
CANADIAN PROFITS, MICHIGAN RISK
Line 5 threatens Michigan's economy and environment, brings little in return

MAY 2018



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This report was prepared as part of Groundwork’s continuing work to protect the Mackinac Straits and the Great Lakes from oil spills.

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Groundwork Center for Resilient Communities is a nonprofit advocacy organization that strengthens economy, builds community and protects the environment. Our key program areas are Strong Cities and Towns, Food and Farming, and Clean Energy. We collaborate with citizens, government, businesses, and organizations to create fresh solutions and innovative models for resilience and prosperity.

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I. EXECUTIVE SUMMARY:

When a ship's anchor hit and made three dents in Enbridge's Line 5 oil pipeline in the Straits of Mackinac on April 1, 2018, the repercussions rang out across Michigan and the Great Lakes, highlighting what pipeline opponents have long warned: the risk of Canadian oil spilling into the Straits is very real. The impacts would be devastating—oil-soaked beaches, blackened birds and dead fish, contaminated drinking water and an immediate halt in income for thousands of families and hundreds of businesses.

This white paper documents that the vast North American oil pipeline network has more than sufficient capacity to ensure that Michigan and Midwest refineries could operate with no economic disruption without Line 5. It also identifies viable solutions that should be implemented to secure necessary propane to Upper Peninsula residents, as well as to transport northern Lower Peninsula oil to southeastern markets.

Michigan is needlessly risking our Great Lakes for a pipeline that primarily benefits Canada. We call on Michigan's governor and attorney general to immediately decommission Line 5 and abandon efforts toward a tunnel for Canada. They should also direct state agencies to develop solutions that will ensure the residents of the U.P. receive affordable propane this winter, and ensure northern Michigan oil can reach southeast Michigan markets.

Awareness of the magnitude of risk from Line 5 has been growing throughout Michigan over the past five years. Canadian pipeline operator Enbridge has a history of inattention to pipeline safety and violations of the easement agreement that clearly justify the State of Michigan taking immediate action to protect our Great Lakes by revoking the easement that authorizes the pipeline to run along the Straits' bottomlands.

Surprisingly, the massive risk that Michigan is taking with our Great Lakes brings very little benefit to our state—but instead Line 5 has become a key shortcut for Enbridge to move oil from western Canadian oil fields to eastern Canadian refineries. Canadian pipeline companies have been unable to build a pipeline in their own country, making Line 5 vitally important to Canada's petrochemical industry. Meanwhile, Line 5 has become much less important to Michigan because use of the type of oil it carries, light crude, has declined dramatically at Michigan and Midwest refineries in recent years.

The Enbridge lobbying machine has successfully framed Line 5 as a benefit to Michigan that is worth the increasing risk, and recently convinced Michigan's governor and attorney general to support a massive tunnel under the globally rare and economically essential Straits of Mackinac to keep the oil flowing. Canada would continue to reap the benefits of this tunnel, while Michigan would continue to shoulder the risk to our Great Lakes. State leaders must decommission Line 5 as soon as possible and immediately secure solutions that put Michigan's needs first, ensure U.P. residents have access to an affordable propane supply, and that northern Michigan-drilled crude oil can reach their markets.

II. INTRODUCTION: MICHIGAN'S LINE 5 OIL PIPELINE—A RISK REVEALED

In 1953, Enbridge's Line 5 oil pipeline was laid across the bottomlands of the Mackinac Straits, and soon after, the public forgot about it. That "out of sight, out of mind" situation persisted despite the line pumping millions of gallons of crude oil through the open waters every day, presenting an ever-present risk of a devastating oil spill to the Straits' economy and ecosystem. Awareness of the pipeline changed, however, when the National Wildlife Federation issued a report about the pipeline in 2012 called "Sunken Hazard." [1] The report came on the heels of an oil pipeline catastrophe caused by Line 5's Canadian owner, Enbridge. In 2010 Line 6B, the company's other Michigan pipeline, ruptured and spilled 1 million gallons of heavy tar sands oil into Michigan's Kalamazoo River, [2] which thrust oil pipelines and the dangers they present into public view.

Pipeline danger was highlighted again in 2014 when a researcher from the University of Michigan, Dr. David Schwab, released a study that used computer modeling to reveal how quickly the powerful, shifting currents at the Straits could spread an oil spill. He described the Straits as the "worst possible place for an oil spill in the Great Lakes." [3]

Following the media attention and public outcry about the risks of Line 5, Michigan Governor Rick Snyder appointed a task force of state officials to study the issue. The task force report clarified that Michigan indeed has legal authority over the 1953 easement and the siting of oil pipelines in the Straits. The study also raised concerns about the magnitude of the risk. With the release of that finding, Michigan Attorney General Bill Schuette publicly stated, "You would not build a Straits pipeline in this decade. I'm doubtful it will be open in future decades. ... Its days are numbered, its duration is limited in my opinion." [4]

In 2015, Governor Snyder appointed the Pipeline Safety Advisory Board [5] and asked them to hire consulting experts and oversee production of two separate reports: a risk analysis report and an alternatives analysis report. After much delay, in fall of 2017 consultants with Dynamic Risk, of Calgary, Alberta, completed the alternatives analysis, which provided considerable new data about the pipeline. One of the report's conclusions was that decommissioning Line 5 without replacement was a viable alternative with little economic impact. [6]

In November 2017, Governor Snyder jumped ahead of his advisory board and struck a private deal with Enbridge to study its options to replace the pipeline, including replacing Line 5 with a tunnel-enclosed pipeline in the Straits. [7] He has pledged to make a decision by September 2018 about a course of action.

Our leaders should not be trying to devise extreme measures to perpetuate an oil pipeline that risks a globally rare asset and thousands of Michigan jobs while giving very little benefit to the businesses and people of Michigan. [8] Instead, Michigan leaders should be focused on replacing the few benefits Line 5 provides our state with other transportation means, such as trucking, which readily exists. Michigan should exercise its legal authority and shut down Line 5 immediately.

III. CANADIAN PIPELINE RISKS MICHIGAN BUSINESSES, JOBS, AND GLOBALLY RARE ENVIRONMENT

Canadian corporation Enbridge transports 540,000 barrels of oil each day through a pair of 65-year-old pipelines that are suspended in the open water of the Straits of Mackinac. (Line 5 runs as a single pipe on the mainland, but splits into two pipes under the waters of the Straits.) [1] The pipeline had effectively been hidden in plain sight for nearly 60 years, with most Michigan citizens completely unaware of the risk to our Great Lakes. It was only after the disastrous 2010 Enbridge oil spill into the Kalamazoo River that attention was drawn to Enbridge's "other" main Michigan pipeline—Line 5.

Taken together the Line 5 events and information that follows describe an unacceptable and extremely risky scenario that juxtaposes the most vulnerable place in the Great Lakes for an oil spill with a company that consistently and repeatedly has not lived up to the trust Michigan has placed in its hands.

A Flawed Pipeline Design and Failed Supports

In 2003, Enbridge inspections, years overdue, discovered the lake bottom had washed out beneath several portions of Line 5 and that many sections were unsupported for more than 75 feet—a clear violation of the easement and defensible grounds for terminating the pipeline lease. The washouts are clear evidence of a flawed design. Sixteen sections were unsupported for 140 feet and one section was unsupported for 286 feet. The washouts most likely existed for years—Enbridge does not know how long because it was not performing external inspections. Without adequate support, the pipeline sways, oscillates, and bends in the extremely strong currents of the Straits, weakening the steel. Since 2003, the state has allowed Enbridge to install 150 anchors to shore up this failed design in the Straits. There are now nearly two miles of pipeline suspended by supports above the bottomlands of the Straits.[10] Enbridge has never applied for, and the state has never demanded, authorization for this total design change—an authorization that is required by Michigan's Great Lakes public trust law, the Great Lakes Submerged Lands Act.[10]

Unexplained Evidence of Potentially Significant Pipeline Changes

An Enbridge 2016 inspection report disclosed anomalies in Line 5, including one section where the pipeline appears bent, though the cause is unknown.[11] In another section, the pipe has lost its round shape and become an oval.[11] Enbridge says it will add supports where "ovalization" has occurred and has denied that this puzzling change in the shape of the pipe indicates a weakening of the structure that raises concern. These changes are clear evidence contradicting Enbridge claims that the pipeline is as "good as new" and can last "forever."

Dozens of Instances of Coating Failure and Exposed Bare Metal

Following assertions by Enbridge that the pipeline's protective coating was in good condition, an Enbridge inspection reported problems related to the external coating. In fact, in 42 out of 48 inspected areas of the pipeline the protective coating has been damaged.[12] In some instances, bare metal is exposed in areas the size of dinner plates.[12] In other places, white calcium-based deposits have collected and compromised the coating. Additionally, concerns have not been answered about the impact on the pipeline coating from corrosive secretions of invasive quagga mussels that cover the pipeline.[12] The quaggas did not exist in the lake when the pipeline was installed. Both the missing coating and the presence of the quagga mussels raise concerns about pipeline corrosion.

Inadequate Spill Response Preparation

In 2016, sixty-three years after Line 5 went live, Enbridge finally placed spill response equipment in the Mackinac Straits. Until then, Enbridge accepted equipment being located several hours away. Placing the equipment in the Straits was not initiated by Enbridge, but came only after public pressure. Even today, with spill response equipment in place, Enbridge concedes oil recovery is not effective in waves greater than four feet, which occurs often in the Mackinac Straits. Case in point: when the recent anchor strike occurred, the anchor also damaged a nearby utility line, releasing a mineral oil into the Straits, and at one point spill responders could not go onto the water for 72 hours due to dangerous winds and waves.[14]

Under best case conditions, only 40 percent of oil is typically recovered—that is to say, in even a successful oil recovery operation, 60 percent of the oil typically remains in the ecosystem.[13]

Also troubling, there is no research available on how large freshwater lake systems recover from an oil spill. As immense as the Great Lakes are, they are nowhere near as powerful and vast as the oceans, and it's reasonable to expect oil would last longer in the ecosystem than in cases such as the BP Gulf Horizon oil spill in the Gulf of Mexico.[13]

The effectiveness of spill response under ice also remains an unknown because little is understood about how to recover oil under ice. In his March 2016 study of worst-case spill scenarios, University of Michigan's Dr. Schwab acknowledged he was unable to model oil spills happening under ice because of a lack of documentation about such spills.[3] The Straits are often frozen from late December into April. With no good recovery technology options available, spill responders could be left with no choice but to simply cut a hole in the ice and set spilled oil on fire.[15]

Enbridge Has Repeatedly Deceived Government Agencies and the Public

Enbridge has proven untrustworthy in dealing with Michigan pipeline regulators and the public. Time and again, Enbridge has proven unwilling to act unless goaded into doing so by public pressure, or forced to act by regulatory enforcement. At times, Enbridge has been ignorant of key issues related to the condition of their pipelines, while at other times, the company has withheld the truth and has been plainly deceptive about their condition.

Only 10 days before the disastrous Kalamazoo River oil spill, Enbridge's vice president of operations testified before a Congressional Committee on Transportation and Infrastructure about the company's pipelines: "Our response time from our control center can be almost instantaneous, and our large leaks are typically detected by our control center personnel." Days later the ruptured pipeline gushed oil for 17 hours into Talmadge Creek, and was only discovered when neighbors reported oppressive oil fumes to local officials.[1]

When Enbridge discovered in 2003 that washouts had created long, unsupported sections of the Line 5 pipeline in the Straits, the company never voluntarily disclosed the situation. This problem only came to light 13 years later, when, in 2016, Enbridge was forced to allow an external review of Line 5 operations and the inspector discovered a 2003 internal study reporting the gaps.[9]

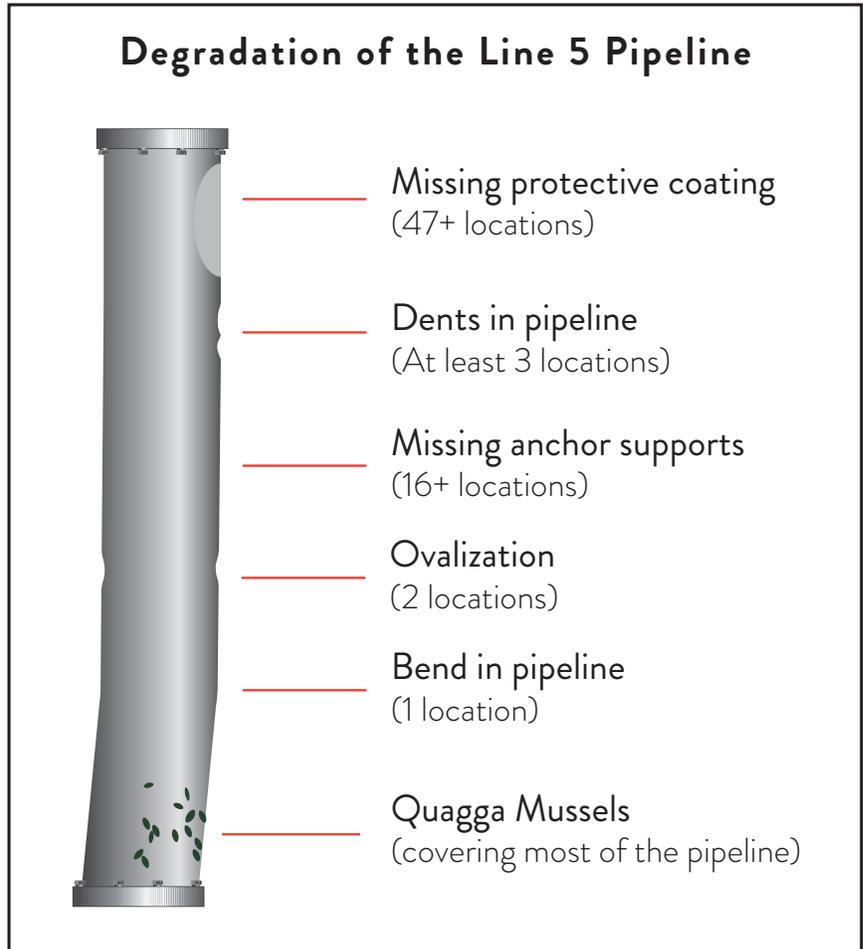
In February 2017, Enbridge denied that Line 5 had exposed metal or missing patches of coating, though the company knew they existed. "We have not found any holidays [the industry term for patches of missing coating]. We haven't seen any. We don't know of any. That's really the bottom line on it," said

Ryan Duffy, Enbridge spokesperson. But at the time, Enbridge already had a written internal plan to repair areas of damaged and missing coating.[16]

Michiganders would expect that Enbridge had learned lessons about the value of transparency and honest reporting following the Kalamazoo River spill catastrophe, but as the subsequent concealing of evidence reveals, an insular corporate culture allows dangerous habits to persist, eroding trust in the company’s ability to safely operate and maintain an aging pipeline in a highly vulnerable location.

Ship’s Anchor Strikes and Damages Line 5

Following the recent ship’s anchor strike, the government required Enbridge to reduce the maximum pressure on the line from 600 psi to 150–200 psi.[17] The anchor strike came just four months after a state-funded report written by Dynamic Risk identified anchor strikes as the No. 1 threat to Line 5’s integrity: “... the dominant threat, representing more than 75% of the annualized total (all-threat) failure probability, is that of anchor hooking caused by the inadvertent deployment of anchors from ships traveling through the Straits.” This event is a stark reminder that human error and the ever-present unpredictability of the environment of the Straits, despite all technological preventive measures, remain significant risks to the safety of our Great Lakes.



The Risk of a Line 5 Oil Spill Has Become Unacceptable:

The recent anchor strike has raised concerns about Line 5 even from former skeptics of decommissioning,

such as Republican State Senator Wayne Schmidt, whose district includes the Straits. Following the anchor strike incident, he placed this statement on his website: “As a result [of the anchor strike], I am calling for a complete shutdown of Line 5. We’ve talked about this long enough—there have been numerous issues that have stemmed from the 65-year-old pipeline and it’s time we shut it down and pursue an alternative. The line should remain down as we independently verify that there is no potential for risk—including shipping or anchor damage—or come up with an alternative. Taking Enbridge at their word that everything is operating as it should is not good enough. There is simply too much conflict and too great a risk to our state’s natural resources.”[18]

Inspections have identified many problems with the physical structure of Line 5—despite Enbridge’s ongoing assertions that the pipeline is good condition.

The potential economic impact of an oil spill at the Straits was recently estimated by a Michigan State University ecological economist as nearly \$6 billion, including both natural resource damage and restoration costs, and total economic impacts on communities—and this estimate did not even consider a worst-case scenario.[19] The study considered economic impacts on the tourism economy, commercial fishing, municipal water systems, and coastal property values. And the economic impact would extend far beyond the Straits region, as Michigan’s successful state-sponsored “Pure Michigan” brand would take a huge hit nationally. Mackinac Island, northern Michigan’s largest tourist attraction, and the state’s iconic Mackinac Bridge would be indelibly associated with oil-stained beaches in the minds of potential tourists from across the nation and beyond.

IV. LINE 5 OIL IS NO LONGER IN MICHIGAN’S INTEREST

In the face of Line 5’s remarkable risk, the only possible reason for Michigan to continue to allow the line would be for great economic benefits. But as this report and other reports have highlighted, Michigan’s economy does not need the Line 5 oil pipeline. Canada currently receives nearly all the economic benefits of the line, while Michigan receives very few—and the product the state does receive from Line 5 can be provided in other ways if the line were to be shut down.

Michigan’s Original Deal to Allow Line 5

When Michigan gave permission for Line 5 to be built in the Mackinac Straits in 1953, our state oil infrastructure was very different, and the agreement clearly benefited Michigan. The pipeline replaced freighters that had been transporting crude oil on the lakes, and the freighters posed a greater environmental risk than the pipeline.[20] In addition, the ships were unable to transport crude oil year round due to ice. Line 5 transported an important percentage of the crude oil that Michigan refineries used.

A pipeline could only be laid across the bottomlands of the Straits of Mackinac with express approval from Michigan, and the legislature passed a special law allowing the Department of Natural Resources to authorize an easement. The easement deal between the State of Michigan and Enbridge (then known as Lakehead Pipeline Co.) reflected a post-WWII mentality that expressed great pride and faith in the promise of technology. Catastrophic oil spills such as Exxon Valdez, BP Gulf Horizon, and Enbridge’s own Kalamazoo River spill had not yet played out on televisions across America.

That overconfidence in technology paired with a poor understanding of the Straits’ environmental vulnerability resulted in what can now only be described as an easement that is a bad deal for Michigan. The state offered the easement nearly for free and with no sunset termination date, and a straightforward requirement that Enbridge “at all times shall exercise the due care of a reasonably prudent person for the safety and welfare of all persons and of all public and private property ...”

The State of Michigan retains the primary authority and the obligation to assure that Enbridge—or any entity granted an easement to use the public’s lakebed—is not compromising the public uses protected by the public trust.[8] The pipeline company has clearly not met that minimal standard, as evidenced by the many easement violations documented by FLOW, a water policy research organization.

The Deal Changes: Line 5 Now Primarily Benefits Canada

The foundational principles behind the Line 5 agreement—that pipeline technology would last indefinitely, that Enbridge would act as a “reasonably prudent” operator, and that the deal was in Michigan’s interest—have changed. We now know the unfortunate reality that pipeline technology operated by Enbridge can fail often and catastrophically. Over the full distance of Line 5 from Superior, Wisconsin, to Sarnia, Ontario, the upland portion of Line 5 has failed at least 29 times over the past 50 years and has spilled at least 1.13 million gallons of oil.[21] Failure of the company’s Line 6B caused the nation’s largest inland oil spill on the Kalamazoo River. Enbridge has also proven to be an untrustworthy and unreasonable operator.

The underlying economic benefits to Michigan from Line 5—other than transporting U.P. propane and Michigan crude oil—have also dramatically diminished. Nearly all of the light crude oil going through Line 5 now simply passes through Michigan on its way to Canada and eastern states, while other pipelines that carry heavy crude supply Michigan’s needs. Expanded oil production in North America means there is far more oil being transported through the Great Lakes region than there is capacity to refine it here. Meanwhile, the use of Line 5’s light crude oil in the Midwest has diminished dramatically. Enbridge has strategically planned the changes to their network. But Michigan has not similarly addressed how this reduced benefit and growing, ever-present risk has changed the deal for the Great Lakes and Michigan’s residents.

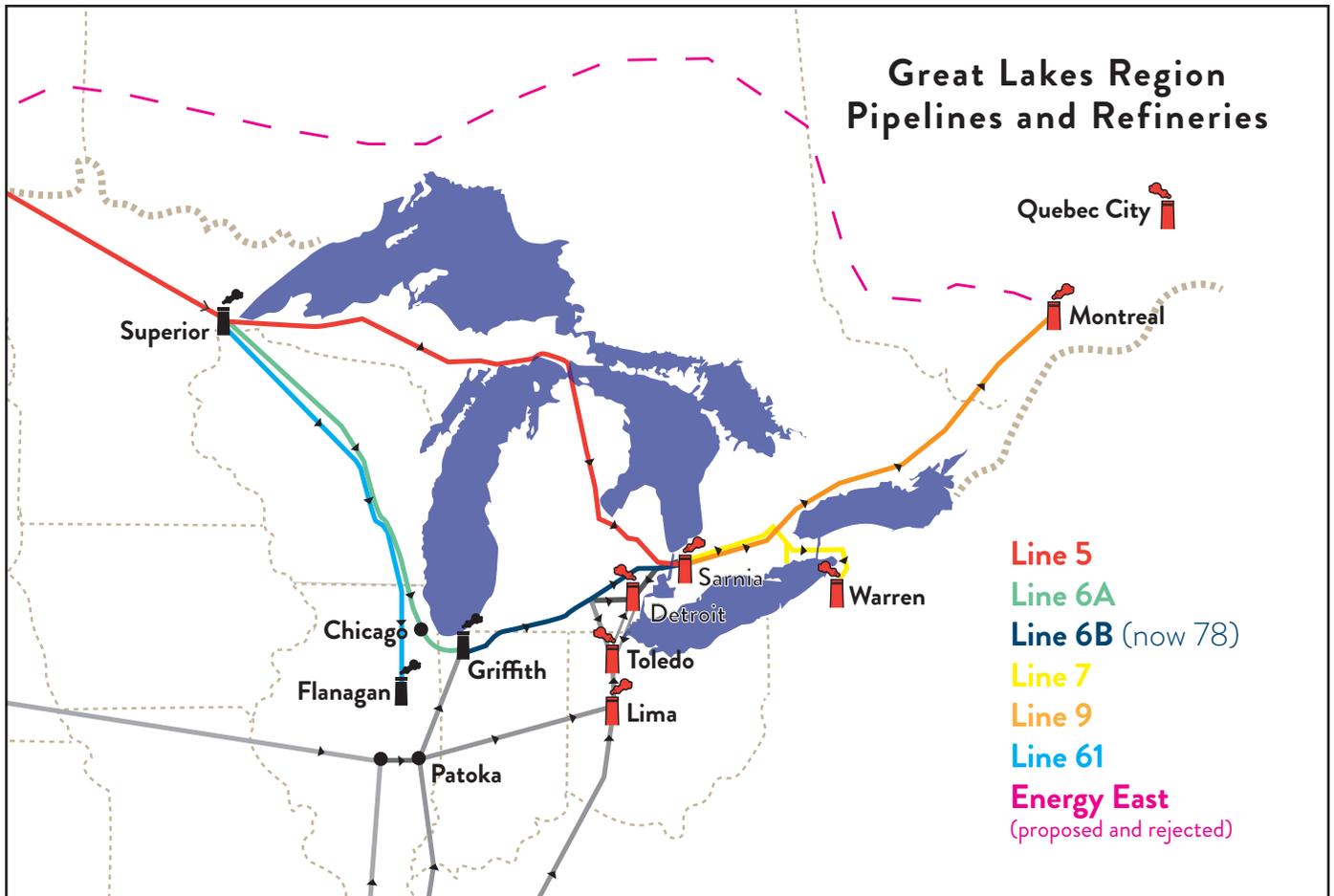
Enbridge Pushes Oil to Canada’s East Coast

During the past 15 years, the amount of oil production in North America has greatly increased, largely due to new technologies for extracting tar sands in Alberta, Canada, and fracking in North Dakota’s Bakken oil fields. As a result of the dramatic increase in tar sands oil, Canadian pipeline companies have been trying to reach the coastal markets of North America, as well as global export terminals. TransCanada’s Keystone XL to the Gulf Coast, the proposed Kinder-Morgan TransMountain pipeline to the West Coast through British Columbia, and the aborted TransCanada Energy East pipeline north of Lake Superior are all attempts to move this glut of Canadian oil to coastal markets.

“The company’s Eastern Canadian Refinery Access Initiative has helped Canadian refineries become more competitive in the North American market, and continues to safeguard jobs in Quebec and Ontario and bolster the security of Canada’s energy supply.”

~Enbridge website

In 2012, Enbridge announced to its shareholders a new corporate expansion strategy that would push oil to the Canadian East Coast.[22] The company’s Eastern Canadian Refinery Access Initiative was one of the company’s most sweeping expansions in its history, a \$3 billion series of pipeline projects across its system intended to move western Canadian crude to eastern refineries and prevent bottlenecks in the U.S. Midwest.[22] The company boasted of using “existing pipeline infrastructure” rather than new pipeline construction to reach refineries in Montreal and Quebec.[22] In late 2015 Enbridge successfully completed this strategy to reach eastern Canadian refineries[23]—making Line 5 a piece of Canadian infrastructure that serves as a shortcut through Michigan and the Great Lakes, putting the Mackinac Straits at risk.



A vast network of pipelines serves refineries in the Great Lakes region. The rejected Energy East pipeline would have duplicated the Enbridge Great Lakes Line 5 short cut by transporting western Canadian oil to eastern Canadian refineries within Canada.

Enbridge’s website makes clear the beneficiaries of this strategy: “The company’s Eastern Canadian Refinery Access Initiative has helped Canadian refineries become more competitive in the North American market, and continues to safeguard jobs in Quebec and Ontario and bolster the security of Canada’s energy supply.”[24]

The completion of this strategy happened over several years, and was the result of several related pipeline expansion projects that Enbridge successfully marketed as independent maintenance and upgrade projects. Each project was permitted or approved separately, with no overall review or approval of the changing function of the pipeline system going through Michigan. These changes to the overall system, as described below, essentially evolved in plain sight, and fundamentally altered the basis for the Line 5 easement at the Straits—even as public attention was focusing on the risk.

Line 5 Capacity Increases—and Carries Only Light Crude Oil

When Line 5 began transporting crude oil in 1953, it was permitted to pump 300,000 barrels per day (bpd) of light crude oil and other light petroleum products.[25] In the following years, Enbridge has periodically increased the capacity through such changes as higher capacity pumps and chemicals that reduce the friction of oil moving through pipelines. In 2013 the pipeline capacity was increased from 490,000 bpd to the 540,000 bpd it now transports[26]—nearly double the original design capacity.

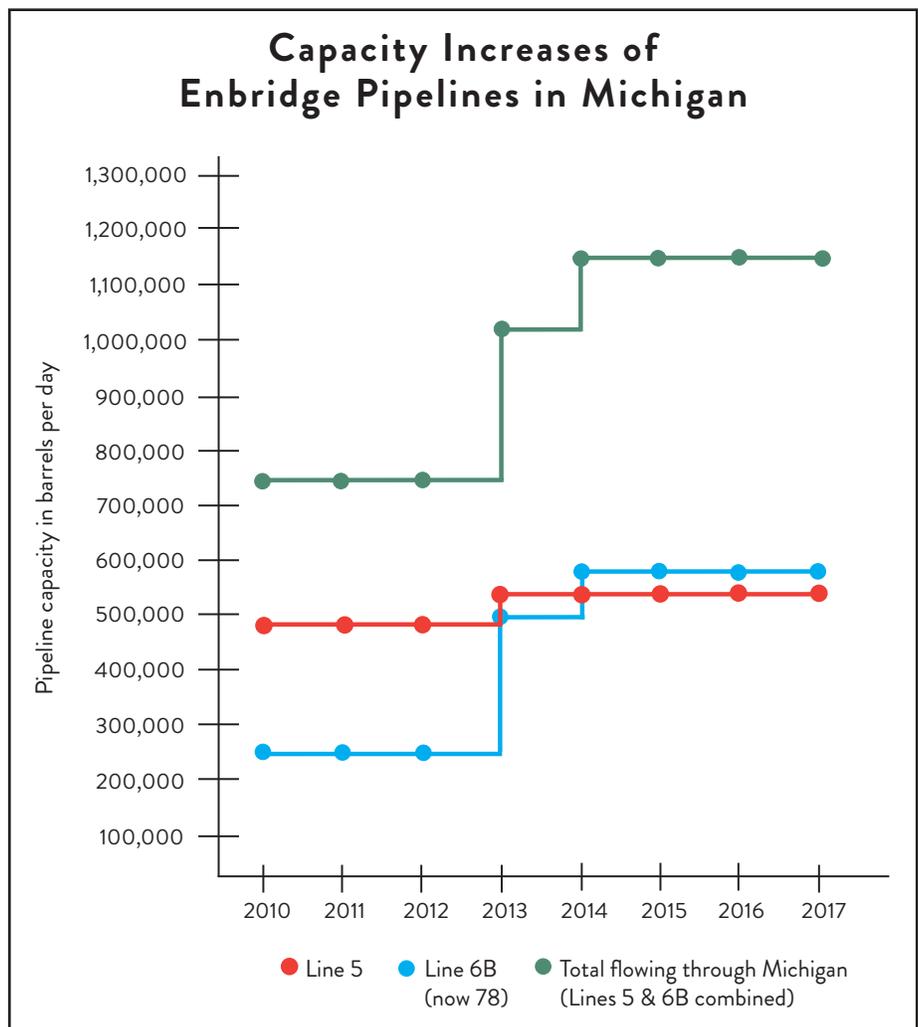
The change in Line 5 capacity over time is relevant to the scope of the Dynamic Risk alternatives analysis study. The consultants were told by Michigan’s Pipeline Safety Advisory Board to consider as a baseline assumption that they should only consider alternatives that could transport 540,000 bpd of oil.[6] Yet that amount of oil was never promised to Enbridge in the easement—nor is that oil being used by Michigan. Instead, a more reasonable approach to consider Line 5 alternatives would have been to study alternatives that satisfy Michigan’s current oil demand in a safe manner.

Line 6B Adds Significant Heavy Crude Oil Capacity for Michigan

More than a decade after Line 5 was constructed, Enbridge laid Line 61 (from Superior, Wisconsin, to Chicago) and Line 6B (from Chicago to Sarnia, Ontario). The two lines consist of over 687 miles of pipeline that start and end in the same locations as Line 5, effectively duplicating Line 5 on a different route.

In 2010, it was Line 6B that spilled more than 1 million gallons of heavy crude oil into the creeks and rivers near Marshall, Michigan. The catastrophic environmental disaster of the Kalamazoo River pipeline rupture has cost \$1.2 billion to clean up thus far, closed the river to the public for two years, left lasting contamination, and impacted the lives of thousands of people. [1] Despite that destruction, when Enbridge proposed a reconstruction plan, the company capitalized on the catastrophe. The firm more than doubled the pipeline’s capacity as part of the Eastern Canadian Refinery Access Initiative strategy to move excess oil beyond Michigan to eastern Canada.[1]

In 2013, Michigan approved the major capacity upgrade for Line 6B to allow as much as 800,000 bpd. Regulators reasoned that “it would be in the public interest to replace the existing line 6B with the new project, which would address the integrity issue, reduce future maintenance digs, and increase capacity to serve the present and future needs of shippers and refiners.”[27] Enbridge was allowed to classify the work as “replacement” rather than “expansion,” which enabled the company to circumvent important



Since 2010 Enbridge has completed major increases to capacity of both Line 5 and Line 6B (78). Line 6B (78) is designed to allow up to 800,000 bpd, which would be an increase of more oil than Line 5 currently carries.

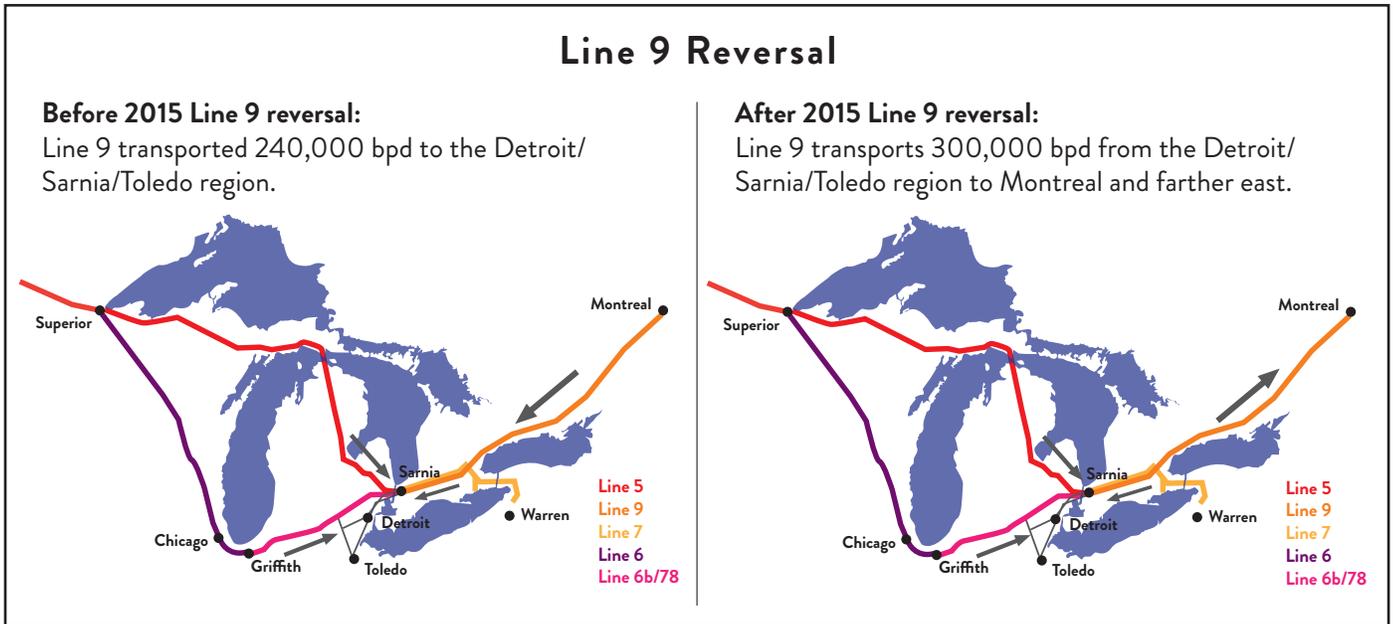
environmental review steps while increasing the line capacity from 240,000 bpd to 500,000 bpd. In 2014, the capacity of Line 6B was increased again, to 570,000 bpd, and renamed Line 78.[28]

Line 78 is constructed so that eventually, with greater pump capacity, it could increase to 800,000 bpd[28]—an increase of 560,000 bpd since 2010—or more oil than Line 5 currently carries.

Line 9 Reversal to Montreal — Canada’s Final Piece in the Plan to Move Oil East

An essential project needed to complete the Eastern Canadian Refinery Access Initiative—pumping light crude to eastern refineries—involved reversing the flow of Line 9, a pipeline within Canada. For years Line 9 transported Saudi Arabian and other OPEC oil that arrived on tankers at ports in Montreal, pumping oil west to refineries in Sarnia and the Midwest. But as the final piece in Enbridge’s Eastern Access strategy, in December 2015, Enbridge reversed the flow of Line 9 and expanded the pipeline’s capacity, so that Line 9 now pumps 300,000 bpd of light crude Canadian oil eastward to refineries in Montreal and Quebec. [23] The Line 9 reversal completed the final important connection that allows western Canadian oil to flow freely to eastern Canadian refineries through a shortcut in the Straits of Mackinac.

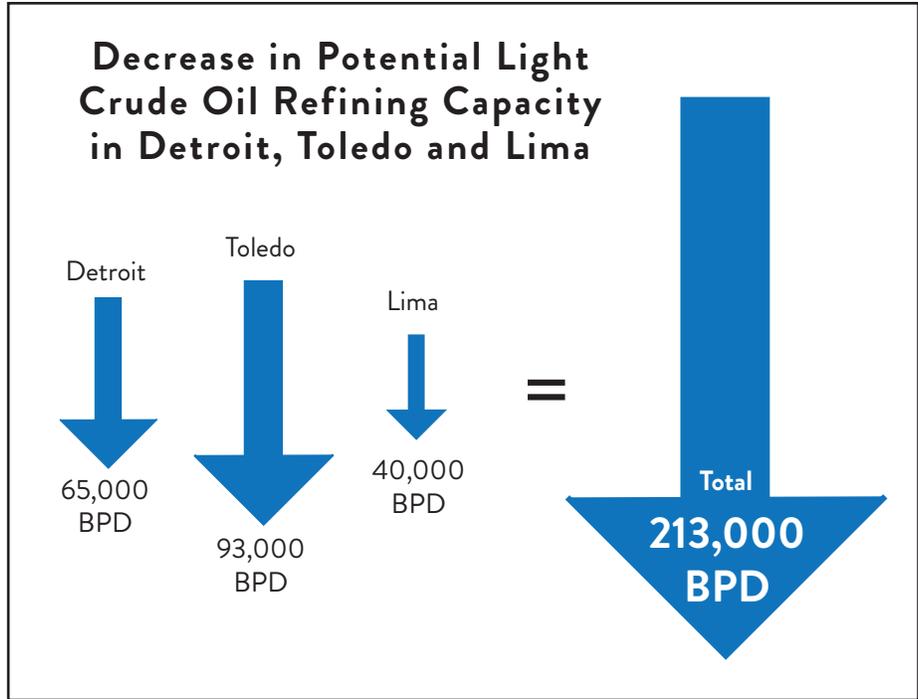
This project was celebrated in Canada as a job-creator and is described as “critical to Quebec’s refining and petrochemical industries.”[24] And while the completion of the Eastern Access Initiative has always been described as benefiting eastern Canadian refineries, recent Enbridge investor communications state that the company’s ultimate goals are to expand the reach into export markets.[22] The company never mentions benefits to Michigan businesses or jobs.



Refinery Transitions: Midwest Refineries Sharply Reduce Use of Line 5’s Light Crude

In recent years, the U.S. refineries that serve Michigan have transitioned their equipment to handle primarily heavy crude oil and significantly less light crude oil. This is especially relevant because Line 5 does not transport heavy crude oil. In 2015, Enbridge signed a deal with the State of Michigan agreeing that heavy crude oil, also known as diluted bitumen (dilbit), would never flow through Line 5.[28]

Prior to recent process changes, the Detroit Marathon refinery took in 80,000 barrels of light crude daily and 20,000 barrels of heavy crude.[29] Today, however, the refinery takes in 100,000 bpd of heavy dilbit crude and just 15,000 bpd of light crude—some of which comes from Line 5—a reduction of 82 percent in the type of oil Line 5 carries. Line 78 (formerly Line 6B) now primarily transports heavy tar sands crude, which is now the primary type of oil used by the refineries serving Michigan.



The refineries providing gasoline to Michigan include Marathon (Detroit), as well as refineries in Toledo and Lima, Ohio. These refineries have also sharply reduced their use of Line 5’s light crude oil. Toledo’s BPF refinery reduced light and medium crude capacity by 93,000 bpd[30] while increasing capacity for heavy crude. Lima’s refinery reduced light and medium crude capacity by 40,000 bpd[31], while increasing capacity for heavy crude.

The three refineries that receive oil from Enbridge pipelines and that also serve Michigan have transitioned equipment to handle much more heavy crude oil and much less light crude oil. Line 5 transports only light crude oil.

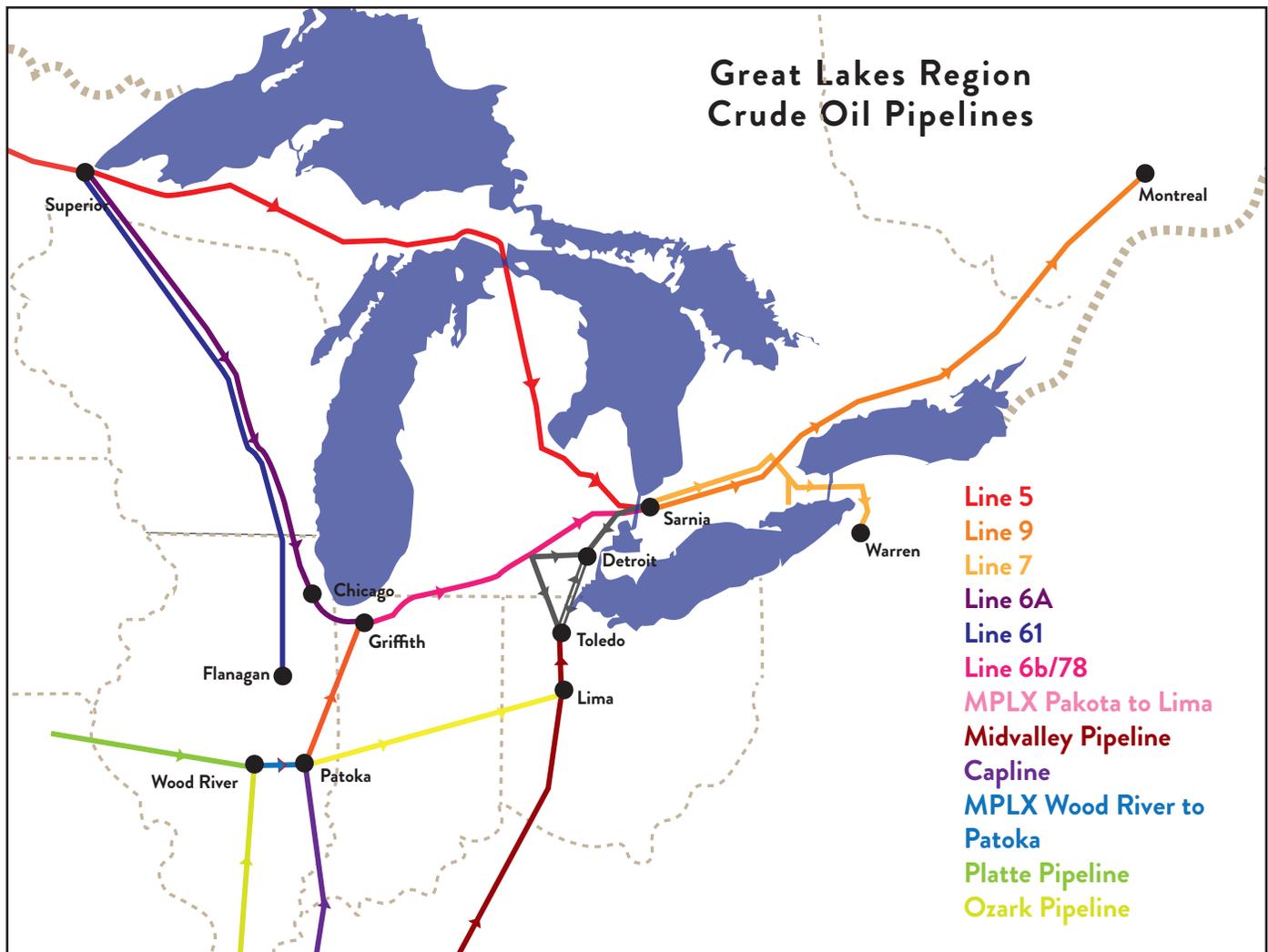
Though much of Line 5 oil is refined in Sarnia, Ontario, which is on the Canada-Michigan border, according to federal trade receipts there were no imports of finished motor gasoline, aviation gasoline, and kerosene from Sarnia into the U.S. According to Dynamic Risk’s alternatives analysis, “The majority of Line 5’s throughput is delivered to Sarnia terminals, where it is then transported to refineries in Ontario, New York State, and Quebec.”[6]

The Growing and Dynamic Pipeline System Can Meet Oil Needs of Michigan and Midwest

A 2017 report prepared by the Great Lakes Commission studying the status of crude oil infrastructure in the Great Lakes summarized the system this way:

“The crude-oil infrastructure has evolved over time, and continues to do so; as one source of crude oil depletes, another new source has always taken its place.”[32]

Pipelines to the south of Michigan have plenty of capacity to fill in the small gaps in Michigan’s energy supply network that the decommissioning of Line 5 would create. In fact, there is already more than enough oil to supply regional refineries without the use of the Line 5 pipeline. Cumulatively, pipelines

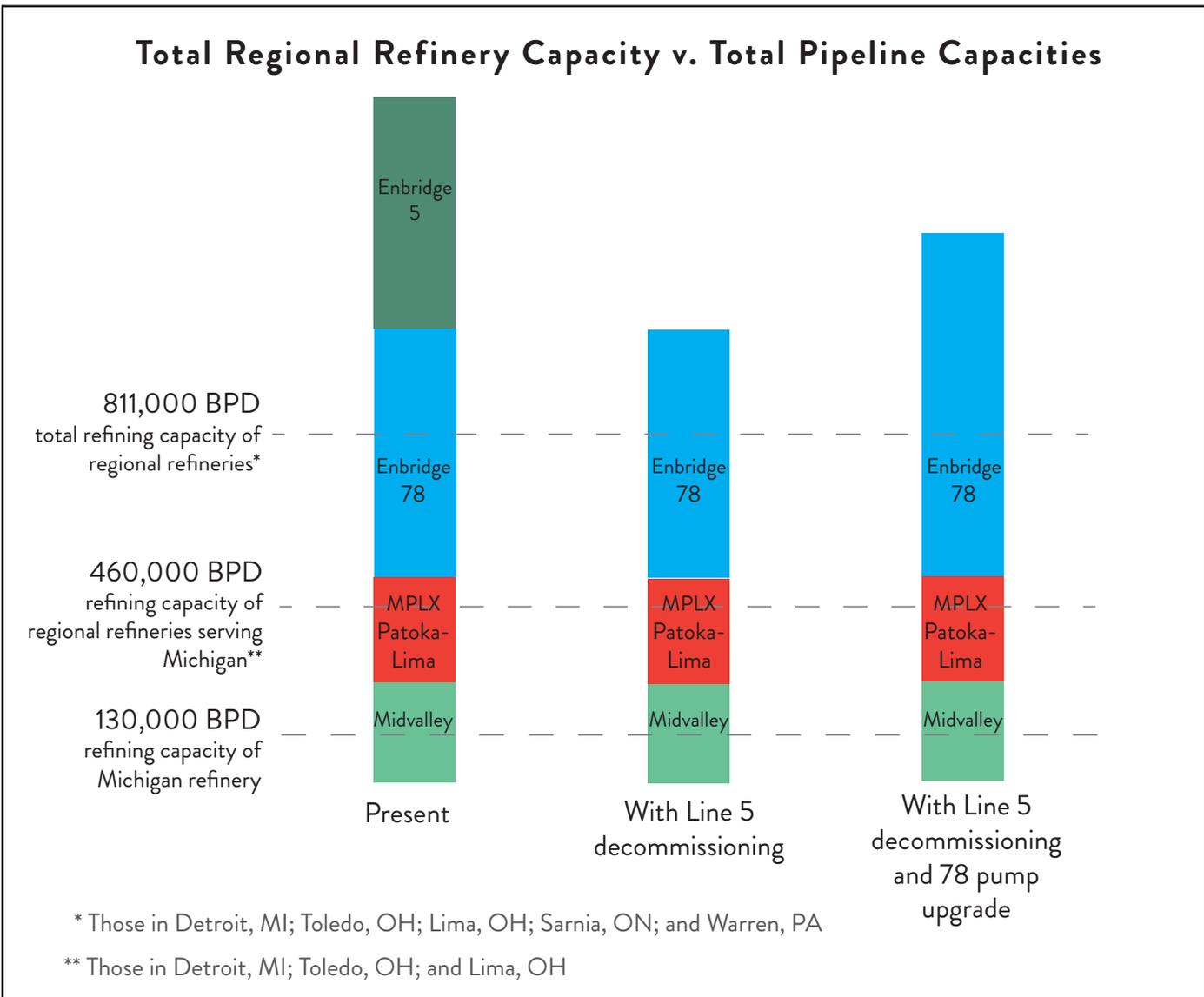


A vast network of oil pipelines in the Great Lakes Region is able to meet refinery demands for Michigan and the Midwest.

coming into the Detroit/Toledo/Sarnia region—Enbridge Line 5, Enbridge Line 78, Midvalley and MPLX Patoka to Lima—have the capacity to bring in 1,599,000 bpd.[33][34][35] In contrast, refineries in the region (Detroit, Toledo, Sarnia, and Warren) only have capacity to refine 811,000 bpd.[51] Even without the 540,000 barrels of oil per day with Line 5, there would still be an excess of 248,000 bpd. Further, should only refineries that serve Michigan be considered (should refineries in Sarnia, ON and Warren, PA be excluded from the count), the cumulative refining capacity of these refineries would be only 460,000 bpd, demonstrating a regional excess of 599,000 bpd.

Dynamic Risk’s alternatives analysis examined the impacts of a complete decommissioning of Line 5 on Michigan consumers and estimated that the cost per gallon of gasoline at the pump would increase in Michigan by two cents per gallon.[6] Assuming 14,000 miles per year (an average annual mileage for family cars) and 22 miles per gallon (average of today’s cars on the road), the cost increase per car would be \$1 per month. Of course, gasoline prices regularly fluctuate much more widely than that for reasons that are completely disconnected to Michigan’s environment and economy. This small increase of two cents per gallon would not be created by a supply/demand shift, but rather it would be created by a change in tariffs, [6] an element of the complex economics of oil transportation.

Current Capacities of Pipelines Serving Midwest Refineries in bpd:	Demand of Refineries That Serve Michigan and Are Connected to Line 5 in bpd:	Refineries That Do Not Serve Michigan and Are Connected to Line 5 in bpd:
Enbridge Line 5 540,000	Detroit Marathon 130,000	Shell Sarnia 75,000
Enbridge Line 78 (formerly 6B) 570,000	BPF Toledo 170,000	Suncor Sarnia 75,000
Midvalley Pipeline 249,000	BP Husky Lima 160,000	Imperial Sarnia 121,000
MPLX (Potoka to Lima) 240,000		United Refining Co. Warren PA 70,000
<i>Pipelines coming into the Detroit/Toledo/Sarnia region have a capacity of 1,599,000 bpd.[33]</i>	<i>Total demand for crude oil from U.S. refineries connected to Line 5 is a mere 460,000 bpd.[34]</i>	<i>The total refining capacity of refineries connected to Line 5 in the US and Ontario is 811,000 bpd.[35]</i>



Even without the Line 5 pipeline, more than enough oil moves into the Detroit/Toledo/Sarnia region to serve regional refineries.

Further, Enbridge continues to add capacity to their pipeline network. The case of Line 61 displays Enbridge’s adroitness in expanding pipeline capacity. Enbridge recently expanded the pipeline which runs adjacent to Line 6 through Wisconsin and then splits off to Flanagan, Illinois, as opposed to traveling east to Griffith, Indiana which is where Line 78 begins. Enbridge expanded Line 61 from 400,000 bpd to 931,000 bpd, an increase of 531,000 bpd. Plans are underway to expand the capacity of Line 61 further, to 1.2 million bpd.[36]

While the expanded Line 61 does not currently tie directly into Michigan’s Line 78, the potential exists to make the connection to increase the feedstock supply to refineries in the Midwest, Canada and other states, or to export through to the East Coast.

Summary: Line 5 Is Now a Convenient and Lucrative Shortcut for Canada

Today, expanded production in North America means there is far more oil being transported through the Great Lakes region than there is capacity to refine here. Enbridge’s Eastern Canadian Refinery Access Initiative has been a successful strategy, capitalizing on the excess pipeline capacity and directing crude oil toward refineries in Montreal and Quebec. Line 5 is a linchpin in this strategy, serving as a shortcut through the Great Lakes that moves light crude oil to meet Canada’s oil needs—but the line is no longer necessary for Michigan.

Enbridge has effectively obfuscated the issue, diverting public attention from the fact that Line 5 now primarily serves Canada. Yet it is not difficult to lift the veil to see how Line 5 no longer benefits Michigan, and that Michigan’s oil needs could be easily met without Line 5. In summary:

1. The oil brought into Michigan by Enbridge pipelines alone has increased since 2010 by 380,000 bpd, and the lines have the capacity to increase by a total of 610,00 bpd—which is more than Line 5 currently carries. Even without the pipelines of other companies serving the region, Enbridge has sufficiently increased oil supply capacity to meet Michigan and Midwest oil needs without Line 5.
2. Enbridge has pledged to Michigan that Line 5 will not carry heavy crude oil, yet heavy crude is what’s needed most by refineries servicing Michigan. Line 5’s “light crude only” restriction effectively guarantees the line’s oil is primarily destined for Canadian refineries that mostly refine light crude.
3. The redirection of the Line 9 pipeline provides clear evidence that Line 5 is now operating as a Great Lakes shortcut for Canadian oil to supply refineries in Montreal and Quebec, and is not necessary for Michigan.

Taken together, these facts make it clear that Line 5 primarily serves Canada’s oil needs, not Michigan’s.

V. SOLUTIONS FOR TRANSPORTING OF U.P. PROPANE AND MICHIGAN-DRILLED OIL AFTER LINE 5 CLOSES

Line 5 does provide two important benefits to the people of Michigan: the delivery of critical propane to the residents of the Upper Peninsula, and the transport of crude oil from oil fields in northern Lower Michigan to market. There are several viable alternatives to ensure that these significant Michigan needs

could be met even when Line 5 is decommissioned. Surprisingly, Michigan officials have identified these issues but have done very little to research or take action to ensure that these needs are met.

From an energy security standpoint, it's important to have viable backup plans should the primary source be rendered inoperable. A major spill anywhere along the aging Line 5 pipeline would take it out of commission for several months, jeopardizing the residents of the U.P. and stranding northern Michigan oil. Michigan officials should immediately be pursuing alternatives for meeting these energy needs, especially given the vulnerable nature of Line 5.

Providing Propane to the Upper Peninsula

Currently, natural gas liquids transported by Line 5 are processed into propane at a U.P. facility in Rapid River, about 15 miles north of Escanaba and Lake Michigan's Little Bay de Noc. The state-commissioned Dynamic Risk alternatives report identified several options other than Line 5 for providing propane to the Upper Peninsula, including truck, rail and a new replacement natural gas pipeline from Superior, Wisconsin, to Rapid River, Michigan.[6]

The report estimates that 15 trucks per day could replace the propane transported to the U.P., and with advance notice these trucks could be available to meet customers' needs this winter. It also indicates that 35 railcars a week could provide for the U.P.'s propane needs. Another viable option mentioned within the Dynamic Risk report that has not been publicly considered is the construction of a new 4-inch pipeline in the same right of way that Line 5 uses, but that would end in Rapid River and not cross the Straits. While this has not been fully studied, it could be a safe, permanent solution for U.P. residents.

Estimated consumer propane price increases from truck and train options range 10–25 cents per gallon for U.P. residents. The estimates are conservatively high but well within usual year-to-year market fluxes.[6] The Governor and Michigan Public Service Commission have options to help control propane prices, as well as ensure state low-income energy assistance and emergency relief funds are fully available to U.P. residents to ensure that they do not financially suffer as a result of a Line 5 decommissioning. In 2013 Governor Snyder implemented similar measures in response to U.P. propane shortages created by national supply shortages.

Groundwork calls upon the Snyder administration and the Michigan Public Service Commission to implement a strategy to provide affordable propane to U.P. residents before this winter and remove the fear of propane shortages or price spikes that have been inappropriately raised by Enbridge as a rationale for keeping Line 5 at the Straits.

Delivering Crude to Market from Northern Lower Peninsula Oil Wells

Upon the decommissioning of Line 5, oil wells in northern Lower Michigan would need to find other ways to transport their oil to southern Michigan markets—an average of approximately 7,000–12,000 bpd, which is staged at the crude oil terminal in Lewiston, Michigan. To convey the oil by truck would require 30 to 50 tanker trucks each day and would add approximately \$2.40 per barrel. An option provided within the Dynamic Risk report is the construction of an 8-inch pipeline that could be built in the existing Line 5 easement, but would head south and not cross the Straits. The Dynamic Risk report mentions this option but does not provide construction cost data.

Groundwork calls upon the Snyder administration and the Michigan Agency for Energy to develop alternative solutions to transport Michigan oil to market before winter.

VI. LINE 5 IS NOW A HIGH RISK, LOW REWARD DEAL FOR MICHIGAN

No successful businessperson would continue in an arrangement that massively risks a vital asset, while the other party in the deal receives nearly all of the financial benefit. Yet this is precisely the deal that Michigan's leaders continue to accept for our state by allowing Line 5 to pump oil through the Straits as a shortcut to Canada. The benefits that Line 5 does provide Michigan—transporting U.P. propane and Michigan-derived crude oil—can be maintained with other transportation means.

Canadians Will Not Risk a Pipeline on Their Soil— Why Should Michigan Risk Our Great Lakes?

The Canadian petrochemical industry, especially refineries in Montreal and Quebec, are literally banking on Line 5 remaining open as a linchpin in their Eastern Access Initiative. Line 5 has become such a critical element of their strategy because Canadians have not been willing or able to construct new pipelines in their own country.

Several Canadian pipeline projects have been proposed over the past decade that would transport Canadian oil across Canadian territory to coastal markets—but none have been approved. Citizens there raise strong environmental objections to pipeline projects crossing inland rivers, streams, and other environmentally sensitive areas.

Last fall, Enbridge competitor TransCanada announced that it was terminating its proposed Energy East pipeline that would have been direct competition to Enbridge's Eastern Canadian Refinery Access Initiative. The proposed pipeline would have provided Canada's only direct connection between western Canadian oil fields and eastern refineries within the nation's boundaries. However, the company cancelled the project, citing "changed circumstances." [37]

On the West Coast, another Enbridge competitor, Kinder Morgan, has been halted by the provincial British Columbia government from completing its Trans Mountain pipeline project, which would have transported Alberta tar sands crude to Vancouver. A fierce debate is still underway between provincial interests in British Columbia and Alberta, with the federal government attempting to intercede. To date, environmental concerns in British Columbia prevail. [38]

The Enbridge Eastern Canadian Refinery Access Initiative, which was completed in 2016 with the reversal of Line 9, remains Canada's only direct transport between western oil fields and eastern refineries. However, the eastern flow of oil relies heavily on the Line 5 shortcut through Michigan's Straits of Mackinac. Canada is unable to construct a pipeline to ship its own oil to its own refineries, and is relying on Michigan to continue to take the risk of Line 5 in the Straits on its behalf.

Governor Snyder's Misguided Proposal to Build a Straits Tunnel for Canada

In November 2017 Governor Rick Snyder expressed frustration with Enbridge's lack of transparency and management of the protections for Line 5 in the Straits. And then he stepped ahead of his appointed

Pipeline Safety Advisory Board and independently negotiated an agreement with Enbridge that directed them to study a replacement of Line 5 in the Straits.[7] Following the April 1, 2018, ship's anchor strike, Snyder called on Enbridge to expedite the study of a tunnel for Line 5 in the Straits. Snyder was recently joined by Attorney General Bill Schuette, who is a gubernatorial candidate, in support of encouraging Enbridge to build a tunnel in Michigan's Mackinac Straits.

Our state leaders' rush to help a Canadian company build a tunnel for Line 5 to move Canadian oil through the most iconic and vulnerable area in the Great Lakes is completely unjustifiable when considering how little the pipeline benefits Michigan. This proposal becomes more unfair to Michigan when one notes Canada's unwillingness to construct a pipeline in Canada because of environmental concerns.

Many observers consider a tunnel proposal as a stall tactic that will allow Enbridge to continue its Eastern Canadian Refinery Access Initiative and Straits shortcut, and allow state leaders to support measures that appear to better protect the Great Lakes. A pipeline tunnel under the Great Lakes would undoubtedly be subject to extensive environmental review, and likely environmental challenges that would take many years to resolve. Some preliminary estimates for the time necessary to design and construct a project of this magnitude are at least seven years.[39] Environmental and legal challenges would add many more years. Meanwhile, a nearly 70-year-old pipeline would continue to imperil the Mackinac Straits.

VII. MICHIGAN NEEDS COURAGEOUS ACTION FROM OUR LEADERS

The case is strong for Michigan to terminate Enbridge's easement and not replace Line 5 because it is no longer in Michigan's interest. Yet it will take extraordinary political courage for Michigan's governor and attorney general to take that action. Enbridge is the largest energy infrastructure company in North America, and it wields tremendous financial and political influence among state and federal officials. The company is exerting that influence today. The company will most certainly put up a costly legal challenge of decommissioning Line 5 at the Straits and would likely be joined by others in the powerful oil industry.

The courage for action must come from the citizens of Michigan. Fortunately, it is not unprecedented for Michigan leaders to take bold action to protect the Great Lakes from an oil spill. In the 1990s, a Canadian oil firm proposed to drill for oil under the Great Lakes. In the face of very strong public opposition, a compromise was struck that favored a technological solution—to allow slant-drilling under the lakes from rigs placed at least ¼ mile from the shoreline. While many environmental groups were prepared to accept the compromise, a Republican legislature stunned them by holding strong and passing a law that banned all oil drilling in, on, or under the Great Lakes. It became law in 2002 under Governor John Engler, and stands to this day as a reminder that Michigan's leaders understand the deep importance of the Great Lakes to Michiganders.

CALL TO ACTION FOR MICHIGAN'S LEADERS

Based on the analysis in this white paper, Groundwork calls on Governor Snyder and Attorney General Bill Schuette to:

- Immediately revoke the Enbridge easement allowing Line 5 in the Straits of Mackinac, based on the enormous risk to our environment and economy, and many easement violations;
- Discontinue efforts to study a tunnel under the Straits that would primarily serve Canadian interests;
- Ensure that residents in the Upper Peninsula have access to affordable, reliable propane this winter;
- Ensure that oil from northern Michigan oil wells can be safely transported to market.

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