking approval to build an underground tunnel and to replace and relocate into that tunnel the portion of the Line 5 petroleum pipeline that currently sits on the bottom of the Straits (the "Proposed Project").

4. If called upon to testify in the above-captioned case, I would provide testimony that quantifies the environmental, public health, and social welfare costs associated with the emission of greenhouse gases resulting from construction of a Utility Tunnel underneath the Straits of Mackinac and the resulting extended operation of Enbridge's Line 5. I will quantify this cost resulting from the Proposed Project using the social cost of greenhouse gases, described more fully below. My testimony will be based on information provided in Enbridge's

application and supporting testimony, documents and information provided in discovery, and publicly available information. I will also rely on the conclusions reached by expert witness Peter Erickson.

5. Economists can estimate and monetize many categories of climate damages by linking together global climate models with global economic models, producing what are called integrated assessment models. These integrated assessment models can take a single additional unit of greenhouse gas emissions (such as from driving a car or burning natural gas at a power plant) and calculate the change in atmospheric greenhouse concentrations; translate that change in concentration into a change in temperature; and model how that temperature change and associated weather changes will cause economic damages. The resulting monetary estimate of how each additional unit of greenhouse gases will impact our health, our economic activity, our quality of life, and our overall well-being is called the social cost of greenhouse gases.

6. Climate change is already causing quantifiable and monetizable damages, such as increased extreme storm activity and coastal destruction. In both the near future and over the long term, unabated climate change will cause significant impacts to both market and nonmarket sectors, including agriculture, forestry, water, energy use, sea-level rise, human health, and ecosystem services. For example, climate change will strain Michigan's energy, water, and transportation infrastructures. Increased heat decreases the efficiency of energy systems and distribution and can reduce operating capacities—as the D.C. Cook Nuclear Power Plant has experienced when Lake Michigan has become too warm to use for cooling the reactors.[1]

[1] Risky Business, *Heat in the Heartland: Climate Change and Economic Risk in the Midwest* 46 (2015), https://riskybusiness.org/site/assets/uploads/2015/09/RBP-Midwest-Report-WEB-1-26-15.pdf. [2] U.S. Global Change Research Program, *Fourth National Climate Assessment* 894 (2018), https://nca2018.globalchange.gov/chapter/midwest.

Increased temperatures in Lake Michigan have also begun to disrupt aquatic food webs, "potentially leading to cascading effects on the health and abundance of species across all levels of Great Lakes food webs."[2]

7. Monetizing the impacts of emissions changes will facilitate comparisons against other costs and benefits. Without such values, decisionmakers and the public are faced with imperfect information; by contrast, when impacts are translated into the common metric of money, decisionmakers can more readily compare society's preferences for competing priorities, and the public can more readily understand the consequences of a regulatory choice.

8. It also may be especially difficult for the public and decisionmakers to give appropriate consideration to climate effects that are only presented through estimates of emissions volumes. As the U.S. Environmental Protection Agency's website explains, "abstract measurements" of so many tons of greenhouse gases can be rather inscrutable for the public, unless "translat[ed] . . . into concrete terms you can understand."[2]

9. The testimony I plan to provide in the above-captioned case will assist the Commission in its evaluation of the environmental impact of the Proposed Project and may also be helpful in allowing the Commission to contextualize whether the Proposed Project improves Michigan's welfare or is an appropriate solution if Enbridge is able to establish a public need for the Proposed Project.

10. The facts provided and statements made in this declaration are true and accurate to the best of my knowledge and belief.

[2] EPA, Greenhouse Gas Equivalencies Calculator, https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator (last updated Sept. 2017).

11. In accordance with Executive Order 2020-23 and due to the Coronavirus 2019 (COVID-19), this declaration has not been notarized. Should the Commission require additional attestation, declarant will certainly comply.

Dated: November 6, 2020

Respectfully Submitted,

Peter Howard

**Peter Howard**
Economic Director
Instituted for Policy Integrity
New York University School of Law

# Peter H. Howard

Institute for Policy Integrity
New York University School of Law
Wilf Hall
139 MacDougal Street, Third Floor
New York, NY 10012
(551)208-1863
HowardP@mercury.law.nyu.edu


## FIELDS OF INTEREST

Environmental Economics and Policy, Climate Economics and Policy, Natural Resource Economics, Land Economics and Policy, Agri-Environmental Policy, Agricultural Marketing and Organization

## EDUCATION

**Doctor of Philosophy** June 2012
*Department of Agricultural and Resource Economics*
*University of California, Davis, CA*

Dissertation
*The Economics of Climate Change at the Local Level: The Case of Shifting Oak Habitat Range in the Tulare Lake Basin*

**Bachelor of Arts** 2003
*Economics*
*Bard College, Annandale-on-Hudson, NY*

## CURRENT POSITION

**Economics Director** February 2015-Present

*Institute for Policy Integrity, New York University School of Law*
Research, mathematical programming, econometric analysis, reviewing literature, writing, hiring and managing economic fellows, research assistants and interns, and grant writing
Projects: Conduct research, write policy briefs, and develop and submit legal comments on climate change, resource extraction, and automobile emissions
Supervisor: Richard Revesz

## PROFESSIONAL EXPERIENCE

**Economic Fellow** August 2012-February 2015

*Institute for Policy Integrity, New York University School of Law*
Research, mathematical programming, econometric analysis, reviewing literature, writing, and hiring and managing research assistants and interns
Projects: Develop an interactive website on the social cost of carbon (SCC); write policy briefs; co-write comments on the SCC; develop research projects that address potential shortcomings in the current SCC estimates
Supervisors: Michael Livermore, Richard Revesz
Work in Conjunction with: Environmental Defense Fund and Natural Resource Defense Council

**Research Assistant** April 2006-August 2012

*Department of Agricultural and Resource Economics, University of California, Davis*
Mathematical programming, data collection and cleaning, reviewing literature, econometric analysis, writing, and managing graduate student research assistants
Projects: Estimate the economic cost to California agriculture of a proposed state-wide ban on chloropicrin; estimate the economic cost to California agriculture of California Department of Pesticide

Regulation's proposed surface water regulations; estimate the economic cost of fumigant and emulsifiable concentrate regulations in Fresno County, California; estimate the economic cost to California agriculture of the non-registration of methyl iodide; estimate the economic cost of fumigant regulations in Ventura County, California; estimate the economic cost to California agriculture of California Department of Pesticide Regulation's VOC regulations
Supervisors: Rachael Goodhue, Richard Howitt
Work in Conjunction with: California Department of Food and Agriculture

**Research Assistant** January 2006-April 2006

*Department of Agricultural and Resource Economics, University of California, Davis*
Write a summary explaining the Statewide Agricultural Production Model (a mathematical programming model for California agriculture), and data collection and cleaning
*Supervisor: Richard Howitt*

**Teaching Assistant** September 2005-December 2005

*Department of Agricultural and Resource Economics, University of California, Davis*
Design lesson plans, teach, and grade
Undergraduate Course: Econometrics
Supervisor: Sandeep Mohapatra

**Conference Coordinator** January 2004-May 2004

*Association for Geo-classical Studies, NY*
Create contact list, plan conference, and contact potential attendees
Supervisor: Kris Feder

## REPORTS

**Turbocharged: How One Revision in the SAFE Rule Economic Analysis Obscures Billions of Dollars in Social Harms**
Peter Howard and Max Sarinsky, forthcoming

**Shortchanged: The Concealed Costs of the Clean Water Rule Rollback**
Bethany Davis Noll, Peter Howard, Jason Schwartz, and Avi Zevin, June 2020

**Beneath the Surface: The Concealed Costs of the Clean Water Rule Rollback**
Bethany Davis Noll, Peter Howard, Max Sarinsky, Jason Schwartz, and Jeffrey Shrader, April 2020

**Expert Report: An Evaluation of the Revised Definition of "Waters of the United States"**
Peter Howard and Jeffrey Shrader, April 2019

**Analyzing EPA's Vehicle-Emissions Decisions**
Bethany Davis Noll, Peter Howard, and Jeffrey Shrader, May 2018

**Social Cost of Greenhouse Gases and State Policy**
Iliana Paul, Peter Howard and Jason Schwartz, October 2017

**The Bureau of Land Management's Modeling Choice for the Federal Coal Programmatic Review**
Peter Howard, June 2016. Available at http://policyintegrity.org/publications/detail/BLM-model-choice.

**Illuminating the Hidden Costs of Coal**
Jayni Hein and Peter Howard, December 2015. Available at http://policyintegrity.org/publications/detail/hidden-costs-of-coal.

**Expert Consensus on the Economics of Climate Change**
Peter Howard and Derek Sylvan, December 2015. Available at http://policyintegrity.org/publications/detail/expert-climate-consensus.

**Foreign Action, Domestic Windfall: The U.S. Economy Stands to Gain Trillions from Foreign Climate Action**
Peter Howard and Jason Schwartz, November 2015. Available at http://policyintegrity.org/publications/detail/foreign-action-domestic-windfall.

**Reconsidering Coal's Fair Market Value: The Social Costs of Coal Production and the Need for Fiscal Reform**
Jayni Hein and Peter Howard, October 2015. Available at http://policyintegrity.org/publications/detail/reconsidering-coals-fair-market-value.

**Flammable Planet: Wildfires and the Social Cost of Carbon**
Peter Howard, September 2014. Available at http://costofcarbon.org/files/Flammable_Planet__Wildfires_and_Social_Cost_of_Carbon.pdf.

**Omitted Damages: What's Missing From the Social Cost of Carbon**
Peter Howard, March 2014. Available at http://costofcarbon.org/files/Omitted_Damages_Whats_Missing_From_the_Social_Cost_of_Carbon.pdf

**Economic Implications of a Statewide Chloropicrin Ban on California Agriculture**
Rachael Goodhue, Peter Howard, Karen Klonsky, Matthew MacLachlan, Pierre Mérel, and Kaitlyn Smoot. Final report submitted to the California Department of Food and Agriculture. October 2012.

**Potential Economic Impacts of Draft Restrictions to Address Pesticide Drift and Runoff: Rice Case Study Analysis**
Kaitlyn Smoot, Luis Espino, Rachael Goodhue, Peter Howard, Karen Klonsky, and Randall G. Mutters. *Agricultural and Resource Economics Update*, University of California, Giannini Foundation 15(3) Jan/Feb 2012.

**Potential Economic Impacts of the February 1, 2010 Department of Pesticide Regulation Draft Restrictions to Address Pesticide Drift and Runoff to Protect Surface Water: Case Study Analysis**
Rachael Goodhue, Peter Howard, Karen Klonsky, and Kaitlyn Smoot. Final report submitted to the California Department of Food and Agriculture. September 2011.

**Costs of Methyl Iodide Non-Registration**
Rachael Goodhue, Peter Howard, Richard Howitt. *Agricultural and Resource Economics Update*, University of California, Giannini Foundation 13(5) May/June 2010.

**Costs of Methyl Iodide Non-Registration: Economic Analysis**
Rachael Goodhue, Peter Howard, and Richard Howitt. Final report submitted to the California Department of Food and Agriculture. May 2010.

**Reducing Volatile Organic Compound Emissions from Pre-plant Soil Fumigation: Lessons from the 2008 Ventura County Emission Allowance System**
Henry An, Rachael Goodhue, Peter Howard, Richard Howitt. *Agricultural and Resource Economics Update*, University of California, Giannini Foundation 12(5) May/June 2009.

**Effects of the January, 2008 CDPR Field Fumigation Regulations: Ventura County Case Study**
Rachael Goodhue, Richard Howitt, Peter Howard, and Henry An. Final report submitted to the California Department of Food and Agriculture. April 2009. Available at www.cdfa.ca.gov/files/pdf/GoodhueHowitt042309.pdf.

**Effects of Proposed VOC Emission Reduction Rule on California Agriculture: A Statewide Industry Analysis**
Rachael Goodhue, Peter Howard, and Richard Howitt. Interim report submitted to the California Department of Food and Agriculture. June 2007.

## COMMENTS

**Comments to EPA Science Advisory Board on Economic Analysis Guidelines**
Jason A. Schwartz, Matt Butner, Peter Howard, and Max Sarinsky, May 2020.

**Second Supplemental Comments on NHTSA's Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021-2016 Passenger Cars and Light Trucks**
Bethany Davis Noll, Peter H. Howard, Jason Schwartz, and Avi Zevin, May 2019.

**Comments on the Replacement of the Clean Water Rule**
Ian David, Bethany Davis Noll, Peter H. Howard, James Meresman, and Jason Schwartz, April 2019.

**Supplemental Comments on NHTHA's Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule**

**for Model Years 2021-2016 Passenger Cars and Light Trucks**
Bethany Davis Noll, Peter H. Howard, Jason Schwartz, and Avi Zevin, Zevin December 2018.

**Comments on NHTSA's Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021-2016 Passenger Cars and Light Trucks**
Bethany Davis Noll, Peter H. Howard, Jason Schwartz, and Avi Zevin, Zevin October 2018.

**Comments on Interior's Offshore Oil and Gas Leasing 2019-2024 Draft Proposed Program,**
Jayni Hein, Peter H. Howard, Alexander Leicht, Kelly Lester, March 2018.

**Comments on Use of the Social Cost of Greenhouse Gases in Environmental Impact Statements,**
Elly Benson et al., March 2018.

**Comments on Arctic Drilling to the Bureau of Ocean Energy Management**
Rachel Cleetus, Denise Grab, Jayni Hein, Peter H. Howard, Benjamin Longstreth, Richard L. Revesz, Jason A. Schwartz, December 2017.

**Comments on EPA Methane Rule Stay**
Susanne Brooks et al., December 2017.

**Comments to Minnesota on the Social Cost of Carbon**
Denise Grab, Peter H. Howard, Iliana Paul, Jason A. Schwartz, July 2017

**Comments on U.S. Army Corps of Engineers Environmental Impact Statement**
Susanne Brooks et al., April 2017.

**California Air Resources Board – Comments on the 2017 Scoping Plan Update**
Denise A. Grab, Peter H. Howard, Iliana Paul, Jason A. Schwartz, April 2017.

**Comments to California Air Resources Board on 2030 Target Scoping Plan Draft**
Denise A. Grab, Jayni Foley Hein, Peter H. Howard, Iliana Paul, Jason A. Schwartz, and Burcin Unel, December 2016.

**Comments on the Department of Energy's Use of the Social Cost of Carbon**
Tomás Carbonell et al., December 2016.

**Comments on the U.S. Department of Interior's Regulatory Impact Analysis and Environmental Impact Statement for the Proposed Stream Protection Rule,**
Peter Howard and Jayni Hein, August 2016.

**Comments on the Draft Proposed 2017-2022 Outer Continental Shelf (OCS) Oil and Gas Leasing Program, BOEM-2014-0059**
Jayni Hein and Peter Howard, June 2016.

**Comments to the National Academy of Sciences on the Social Cost of Carbon**
Peter Howard and Jason Schwartz, April 2016, Available at http://policyintegrity.org/what-we-do/update/national-academy-of-sciences-reviews-social-cost-of-carbon.

**Comments on the Energy Conservation Standards for Walk-In Coolers and Freezers**
Laurie Johnson, Peter Howard, Megan Ceronsky, Rachel Cleetus, Richard Revesz, and Gernot Wagner. November 12, 2013. Available at http://policyintegrity.org/documents/Comments_on_use_of_SCC_in_Walk-in_Coolers_and_Commercial_Refrigeration_Rules.pdf

**Comments on Petition for Correction: Technical Support Document: Social Cost of Carbon for Regulatory Impact Analysis under Executive Order 12866 (February 2010) and Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis under Executive Order 12866 (May 2013)**
Laurie Johnson, Peter Howard, Megan Ceronsky, Rachel Cleetus, Richard Revesz, and Gernot Wagner. October 21, 2013.

**Comments on the Energy Conservation Program: Energy Conservation Standards for Metal Halide Lamp Fixtures; Proposed Rule, 78 Fed. Reg. 51,464 (August 20, 2013)**
Laurie Johnson, Peter Howard, Megan Ceronsky, Rachel Cleetus, Richard Revesz, and Gernot Wagner. October 21, 2013.

## PUBLISHED PAPERS AND CHAPTERS

**Wisdom of the Experts: Using Economic Consensus to Address Positive and Normative Uncertainties in Climate-Economic Models**
Peter Howard and Derek Sylvan. 2020. *Climatic Change*, 162, 213-232.

**Funding Inclusive Green Transition through Greenhouse Gas Pricing**
Thomas Sterner, Richard T. Carson, Marc Hafstead, Peter Howard, Sverker Carlsson Jagers, Gunnar Köhlin, Ian Parry, Ryan Rafaty,E. Somanatan, Jan Christoph Steckel,Dale Whittington, Francisco Alpizar, Stefan Ambec, Claudia Aravena, Jorge Bonilla, Reza Che Daniels, Jorge Garcia, Niklas Harring, Kanishka Kacker, Suzi Kerr, Haileselassie Medhin, Pham Khanh Nam, German Romero, Olof Johansson-Stenman,Mike Toman,Jintao Xu, Min Wang. 2020. Ifo DICE Report,

**Chapter 22 - The Social Cost of Carbon: Capturing the Costs of Future Climate Impacts in US Policy**
Peter H Howard. 2018. *Managing Global Warming: an interface between technology and human issues*

**Sociopolitical Feedbacks and Climate Change**
Michael Livermore and Peter Howard. 2019. *Harvard Environmental Law Review*

**Few and Not So Far Between: A Meta-analysis of Climate Damage Estimates**
Peter Howard and Thomas Sterner. 2017. *Environmental and Resource Economics*, 68(1), 197-225.

**Best Cost Estimate of Greenhouse Gases**
Ricky Revesz, R., M. Greenstone, M. Hanemann, M. Livermore, T. Sterner, D. Grab, P. Howard, and J. Schwartz. 2017.Science, 357(6352),655-655.

**The social cost of carbon: A global imperative." Review of Environmental Economics and Policy**
Richard L. Revesz, Jason A. Schwartz, Peter H. Howard, Kenneth Arrow, Michael A. Livermore, Michael Oppenheimer, and Thomas Sterner. 2017. *Review of Environmental Economics and Policy*, 11(1), 172-173.

**Think Global: International Reciprocity as Justification for a Global Social Cost of Carbon**
Peter Howard and Jason Schwartz. 2016. Colum. J. Envtl. L. 42, 203.

**Global warming: Improve economic models of climate change**
Revesz, R. L., Howard, P. H., Arrow, K., Goulder, L. H., Kopp, R. E., Livermore, M. A., ... & Sterner, T. 2014. *Nature*, *508*(7495), 173-175.

## WORKING PAPERS

**Between Two Worlds:: Methodological and Subjective Differences in Climate Impact Meta-Analyses**
Peter Howard and Thomas Sterner

**Option value and the social cost of carbon: What are we waiting for?**
Peter Howard, Alexander Golub, and Oleg Lugovoy

**The Relative Price of Agriculture: The Effect of Food Security on the Social Cost of Carbon**
Peter Howard and Thomas Sterner

**Optimal Preservation of Private Open Space within a Municipality under Irreversibility and Uncertainty**
Peter Howard

**Measuring the Welfare Loss to Landowners of Future Geographic Shifts in the Suitable Habitat for Vegetation Due to Climate Change**
Peter Howard

## PRESENTATIONS AND POSTERS

**Between Two Worlds:: Methodological and Subjective Differences in Climate Impact Meta-Analyses**
Peter Howard and Thomas Sterner, 2020 AERE Summer Conference

**Option value and the social cost of carbon: What are we waiting for?**
Peter Howard, Alexander Golub, and Oleg Lugovoy, 2020 AERE Summer Conference

**Between Two Worlds:: Methodological and Subjective Differences in Climate Impact Meta-Analyses**
Peter Howard and Thomas Sterner, 13th Annual Meeting of EfD- in Colombia

**Option value and the social cost of carbon: What are we waiting for?**
Peter Howard, Alexander Golub, and Oleg Lugovoy, 2019 SISC Annual Conference

**Two Heads are Better than One: Using Economic Consensus to Address Positive and Normative Uncertainties in Climate-Economic Models**
Peter Howard and Derek Sylvan, 2018 at 2018 World Congress of Environmental and Resource Economists

**Wisdom of the Experts: Using Economic Consensus to Address Positive and Normative Uncertainties in Climate-Economic Models**
Peter Howard and Derek Sylvan, 2018 at Environmental Defense Fund

**The Wisdom of the Economic Crowd: Calibrating Integrate Assessment Models Using Consensus**
Peter Howard and Derek Sylvan, 2016 AAEA Annual Meeting

**Few and Not So Far Between: A Meta-analysis of Climate Damage Estimates**
Peter Howard and Derek Sylvan, 2016 AAEA Annual Meeting

**Few and Not So Far Between: A Meta-analysis of Climate Damage Estimates**
Peter Howard and Derek Sylvan, 2016 EAERE Annual Meeting

**Comments on the 2017-2022 Outer Continual Shelf (OCS) Oil and Gas Leasing Program**
Peter Howard, Invited speaker to BOEM's Energy Supply/Demand Modeling, Market Substitutions, and Implications of Downstream GHGs/Climate Policy Change. June 2016.

**The Economic Climate: Establishing Expert Consensus on the Economics of Climate Change**
Peter Howard, Invited speaker to Bard College's Environmental and Urban Studies Colloquium

**The Economic Climate: Establishing Expert Consensus on the Economics of Climate Change**
Peter Howard and Derek Sylvan, 2015 AAEA Annual Meeting

**Estimating the Option Value of Offshore Drilling in United States' OCS Regions**
Peter Howard, 2015 Society for BCA Conference

**The Social Cost of Carbon: How the Federal Government Values Carbon Dioxide Emissions**
Peter Howard, 2015 Climate Leadership Conference sponsored by the Environmental Protection Agency

**What's the Cost of Climate Change? How to Improve the Social Cost of Carbon**
Peter Howard, Invited Speaker to Bard College

**Raising the Temperature on Food Prices: Climate Change, Food Security, and the Social Cost of Carbon**
Peter Howard and Thomas Sterner, 2014 AAEA Annual Meeting

**Loaded DICE: Refining the Meta-analysis Approach to Calibrating Climate Damage Functions**
Peter Howard and Thomas Sterner, 2014 AAEA Annual Meeting

**The Relative Price of Agriculture: the Effect of Food Security on the Social Cost of Carbon**
Peter Howard and Thomas Sterner, 2013 AAEA & CAES Joint Annual Meeting

**The Relative Price of Agriculture: the Effect of Food Security on the Social Cost of Carbon**
Peter Howard and Thomas Sterner, 2013 AERE Summer Conference

**The Relative Price of Agriculture: the Effect of Food Security on the Social Cost of Carbon**
Peter Howard, 2013 Society for BCA Conference

**Climate Change, Vegetation, and Welfare: Estimating the Welfare Loss to Landowners of Marginal Shifts in Blue Oak Habitat**
Peter Howard, 2012 AAEA Annual Meeting

**Are Pesticide Buffers Expensive? Using Positive Mathematical Programming to Estimate the Cost of Proposed Pesticide Buffers in California**
Peter Howard, Rachael Goodhue, Pierre Mérel. 2012 AAEA Annual Meeting

**Optimal Preservation of Agricultural and Environmental Land within a Municipality Under Irreversibility and Uncertainty**
Peter Howard, 2011 AAEA & NAREA Joint Annual Meeting

**Measuring the Welfare Loss to Landowners of Future Geographic Shifts in the Suitable Habitat for Vegetation Due to Climate Change**

Peter Howard, 2011 AERE Summer Conference

**Optimal Preservation of Oak Woodlands within a Municipality**
Peter Howard, 12th Occasional California Workshop on Environmental and Resource Economics (2010)

**Optimal Preservation of Oak Woodlands within a Municipality**
Peter Howard, 2010 Belpasso International Summer School on Environmental and Resource Economics, Sicily

**Optimal Preservation of Oak Woodlands within a California Municipality**
Peter Howard, 2010 Giannini ARE Student Conference

**Optimal Preservation of Oak Woodlands within a California Municipality**
Peter Howard, 2010 UCD Brown Bag Presentation

**Should More California Oak Habitat Be Protected Because of Global Warming?**
Peter Howard, 2009 AAEA & ACCI Joint Annual Meeting

**The Economic Effects of Regulations to Reduce VOC Emissions from Pesticides: The Case of Fumigants**
Peter Howard, 40th California Nematology Workshop (2008)

## EXPERT TESTIMONY

**Report on Colorado's Zero Emission Vehicle Program**
Peter H Howard and Jason A Schwartz, October 2018

**Testimony Before the New Jersey Legislature: Senate Environment and Energy Committee and the Assembly Environment and Solid Waste Comm.**
Peter Howard, April 2019

**Testimony on Colorado's Low Emission Vehicle Program and the Social Cost of Carbon.**
Peter H Howard and Jason A Schwartz, October 2018

**WESTERN ORGANIZATION OF RESOURCE COUNCILS et al., Plaintiffs, vs. U.S. BUREAU OF LAND MANAGEMENT et al. Defendants.**
Peter Howard, May 2018

## BLOG

**How Much Higher? The Growing Consensus on the Federal SCC Estimate**
Peter Howard, September 2014, Cost of Carbon Pollution Project
Available at http://costofcarbon.org/blog/entry/how-much-higher-the-growing-consensus-on-the-federal-scc-estimate.

**Working Group Estimated, GAO Approved**
Peter Howard, September 2014, Cost of Carbon Pollution Project
Available at http://costofcarbon.org/blog/entry/working-group-estimated-gao-approved.

**Is the rift between Nordhaus and Stern evaporating with rising temperatures?**
Peter Howard and Charles Komanoff, August 2014, Carbon Tax Center
Available at http://www.carbontax.org/blogarchives/2014/08/21/is-the-rift-between-nordhaus-and-stern-evaporating-with-rising-temperatures/.

**Playing Catch Up to the IPCC**
Peter Howard, April 2014, Cost of Carbon Pollution Project
Available at http://costofcarbon.org/blog/entry/playing-catch-up-to-the-ipcc.

## TEACHING

- Adjunct Assistant Professor of Public Service, Wagner Graduate School of Public Service, Environmental Economics: developed and taught course
- Advised on projects at Policy Integrity's Regulatory Policy Clinic (worked with New York University Law Students)

- Guest lecture at University of Cape Town
- Guest lecture for Katrina Wyman, New York University School of Law (Multiple times)
- Guest lecture for Rickey Revesz and Nathaniel Keohane, New York University School of Law
- Guest lecture for Principles of Macroeconomics at the University of North Carolina Asheville (UNCA)
- Guest lecture at Bard College (Multiple times)
- Supervised undergraduate summer interns
- Teaching Assistant in graduate school for undergraduate economics course
- Taught 7th Grade

## GRANTS, FELLOWSHIPS, AND HONORS

- Gamma Sigma Delta - The Honors Society of Agriculture 2010-Present
- Giannini Foundation Mini-grant with Richard Howitt 2009-2010
- Non-Resident Tuition Fellowship 2005-2006

## AWARDS

- UCD & Humanities Graduate Research Award 2010-11
- Jastro-Shields Graduate Research Scholarship Award 2010-2011
- UCD & Humanities Graduate Research Award 2009-2010
- Jastro-Shields Graduate Research Scholarship Award 2009-2010

## PROFESSIONAL MEMBERSHIPS

- Agricultural and Applied Economics Association
- Former Board Member of the Henry George School

## COMPUTER PROGRAMS

- Programming: Julia, MATLAB and GAMS
- Statistics: Stata
- Spatial: ArcGIS
- Microsoft office: Word, Excel, Access, PowerPoint
- Other word processing: Latex

## SELECTED MEDIA COVERAGE

- **The U.S. Government's Price on Carbon Doesn't Value the Future Much.** Available https://qz.com/1881523/the-us-government-wont-put-a-new-price-on-carbon/
- **Material World: Global Warming Is Coming for Your Shopping Cart.** Available https://www.bloomberg.com/news/articles/2017-11-28/material-world-global-warming-is-coming-for-your-shopping-cart
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## COMPUTER PROGRAMS

- Programming: Julia, MATLAB and GAMS
- Statistics: Stata
- Spatial: ArcGIS
- Microsoft office: Word, Excel, Access, PowerPoint
- Other word processing: Latex

## PEER REIVEW

- Ecological Economics
- Nature Climate Change
- Nature Communications
- Nature Sustainability

**STATE OF MICHIGAN**
**MICHIGAN PUBLIC SERVICE COMMISSION**

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| In the matter of the Application for the Authority to Replace and Relocate the 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 | ) | Case No. U-20763 |

## PROOF OF SERVICE

I hereby certify that a true copy of the foregoing *Application for Leave to Appeal Ruling, Brief in Support of Application to Appeal Ruling, Declaration of Peter. A. Erickson, C.V. of Peter A. Erickson, Declaration of Dr. Peter H. Howard, Ph.D., and C.V. of Dr. Peter H. Howard, Ph. D.* was served by electronic mail upon the following Parties of Record, this 6th day of November, 2020.

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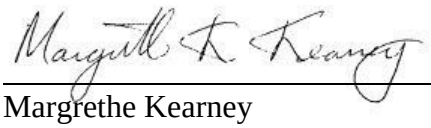

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