Liquid Pipeline: Extreme energy's threat to the Great Lakes and the St. Lawrence River

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Measurements

Measurements in this report use a variety of units, often dependent on the source of the information presented. In some cases, a converted measurement is offered in brackets. The most frequently used units of volume for liquid petroleum products are listed below, converted to litres:

1 Gallon (U.S.) = 3.785 litres

1 Barrel (U.S.) = 158.99 litres

1 rail carload* = max. 131,000 litres

* The DOT 111 – the most commonly used tank car in the U.S. and Canada – has a maximum capacity of 131,000 litres. For more information, see: wikipedia.org/wiki/DOT-111_tank_car

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"Water is speaking to us but are we listening? We are all treaty people – a piece of us is dying. Complacency and ignorance are no longer acceptable. We have to be the voice for generations to come. Our grandchildren will look back and ask 'Why did they not act to save our precious water?' I want to be able to look in the mirror and know that I did my best."

– Chief Kaghee, Saugeen First Nation, on the shores of Lake Huron

Executive Summary

This report details plans to transport dangerous new forms of energy – as well as the waste from more traditional forms – around, under and on the Great Lakes and the St. Lawrence River. It is also a call to action to stop these plans before it is too late.

Production of unconventional energy in North America is exploding and so are the transport routes to carry it. The tar sands of Alberta are producing far more bitumen than can be sold in Canada. If current expansion plans are realized, the tar sands could one day be producing 5 million barrels (800 million litres) of heavy crude – the dirtiest oil on Earth – a day. This would eventually require an additional 14,000 kilometres of pipelines to carry the oil to export markets. Refining of tar sands crude in American refineries has also exploded; there are now 66 U.S. refineries processing Alberta bitumen, the majority of which are located in states within the Great Lakes Basin.

Equally expansive is the practice of fracking. Since 2005, more than 82,000 fracking wells have been drilled or permitted in the U.S. If the shale gas reserves in the land areas of just four Great Lakes states are developed, total water withdrawals to service these operations could exceed 37 billion gallons (148 billion litres) a year. The chemicals used in these fracking operations pose a direct threat to the water of the Great Lakes as well as the health of millions people who depend of them for drinking water.

The energy industry has huge plans to move these energy supplies. Canadian rail shipments of crude oil grew from 6,000 carloads a day in 2009 to more than 14,000 in 2013. In 2012 alone, there was a 300 percent increase of oil transport by rail in the U.S. The American Petroleum Institute says that there are over 18,000 miles (29,000 kilometres) of new crude pipelines planned in the U.S. by 2018, much of it in the Great Lakes region. And planned expansions of existing pipelines are such that even if the Keystone XL pipeline is not approved, Alberta bitumen will still flow south in unprecedented amounts. Line 67, the Alberta Clipper, will carry more crude than Keystone if its plans for expansion are approved. Even the aging Line 5 – twin underwater pipelines that run under the Straits of Mackinac – are to carry Alberta crude in growing amounts.

The newest way to transport bitumen, fracked oil, fracking wastewater and nuclear waste is by water. Plans are in the works to transport these forms of extreme energy on barges and tankers across the Great Lakes to refineries in the south or down the St. Lawrence River to refineries there, for export. The American Petroleum Institute predicts that capital investment in marine transport of crude oil will jump 73 per cent by 2025. The U.S. Coast Guard has recently come out in favour of marine transport of fracking wastewater.

Events are moving rapidly to establish the Great Lakes and the St. Lawrence River as a carbon corridor for a newly aggressive North American energy industry. This poses the greatest threat yet to these waters.

Introduction

The Great Lakes of North America form the largest group of freshwater lakes in the world, holding more than 20 per cent of the world's surface freshwater and 95 per cent of North America's. Add to this the groundwater underlying and feeding the Great Lakes or its tributary streams and lakes, and the percentage is closer to 25 and 97 per cent respectively. Two Canadian provinces – Ontario and Quebec – and eight U.S. states: Minnesota, Wisconsin, Michigan, Illinois, Indiana, Ohio, Pennsylvania and New York, border the Lakes and the St. Lawrence River, which is their primary flow outlet to the Atlantic Ocean. As well, there are many indigenous territories with governance and treaty rights. The Great Lakes have a unique biodiversity and are home to more than 3,500 species of plants and animals.

The Great Lakes were formed more than 20,000 years ago when the last glacier continental ice sheet retreated. The Great Lakes provide life and livelihood to more than 40 million people and are the economic centre at the heart of the continent.

The Great Lakes are in serious trouble. Multipoint pollution, climate change, over-extraction, eutrophication, invasive species and wetland loss are all taking a terrible toll on the watershed that provides life to so many people and species. Once thought to be immune to the water crisis that threatens other parts of the world, the Great Lakes are a source of growing concern as residents watch their shorelines recede, their beaches close and their fisheries decline.

There are many environmental and community groups as well as elected officials in all the various political jurisdictions sounding the alarm about these threats. The International Joint Commission (IJC), established to regulate shared water, uses of the watershed, and investigate and solve transboundary disputes, oversees the Great Lakes Water Quality Agreement that establishes management plans for each lake. The IJC closely monitors water quality, water level fluctuations and invasive species.

There is a newer threat to the Great Lakes that has not received anywhere near the attention or concern it deserves.

While the IJC and the Canadian and American governments have all been criticized for not taking strong enough action on these well-known and very serious threats to the Great Lakes and the St. Lawrence River, the threats are on their radars and are well established in the public consciousness. However, there is a newer threat to the Great Lakes that has not received anywhere near the attention or concern it deserves: the increased production and transport of unconventional or "extreme" energy sources on, under or around the Great Lakes.

My 2011 report, *Our Great Lakes Commons: A Peoples' Plan to Protect the Great Lakes Forever*, called for an exciting new proposal to designate the Great Lakes and its tributary waters as a lived Commons to be shared, protected, carefully managed and enjoyed by all who live around them. Since then, an increasing number of people and communities have taken up the call to become stewards of the Great Lakes and the St. Lawrence River. Plans to use this watershed as a carbon corridor for the dirtiest forms of energy on Earth threaten this Commons as never before.

Extreme energy

As conventional sources of energy are drying up all over the world, new, more intensive and environmentally destructive energy extraction methods are being used to provide for increased energy demands. According to the Extreme Energy Initiative, a project of the Human Rights Consortium of the University of London in England, "extreme energy" is a group of energy extraction methods that grows more intensive over time, and that is strongly correlated with damage to both the environment and society.

Examples of extreme energy extraction include: tar sands open-pit mining, mountaintop removal, deep water and Arctic drilling, and hydraulic fracturing (fracking) for shale gas and coal bed methane. Biofuels can also be included, as they constitute a form of energy production that requires large amounts of water and the removal of land for food production.

The Human Rights Consortium warns that extreme energy poses a threat to civil and human rights. It notes examples of rights violations connected to conventional fossil fuel extraction, such as against the Ogoni people of southwest Nigeria and the Kichwa people of the Ecuadorian Amazon. Further threats to human rights from extreme forms of energy extraction include the right to water, the right to health, the right to information about the potential effects of these industries, the right to protest, and indigenous rights to free, prior and informed consent.[1]

As well, there are serious environmental implications of extreme energy extraction methods. Extreme energy uses much more energy to produce. As Canadian journalist and energy expert Andrew Nikiforuk points out, fuels that require lots of energy to make energy ultimately provide fewer returns to society. At the beginning of the hydrocarbon era, it took one barrel of oil to find and liquidate 100 barrels of oil, resulting in an energy return on energy investment ratio of 100 to 1. This ratio steadily dropped as the deposits of easily accessible oil and gas were depleted. The ratio for U.S. oil production is now approximately 11 barrels to 1. For extraction of Alberta tar sands oil, the ratio is 7 to 1, and drops to 3 to 1 after it has been upgraded and refined into something useful, such as gasoline. This, says Nikiforuk, makes bitumen a "pathetic and tragic" source of energy.[2]

An oil refinery in Sarnia, Ontario.

The threat of extreme energy to the world's vulnerable water supplies is very real. Large-scale water consumption combined with massive pollution from extraction methods are harming watersheds around the world. Extreme energy extraction, production and transport are about to put the Great Lakes of North America at risk.

Photo: Flickr user josullivan.59. CC BY-NC-SA 2.0

Photo: Eric Bégin via Flickr. CC BY-NC-ND 2.0

The oil tanker *Emerald Star* on the Beauharnois Canal, part of the St. Lawrence Seaway in Quebec.

Current petroleum shipments

Transporting energy over the Great Lakes is not new. Nearly 4 million tons of oil and petroleum products are shipped every year to and from Great Lakes ports in the U.S.[3] and more than 19 million metric tonnes to and from Canadian ports in the Great Lakes and the St. Lawrence River.[4] There is twice as much petroleum tanker traffic on Canada's east coast as on its west coast.

Most tankers are carrying Canadian energy exports. There is also heavy traffic in oil imports from countries like Venezuela to provide energy for Eastern Canada. Unifor, the Canadian union that represents energy workers, reports that more than 95 million tonnes of petroleum and fuel products are moved in and out of 23 ports in Atlantic Canada every year, and 23 million tonnes are moved in and out of Quebec's 39 ports. About 100 deep-sea oil tankers, each carrying close to 1 million barrels of oil, arrive at the Ultramar dock in Quebec City, bringing foreign crude for refining.[5]

Oil spills are common in both Canada and the U.S. Between 2007 and 2009 there were more than 4,000 oil spills in Canada alone.[6] Oil spills also happen on the Great Lakes, although their numbers have decreased in recent years due to preventive measures in both countries. In its November 2013 report, *Oil and Water: Tar Sands Crude Shipping Meets the Great Lakes*, the Alliance for the Great Lakes notes that there are 27 transport cargo vessels carrying oil and petroleum products plying the Great Lakes, and that there have been 220 petroleum-related spills from commercial vessels since 2003.

Between 2007 and 2009 there were more than 4,000 oil spills in Canada alone.

The most significant spill off Canada's east coast occurred in 1970, when the tanker *Arrow* spilled more than 10,000 tonnes of oil off Nova Scotia, about one-quarter of the amount spilled by the Exxon Valdez. In 2005, a large explosion aboard a tank barge carrying clarified slurry oil from Illinois to Chicago led to the discharge of 84,000 gallons (around 320,000 litres) of oil into the canal that links Lake Michigan and the Mississippi River.

Photo: Council of Canadians

Tar sands crude

Dangerous as these more conventional shipments may be to the Great Lakes, the greater threat is from shipments and spills of extreme forms of energy. Tar sands are a type of petroleum deposit containing sand, clay and water saturated with a dense form of petroleum called bitumen. With the consistency of molasses, to be useable the oil has to be separated from the mixture in a process that uses and destroys vast quantities of water – three to five barrels worth (or as much as 800 litres) – for every barrel of extracted oil.

Tar sands bitumen is heavy. To transport it by pipeline, chemical diluents are added. Unlike conventional crude, this diluted bitumen – or "dilbit" as it is commonly known – floats briefly in water, but then sinks as the light components evaporate, leaving the heavy components behind. Consequently, dilbit is substantially more difficult to clean up and poses a greater danger to watersheds than conventional crude.

On July 25, 2010 an Enbridge pipeline ruptured in Michigan and spilled almost 4 million litres of chemical-laced Alberta tar sands bitumen into the Kalamazoo River and surrounding wetlands. Damage to the river, the estuaries and the aquatic life was widespread and a number of families had to be evacuated. The clean-up expense has topped $1 billion and the damage is still widespread.[7]

According to the World Energy Council, more than 70 per cent of known global bitumen reserves are in Canada, most in northern Alberta. The deposits around Fort McMurray, Peace River and Cold Lake – the largest in the world – lie under 141,000 square kilometres of boreal forest (an area bigger than Scotland) and contain about 1.7 trillion barrels of bitumen, almost 2 million of which are processed every day. The governments of Canada and Alberta and the big energy companies have a $40 billion tar sands expansion plan. If they are successful, the operation will be producing about 5 million barrels (800 million litres) of the dirtiest oil on Earth every day and will require an additional 14,000 kilometres of pipeline to move it.

Tar sands bitumen destroys vast quantities of water when it's extracted.

Photo: Jason W Lacey via Flickr. CC BY-NC-ND 2.0

Tar sands exports

Canada exports about two-thirds of its oil, including Alberta tar sands crude, to the United States. The amount of Canadian tar sands crude refined in the U.S. grew almost five-fold between 2000 an 2010,[8] and another 40 per cent between 2010 and 2012.[9] The number of U.S. refineries processing tar sands bitumen increased from 57 to 66. *Mother Jones* climate reporter Tim McDonnell says that tar sands oil is already plentiful in the U.S. "It goes to fuel our cars and corporations' trucking fleets, and it's used in the production of products from aluminium cans to asphalt."[10]

The U.S.-based Natural Resources Defense Council says that by 2020, almost one-fifth of the gasoline supply in the Northeast and the Mid-Atlantic states could be derived from tar sands crude and will lead to an increase in greenhouse gas emissions of approximately 10 million metric tons, an amount that would offset most of the carbon pollution reductions that the region is seeking under its landmark Regional Greenhouse Gas Initiative.[11]

Such predictions are based on the assumption that this crude will get to market. But intense opposition to pipelines such as Keystone XL, which would ship to the U.S., and the Northern Gateway to the west coast of British Columbia, have caused governments and companies to seek other forms of transport for this energy. Rail transport of oil, much of it bitumen from the Alberta tar sands, has skyrocketed in Canada, up from 6,000 carloads in 2009 to more than 14,000 in 2013.[12] In 2012 alone, there was a 300 per cent increase in oil transported by rail in the U.S.[13] Experts predict that North American trains will carry as many as 2 million barrels (over 300 million litres) of crude every day by the end of 2014.[14]

Marine shipping of extreme energy

More recently, tar sands (and fracked oil) companies have started transporting product in ships. Using tankers to ship tar sands crude is considerably cheaper than shipping it by rail. Officials at Calumet LLC, owners of an oil refinery in Superior, Wisconsin, estimate that transport by ship is about one-third the cost of rail transport.[15] An estimated 40,000 barrels of heavy Canadian crude a day is loaded from pipelines onto barges in Wood Rivers, Illinois where it travels down the Mississippi River to the Marathon Petroleum Corporation's refinery in Garyville, Louisiana. There are now plans to expand this operation.[16]

Between 2011 and 2012, the amount of oil from the fracking fields of North Dakota and the tar sands of Alberta delivered to U.S. refineries by barge increased 53 per cent.[17] Enbridge is planning to carry North Dakota fracked oil by rail to Eddystone, Pennsylvania, near Philadelphia, where it will be transferred onto barges and shipped down the Delaware River to refineries. The American Petroleum Institute predicts that between 2014 and 2025, capital investment in marine transport of liquefied petroleum gas and natural gas liquids will increase by 32 per cent, liquid natural gas by 36 per cent, and crude oil by 73 per cent.[18]

More than 70 per cent of all tar sands crude refined in the U.S. is processed in the 26 refineries located in the American Midwest, 19 of them in the Great Lakes states, and nine located right on or very near the Great Lakes.[19] The Flint Hills refinery in Pine Bend Minnesota, owned by billionaire right-wing advocates Charles and David Koch, refines more tar sands crude than any other refinery in the U.S. Almost 80 per cent of the fuel purchased at gas stations in Minnesota now comes from the Alberta tar sands.

In addition, several refineries in Sarnia, Ontario, located right on Lake Huron, refine tar sands crude, piped in from refineries in Superior, Wisconsin and Chicago. Suncor Energy

The oil tanker *High Prosperity* passes Quebec City

Photo: Flickr user sandy.redding. CC BY-NC-SA 2.0

Inc. and Valero Energy Corp. are now importing U.S. Gulf Coast crude by tanker from Texas and Louisiana for their Quebec refineries. While at the moment, this oil is light crude, the Suncor plant is reviving plans to add a heavy oil-processing unit to its Montreal plant, which would allow it to process tar sands bitumen.[20] This network of Great Lakes refineries situates the watershed as an ideal route for tar sands transport.

Because of this network of refineries on or near the Great Lakes, there is intense and growing pressure to increase the flow of tar sands bitumen through existing and new pipelines and to transport it by barge and ship across the watershed.

As the Alliance for the Great Lakes reports, proposals are in the works that could make the Great Lakes the next frontier for moving tar sands crude to this vast network of local refineries. This, in turn, will open the door to shipping large volumes of this crude on the waters themselves. "With more tar sands crude coming to Great Lakes refineries, the pressure is mounting to find economical ways to move it out. Shipping it across the Great Lakes is a strong possibility." The Chicago-based conservation and education organization, which has been devoted to protecting the Great Lakes for more than 40 years, warns the Great Lakes are poised to become a "thoroughfare" for tar sands crude.[21]

Writing in *Maritime Executive*, a journal for leaders in the shipping industry, Canadian transportation journalist Harvey Valentine speculates that one day, a future water connection between Lake Superior and Lake Winnipeg will transport Alberta tar sands oil to the American inland waterway system at Chicago and Cleveland to move to markets in the U.S. and other markets via the St. Lawrence River.[22]

Suncor refinery in Sarnia where bitumen is processed.

Photo: Council of Canadians

Superior, Wisconsin's proposal to ship tar sands crude

One company is already making plans to ship large quantities of bitumen across the lakes in barges. Calumet, owners of the refinery in Superior, Wisconsin, says that the Upper Midwest is "awash" in oil and has more oil than capacity to move it. Manager Dave Podratz told the *Superior Telegram* that Enbridge, the Canadian pipeline company transporting the oil, can bring 500,000 more barrels a day into the refinery than it can send out.[23]

Recently, Enbridge sought permission to nearly double the capacity of its Alberta-Superior pipeline – Line 67, also known as the Alberta Clipper – to 800,000 barrels a day. Similar increases are now planned for a second Alberta-to-Superior pipeline – Line 3 – which could deliver 760,000 barrels of crude a day by 2017. To meet this inflow, Calumet built a huge new rail car oil-loading terminal allowing it to fill 100-car unit trains with oil headed to eastern refineries.

But this new rail capacity is still not enough. Calumet is proposing to build a $25 million crude oil transfer dock where bitumen from Canada, and Bakken crude from the fracking fields of North Dakota, will be loaded onto tankers and barges and moved across the Great Lakes to refineries in Ontario, Michigan, Ohio and the East Coast. The facility would be able to load one oil tanker or barge every four days and ship up to 13 million barrels (almost 2 billion litres) of oil every year. The dilbit – the most toxic oil on Earth – would not be refined before it is sent out across the waters of the Great Lakes.

Starting in Superior, Wisconsin, explains *Platts,* a journal that provides information on energy commodities, the crude would travel to Lake Michigan to access BP's 405,000 barrel-a-day Whiting, Indiana refinery, and from there, be shipped across the Chicago locks to ExxonMobil's 238,000 barrel-a-day refinery in Joliet, Illinois or to Citgo Petroleum's 167,000 barrel-a-day facility in Lemont. From Illinois, it could continue to Detroit, home to Marathon's 114,000 barrel-a-day refinery and then to the Sarnia, Ontario market. A crude-carrying vessel could navigate to St. Lawrence refineries in Montreal and Quebec.[24]

Community and environmental groups remain resolved to protect the Great Lakes' waters from oil shipments.

In January 2014, after holding public hearings, and in reaction to strong public opinion against this project, the Wisconsin Department of Natural Resources turned down a permit application from Elkhorn Industries to make repairs to the harbour pier that were needed before the proposed oil terminal could be built. While community and environmental groups expressed some relief at this decision, the company made it clear that it is still intent on moving ahead and dismissed the decision as applying only to repairs to the dock, not to the terminal itself.

The agency also left the door open for the company to come back with an "improved" application, expected in the spring of 2014, which would need to include more information than had been in the original proposal. It also ordered a comprehensive environmental assessment before any more work can proceed. The company said it would resubmit an application containing the necessary information.[25]

Community and environmental groups remain resolved to protect the Great Lakes' waters from oil shipments.

Governments unprepared for heavy oil spills

The Alliance for the Great Lakes reminds us that the Great Lakes are the source of drinking water for more than 40 million people and that in a clash between oil and water, the environment is always the loser. The Alliance also points out that even the safest, best maintained vessels face spill risks in loading cargo and sailing on the open water. Tar sands crude is more difficult to clean up than conventional oil because, as noted earlier in this report, it sinks to the bottom of water bodies.

The Alliance reports that the U.S. Coast Guard acknowledges that current methods for finding and recovering submerged oils are inadequate and that their "worst case" discharge scenario is based on a spill of conventional oil. Additionally, the Alliance points to the fact that Great Lakes ports were not designed to load and ship heavy tar sands crude. Also a concern to the Alliance is the fact that the U.S. Environmental Protection Agency (EPA) is not able to fulfil its responsibility to inspect and monitor facilities that have a reasonable chance of a discharge into navigable waters – there are about 64,000 of them. The last survey of petroleum-refining facilities was undertaken in 1995 and at that time, only about 39 per cent met EPA criteria. Obviously no one was looking at tar sands crude back then.

Several reports in Canada cite similar flaws in our country's ability to deal with major oil spills. In a strongly worded 2010 audit, Environment and Sustainable Development Commissioner Scott Vaughn said the Canadian government is not ready to handle a major oil spill, and that the Canadian Coast Guard had not done a national risk assessment of oil spills from ships since 2000, before tar sands oil started to be moved in bulk across the continent. He warned that the volume of hazardous and noxious substances being transported in Canadian waters is growing quickly, but said that the Canadian government has no plan to deal with the consequences of accidents.[26]

In December 2013, a panel set up to examine preparedness for tanker traffic carrying oil off the west coast found that Ottawa's oil spill response lacks federal leadership and is not prepared for disasters in high-risk areas.[27]

Conventional oil floats on top of water, but the surface sheen of tar sands crude oil belies the hidden disaster of a spill: tar sands and other heavy crudes sink to the bottom of a lake or river, making clean-up efforts difficult, or impossible.

Photo: Jason W Lacey via Flickr. CC BY-NC-ND 2.0

Gutting freshwater protection

Concerns should also extend to proactive moves by governments intent on promoting tar sands extraction and shipment. The Harper government has openly stated its support for expanded tar sands operations and gutted the most important freshwater protections in Canada in order to pave the way for the growth of the oil and pipeline industries.

The new Fisheries Act no longer protects habitat and is limited to preventing what it calls "serious harm" to commercial, recreational and First Nations enterprises. Changes to the Navigable Water Protection Act stripped federal government protection from more than 99 per cent of all lakes and rivers in Canada and specifically exempted major pipeline projects from review. Pipelines carrying heavy crude can now cross under or around more than 31,000 lakes and more than 2 million rivers without federal scrutiny. The Canadian Environmental Assessment Act was replaced with a watered down version that immediately resulted in the cancellation of 3,000 active assessments.

In late 2013, the Canadian government announced more than $100 million in cuts to the federal department in charge of protecting Canada's freshwater and oceans. It has also gutted the Canada Centre for Inland Waters, once considered one of the finest centres for fresh water management in the world that concentrated on the Great Lakes. After deep lay-offs, many of the remaining scientists have been reassigned to study the Alberta tar sands instead of the Great Lakes.

All of these changes were demanded by the energy industry, outlined in a letter to the Harper government obtained through an access to information request by Greenpeace Canada.[28] The gutting of Canada's freshwater heritage created a strong backlash, particularly among First Nations who are experiencing rampant exploitation by extractive industries on their traditional lands and waterways. Quite simply, said Lake Ontario Waterkeeper, "The Navigable Waters Protection Act no longer protects water. The Fisheries Act no longer protects fish. The Environmental Assessment Act no longer requires environmental assessments be done before important decisions are made."[29]

The Credit River, in Southern Ontario, is no longer protected by any federal legislation, but is at risk from the Line 9 pipeline.

Photo: Gary J Wood via Flickr. CC BY-SA 2.0

In February 2014, the Harper government delivered its second budget, that failed to allocate any new funding to the Great Lakes. "Contrast this to the $300 million that the Obama administration allocates annually to the Great Lakes Restoration Initiative," says Emma Lui, national water campaigner for the Council of Canadians.

concern over the dangers to the Great Lakes that the Superior, Wisconsin project – and others likely to follow – pose.

Sierra Club Wisconsin says this new regional tar sands network severely threatens the Great Lakes and is "sneaking in under the radar." Brent Patterson, political director of the

> "The Navigable Waters Protection Act no longer protects water. The Fisheries Act no longer protects fish. The Environmental Assessment Act no longer requires environmental assessments be done before important decisions are made."

Other governments are promoting local industries and refineries by allowing them to bypass environmental regulations. The BP refinery in Whiting, Indiana recently upgraded its facility to allow it to process tar sands oil, and asked the state government to allow it to continue dumping toxic waste into Lake Michigan. The Indiana government, citing the need for jobs, had made this "temporary" deal back in 2007 in order to support the company in its $3.8 billion expansion. But in July 2013, the state gave BP permission to increase its toxic dumping, allowing it to dump 54 per cent more ammonia and 35 per cent more toxic sludge into the lake. BP is also now permitted to dump 20 times the amount of mercury allowed under federal U.S. law.[30]

Faced with this kind of political support for tar sands transport and refining, as well as a lack of sufficient regulation to prevent disasters, environmental groups, First Nations and many local communities are expressing grave

Council of Canadians, notes that Canada has 3,000 kilometres of inland waterways and a federal government that has gutted their protection. He says the proposal to ship tar sands crude on the Great Lakes and the St. Lawrence River is "a dangerous equation for those of us who see the Great Lakes as a Commons, not as a tar sands and fracked oil shipping route."[31]

Andrew Slade, program coordinator for Minnesota Environmental Partnership, says that trying to curb tar sands shipments from Alberta is like trying to stop lava flowing from a volcano. He wonders whether the people of the region are prepared to see the strong gales of November threaten a floating tank of tar sands oil and asks, "Will a dock project in Superior be the next front in the global fossil fuel war?"[32]

Photo: Irekia - Eusko Jaurlaritza CC BY 2.0

Fracking frenzy

Aside from tar sands bitumen, another extreme form of energy threatens the Great Lakes. Fracking, short for "hydraulic fracturing," is a water-intensive and water-polluting process where a mixture of sand, chemicals and water is injected deep underground at high pressure to release natural gas from rock formations. Over the past decade, multi-stage, high pressure, horizontal fracking has exploded in North America and has transformed the political landscape where energy is concerned.

Since 2005, there have been more than 82,000 fracking wells drilled or permitted in the U.S.[33] Canadian journalist Andrew Nikiforuk reports that both EnCana and Chesapeake Energy, two of the largest shale gas companies, have assembled land bases equal in size to the state of West Virginia for shale drilling alone.[34]

In a December 2013 analysis of energy trends for the American Petroleum Institute, energy information experts from IHS Global report that in recent years, unconventional oil and gas activity, especially shale gas fracking, has thrust the country into an unexpected position. U.S. energy policy has shifted from a mind-set of dependence on growing imports to one of determination not just to be energy independent, but also to become a major exporter. The U.S. is suddenly experiencing rapid growth in crude oil production and, at 65 billion cubic feet per day, the U.S. has become the world's largest natural gas producer.[35]

The exponential growth of fracking has led to exponential growth in capital investment for oil and gas infrastructure – from pipelines and railways, to terminals and marine transport. Capital spending on oil and gas infrastructure increased 60 per cent between 2010 and 2013, says the American Petroleum Institute, and there is no end in sight. A "sustained period of high levels of oil and gas infrastructure investment," averaging more than $80 billion a year will continue to the end of the decade. By 2025, investments in the sector will total more than $890 billion (2012 dollars).

But fracking is deeply controversial because of the growing body of evidence that it endangers human health and is a major source of air and water pollution. Fracking contaminates water with the chemical cocktail used in the process. While the chemicals are under trademark protection and therefore considered trade secrets, a 2011 American study identified more than 600 chemicals used in fracking,

at least one quarter of which have been linked to cancer and mutations, and half of which can affect the nervous, immune and cardiovascular systems.[36] The chemicals include arsenic, lead, barium, strontium, toluene, xylene, radium-226 and benzene. The amount of benzene from a single fracked well can contaminate almost 400 billion litres (100 billion gallons) of drinking water.[37]

Since 2005, fracking in the U.S. has produced 2 billion gallons (8 billion litres) of toxic chemicals. In 2012, fracking created 280 billion gallons of toxic wastewater.[38] Between 2011 and 2013, nearly 300 oil spills occurred in North Dakota, and recent reports confirm that radioactive sludge is coming back to the surface of many of the fracking sites, mixing with freshwater across the state.[39]

Fracking also releases between 30 and 50 per cent more methane into the atmosphere than conventional gas. According to Dr. Anthony Ingraffea, a professor of engineering at Cornell University, methane gas is a powerful greenhouse gas that has a global warming potential 72 times greater than carbon dioxide, and contributes substantially to the greenhouse gas footprint of shale gas extraction.[40]

Fracking has brought environmental devastation and declining property values in many areas by polluting drinking water supplies, contaminating groundwater, and spilling toxins into rivers and lakes. There are a myriad of reports of livestock illnesses and deaths on farms near fracking wells and reports of earthquakes near sites of intense operations. People living downwind from fracking sites have reported eye, throat and nasal irritation, frequent nosebleeds, hair loss, unexplained rashes, chronic coughs, lung congestion and extreme fatigue. Children have developed asthma and tumours. The Fracking and Health Awareness Project of Nova Scotia warns that children's immature bodies are less able to metabolize some toxic substances and are therefore more vulnerable than adults when they are exposed.[41]

Tank cars snake across fracking country in North Dakota.

Photo: © Tristan Spinski

Photo: Sûreté du Québec via Wikipedia. CC BY-SA 1.0

Picture taken from a Sûreté du Québec helicopter of Lac-Mégantic the day of the derailment.

Fracked oil spills are deadly

In early 2014, the U.S. Department of Transportation issued a safety alert on the transport of fracked oil from the Bakken fields of North Dakota, saying that this type of crude may be more flammable than traditional heavy crude oil. As Andrew Nikiforuk reminds us, the frantic movement of fracked Bakken oil on Canada's poorly regulated rail system resulted in a catastrophic explosion that incinerated 47 people in Lac-Mégantic, Quebec in the summer of 2013. Major derailments have terrified rural communities in North Dakota and Alabama as well. A fiery December 2013 train collision near Casselton, North Dakota set off a blaze that engulfed at least 21 cars.

Nikiforuk reports that due to the unusual properties of fracked oil, its explosive flammability may, in part, be related to the large number of volatile chemicals and frack fluids such as diesel and kerosene used to release the oil from deep shale formations. It can also have a high hydrogen sulphide content in such perilous amounts that Enbridge recently applied to restrict shipments in its pipelines over concern about workers' safety.[42]

Dr. Scott Smith, a scientist with actor Mark Ruffalo's organization Water Defense, has tested oil samples he collected from the Bakken fields and said they contain unprecedented levels of explosive volatiles such as benzene, toluene and xylene. "We must work to better understand the risks involved with the transportation of unconventional crude oil – whether diluted bitumen or Bakken fracked oil."[43]

Fracking frenzy near the Great Lakes

Shale gas reserves exist under vast areas of the Great Lakes region, including Michigan, Ohio, Pennsylvania, New York, Ontario and Quebec. There are now almost 9,000 fracking wells in Pennsylvania and 100,000 more are planned. Pennsylvania has developed its shale gas industry so quickly that its rural areas – once vast, dark expanses that could be viewed from space – are now lit up like a Christmas tree in satellite images. (Most of these are located outside the Great Lakes Basin.) Ohio also has a large fracking industry and reports that by 2015 approximately 2,230 horizontal wells will be drilled in the state.[44] Illinois recently agreed to restart fracking after intense opposition forced the state to hold a review.

Michigan is the centre of fracking in the Great Lakes region. There are 52 active fracking permits in the state with another six pending applications. EnCana has big plans to drill an additional 500 shale wells using 4 billion gallons (15 billion litres) of groundwater. The company will leave the contaminated water in the ground.[45]

While New York has had a de facto fracking moratorium since 2008, Upstate New York already imports and disposes of radioactive fracking waste from the Marcellus shale projects in Pennsylvania, putting local watersheds, Lake Ontario and the Great Lakes Basin at risk. And while there are no natural gas deposits in Wisconsin and Minnesota, both states are using vast amounts of water to mine for silica sand, which is used in the fracking process. [46]

In Canada, strong community resistance to fracking has slowed down the industry. The Ontario Geological Survey drilled 11 locations in southern Ontario to assess shale gas potential. There has been exploratory drilling in 31 locations in the St. Lawrence River Lowlands in Quebec. However, Ontario has not granted any permits pending a promised review, and Quebec placed a moratorium on fracking in the St. Lawrence Valley until further study is conducted. Quebec has tabled a bill that would see a moratorium on fracking in that region for five years. Niagara-on-the-Lake, Hamilton and the Chiefs of Ontario have all passed resolutions calling for a stop to fracking.

Pressure is mounting in both provinces, however, to expand natural gas infrastructure, which would open the door to more fracking on the U.S. side of the border.

Photo: NASA

Fracking threatens the Great Lakes

In a legal analysis on fracking in the Great Lakes Basin, the National Wildlife Federation says there are three ways fracking threatens the Great Lakes.

The first threat is water consumption. Fracking uses large amounts of water from local sources. Shale gas operations in Pennsylvania for instance, use 15 million litres of water for each fracked well compared to less than 400,000 litres for a conventional gas well.[47] EnCana used 8.5 million gallons (more than 32 million litres) of groundwater to frack a single well – the Westerman in Kalkaska County, Michigan,[48] 45 million litres (almost 12 million gallons) per well for its Excelsior 2-25 and Garfield 1-25 wells, and 80 million litres (21 million gallons) for its Excelsior 3-25 site.[49] Since 2005, the industry has used 250 billion gallons (one hundred billion litres) of water.[50]

If the land area of just four Great Lakes states within the Basin experienced shale development similar to that of the Marcellus shale – which isn't an unlikely scenario – total water withdrawals could top 37 billion gallons (148 billion litres) a year.[51] While federal law prohibits water from being diverted directly out of the Basin, many fracking operations and other bulk water users withdraw from ground and surface water sources that feed the Great Lakes.

In its February 2014 report *Trouble Brewing in the Great Lakes*, Washington-based Food and Water Watch say that when an aquifer is over-pumped, the water levels of a connected surface water body can fall and water flows can change. "With millions of gallons of water needed to frack a single well, withdrawing water from around the Great Lakes could affect

Photo: Council of Canadians

A fracking well in Kalkaska County, Michigan.

If the land area of just four Great Lakes states within the Basin experienced shale development similar to that of the Marcellus shale, total water withdrawals could top 148 billion litres a year.

Photo: respectmyplanet.org

Fracking wastewater in Michigan.

local supplies and have cumulative impacts on the Basin, further straining already stressed water sources."[52] Moreover, says the National Wildlife Federation, almost all of the water withdrawn for fracking in the Great Lakes Basin will not be returned to the source watershed to replenish resources. Instead, the water will be placed underground for disposal.

The second threat to the Great Lakes is water contamination from well activities. Because fracking uses substantially more chemicals than conventional oil and gas operations, it requires that the wellbore be placed under high pressure. This can damage the integrity of well construction, leading to chemical and hydrocarbon leaks into groundwater. The pressure can also lead to the uncontrolled release of chemicals and hydrocarbons out of the wellbore. Surface spills can release chemicals into surface water that can migrate into the Great Lakes Basin. "Once contaminants enter the interconnected hydrologic system, they have the potential to affect both surface and groundwater," reports the Federation.

The third threat to the Great Lakes is water contamination from the treatment and disposal of the wastewater. Flowback water (water that "flows back" during the fracking process) contains large amounts of brine, toxic metals and chemicals such as mercury, lead and arsenic, radioactive material such as radium and uranium, organic acids and polycyclic aromatic hydrocarbons. It also contains high concentrations of total dissolved solids (TDS) – inorganic salts and organic matter that dissolve in water and are common in sewage, urban and agricultural runoff. Chloride, the primary component of TDS in flowback, can cause acute effects in aquatic insects, fish and frogs.

Flowback is very hard to treat, as standard municipal water treatment plants are not designed to handle this level of water contamination. Releasing flowback into surface waters after improper treatment poses a direct threat to water. Disposal wells are also a risk due to underground leaks and the migration of contaminated water into local groundwater sources. The National Wildlife Federation says there are approximately 860 disposal wells in Michigan and 177 in Ohio, 35 of which are located in the Great Lakes Basin. Companies also inject flowback into the ground as a method of disposal, which has caused earthquakes in the Basin such as those in Youngstown, Ohio.[53] The plans for massive fracking development in the region clearly will include many more deep disposal wells that will receive more flowback, not just from operations inside the Basin, but potentially from other sites that have less access to such disposal wells. This practice puts the waters of the Great Lakes Basin at great risk.

Marine shipping of fracked oil and wastewater

The opening of marine transport to extreme energy poses another issue with fracking wastewater. The U.S. Coast Guard, which regulates the country's waterways, has announced it will recommend allowing shale gas companies to ship fracking wastewater on the nation's rivers and lakes. The agency began studying the issue in 2011 after it received inquiries from companies transporting Marcellus shale wastewater, and announced its proposed policy at the end of 2013. Each barge could transport approximately 10,000 barrels of wastewater.

Although the U.S. Coast Guard says the wastewater would be tested for safety, officials admit that due to the trademark protection of the fracking fluids, the full list of proprietary chemicals may be withheld from public release.[54] While current plans are to take northern fracked wastewater to southern facilities, the practice could quickly spread to the Great Lakes.

Pipelines and more pipelines

North America is experiencing a major oil pipeline boom. The American Petroleum Institute projects that over 18,000 miles (just under 29,000 kilometres) of new crude oil pipelines will be constructed, expanded, reversed or converted in the U.S. by 2018 and this trend "will be the continued development of a large central transportation corridor running from north to south through the Mid-Continent region." Investments in U.S. crude oil pipelines increased from $1.6 billion in 2010 to $6.6 billion in 2013. By 2015, says the Institute, "the landscape of major U.S. crude pipelines will have almost no resemblance to the picture that existed in 2005."[55]

A great deal of this investment will be in the Great Lakes region. Enbridge's "Lakehead System" is already one of the largest networks of pipelines in the world. However, Enbridge has serious plans for expansion in the region. On its website, Enbridge says it is strategically positioned to expand and extend its North American energy delivery networks and is "currently engaged in our largest capital investment program in our 60-year history."[56]

Line 67, the Alberta Clipper, transports tar sands crude oil from Hardisty, Alberta to the refinery in Superior, Wisconsin. As noted above, Enbridge plans to double the pipeline's capacity to 800,000 barrels a day. (It needs a presidential permit from the State Department to proceed.) The company openly states that Line 67 will carry heavy crude from the tar sands.

Sierra Club U.S. says that the two major pipelines – Keystone, TransCanada's controversial north-south proposed pipeline, and Line 67 – should be reviewed together to account for how the two pipelines would contribute to climate change. In January 2014, the environmental group, along with 15 other groups, filed a petition with the U.S. State Department asking it to review the two projects together, pointing out that if both were given the green light, they would carry almost 1.3 million barrels (more than 200 million litres) of Alberta crude a day.[57]

After the petition was filed, Enbridge announced plans to expand yet another Alberta to Superior, Wisconsin pipeline. The 46 year-

old Line 3, which spilled almost 1,000 cubic metres of crude into a wetland near Glenavon, Saskatchewan in 2007, will be "upgraded" with improved steel and coating. This change will also include a 2-inch increase in the pipeline's diameter, 21 new pumping stations, and a capacity increase from 390,000 barrels-a-day to 760,000. Despite the significant changes, Enbridge hopes to avoid the presidential permit that would normally be required for such an expansion.[58]

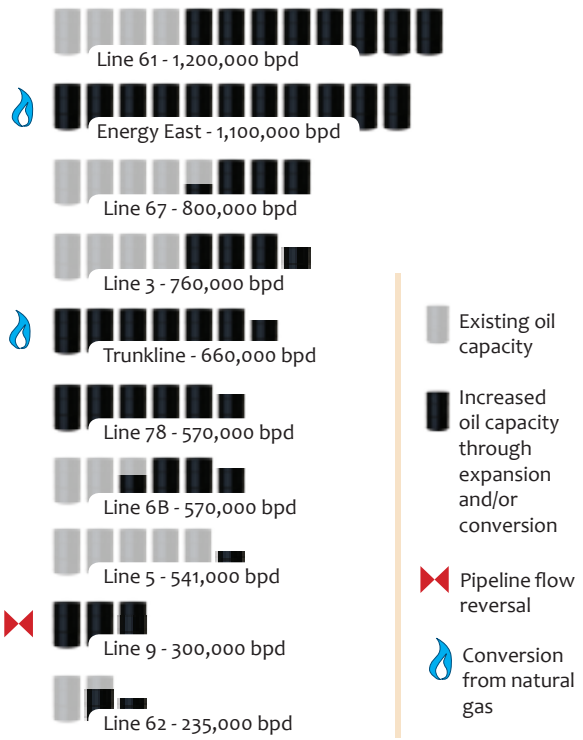
Enbridge has also been quietly increasing the capacity of Line 6B, the pipeline that ruptured in Michigan. It intends to increase this line's capacity from 240,000 barrels a day to as much as 570,000 barrels.

Line 61 moves oil from Superior, Wisconsin to Flanagan, Illinois and Enbridge is seeking to expand its capacity from 400,000 barrels a day to 560,000 barrels in the next phase, and 1,200,000 barrels over time. The Flanagan South Pipeline will then take this "increased North American crude oil production" – up to 800,000 barrels – to refineries on the U.S. Gulf Coast. Several other new or expanded pipelines will bring Canadian tar sands oil to the Gulf for refining. They include Seaway, which will bring another 850,000 barrels, and Trunkline, which will bring 660,000 barrels.

With these plans, Enbridge and TransCanada – the company behind the Keystone XL pipeline – appear to be anticipating alternate ways to facilitate shipments should the Obama administration withhold approval for the Keystone project. So is the U.S. government. When the State Department issued its final environmental impact statement on Keystone in early February 2014, it clearly stated that if Keystone is not approved, a "no action alternative" is to ship the crude oil east along the St. Lawrence River with ocean freighters and pipelines, looping around the east coast to get to Gulf Coast refineries. The report pointed out that Canadian companies are increasingly using oil-floating barges and freighters to transport large volumes of Canadian crude in the U.S. The State Department says that tar sands crude and Bakken field fracked oil is already being transported on the St. Lawrence River.[59]

In fact, *Inside Climate News*, a Pulitzer Prize winning non-profit news organization, says Enbridge is quietly building a 5,000-mile network of new and expanded pipelines that will achieve the same goal as the Keystone. When completed, this expanded Lakehead System will bring even more tar sands oil into the U.S. than Keystone. These plans have escaped the kind of public scrutiny and media attention other pipelines have received largely because the expansion has proceeded in many segments and phases, says the consortium.[60]

Current and planned pipeline construction or expansion in the Great Lakes Basin



Source: Enbridge, InsideClimate News

Poor safety history of pipelines

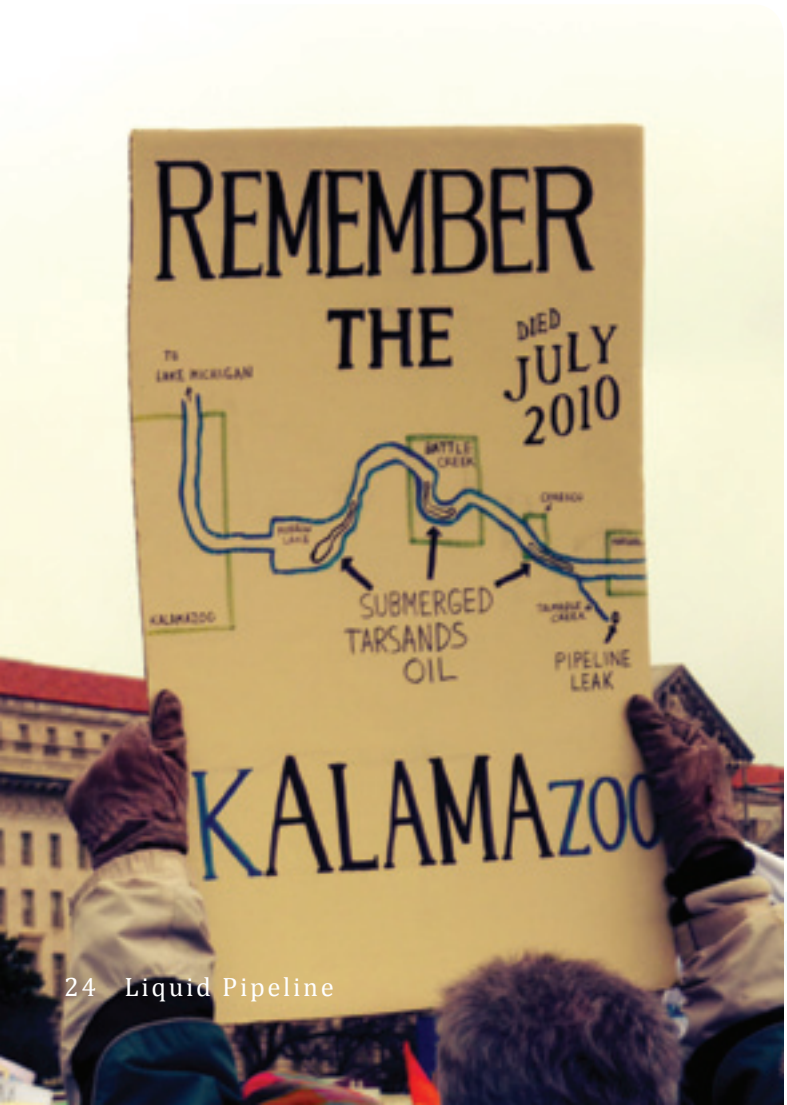
One major concern with this expansion is that these pipelines will ease the "bitumen bubble" that now exists in Alberta and allow the energy companies and supportive governments to continue to expand tar sands operations. Opposition to the tar sands is growing in Canada and around the world as the air and waters of the region become more fouled, reports of illness among local First Nations communities grow, and Canada falls further behind in its once-stated commitment to rein in greenhouse gas emissions. These pipelines are the arteries of the tar sands operation and, because of their massive costs, their very growth will create an imperative to fill them, thus allowing the pipeline companies and the oil industry to dictate energy policy across the continent.

Another major concern is the threat of spills. This aging pipeline infrastructure was built largely in the 1950s and 1960s and was not meant to carry the more corrosive forms of oil now being produced. Enbridge was the company responsible for the terrible spill in Michigan and its 17-hour delay in dealing with it has come under heavy criticism. U.S. federal investigators compared the company to the "Keystone Kops" and said Enbridge could have prevented the disaster had they maintained the pipeline properly.

The National Wildlife Federation is deeply critical of Enbridge's safety record. It says the company's pipelines are old and showing signs of wear and tear. The protective tape coatings placed around pipelines a half-century ago to prevent corrosion are failing, says the Federation, and in some cases, are an accident waiting to happen. Enbridge had more than 800 spills in North America between 1999 and 2010, dumping nearly 6.8 million gallons (about 26 million litres) of oil. [61]

After the Michigan spill, Enbridge promised to improve its safety record, but since then, there have been a number of serious spills including a 50,000 gallon (almost 200,000 litre) spill in Wisconsin, a 60,000 gallon spill in Alberta, and a 600 gallon spill in Viking, Minnesota. In January 2014, Enbridge had to shut down Line 67 after a 125 barrel (20,000-litre) spill at a pump station south of Regina, Saskatchewan.

Undaunted, Enbridge's expansion plans are quickly moving ahead.



A protester at the Forward on Climate rally in Washington, DC.

Photo: Flickr user DCErica. CC BY-NC 2.0. Image cropped from original.

Buried pipelines

Alarm is growing over an aging pipeline that runs under the Great Lakes. Line 5 is a twin pipeline that runs under the Straits of Mackinac in northern Michigan at the confluence of Lakes Michigan and Huron. It carries a total of 20 million gallons (almost 80 million litres) of oil and gas each day from Superior, Wisconsin to Sarnia, Ontario. In a powerful 2012 report, *Sunken Hazard*, the National Wildlife Federation says these sunken pipes, built in 1953, are an "ever-present threat" to the Great Lakes.

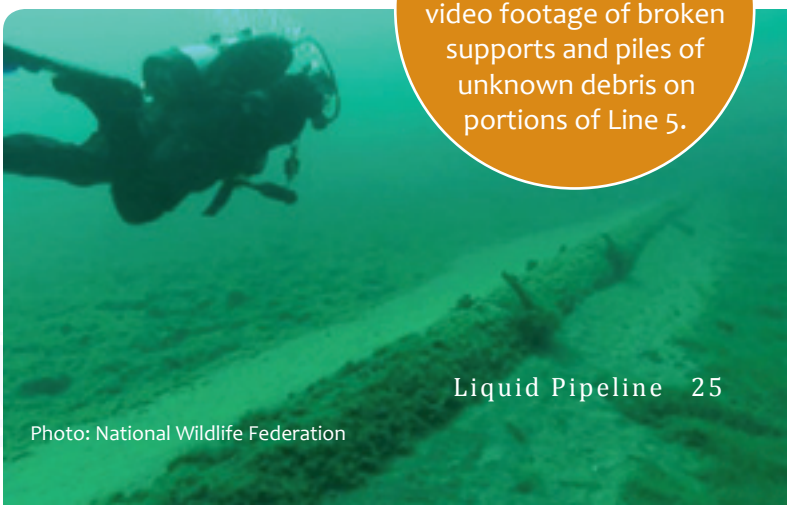
Pipelines deteriorate as they age and the Line 5 pipelines have been subjected to fierce underwater currents, intense external pressure and varying water temperatures for 60 years. Powerful storm-driven currents cause water to oscillate back and forth between the two lakes, reports the Federation, which means at times, the volume of water flowing beneath the Mackinac Bridge is 50 times greater than the average flow of the St. Clair River, one of the largest rivers in the Great Lakes Basin. These currents make the Straits "one of the worst places in the lake" where an oil spill would spread quickly.

In July 2013, the National Wildlife Federation conducted a diving expedition to obtain footage of Line 5, and what the team filmed is very disturbing. Images include unsupported pipelines suspended over the lakebed, some original supports broken away (indicating the presence of corrosion), and some sections covered in large piles of unknown debris.

As with most of the other pipelines, the capacity of Line 5 has been increased – from 491,000 barrels a day to 541,000. While the Line 5 does not carry diluted bitumen as the oil has gone through some process of upgrading, it is tar sands derived and therefore substantially heavier than the light crude the pipelines were built to carry. The transport of tar sands oil requires higher operating pressures, which in turn heats the line, and could pose significantly higher risks of spills. A leak from these aging pipes would devastate some of the lakes' best fisheries, poison wildlife and contaminate drinking water supplies, says the Federation.

A significant rupture would be catastrophic. Enbridge's own emergency response plans show it would not be possible to immediately shut off the flow of oil, and that it would take company crews at last three hours to respond. The Federation says a serious spill would cause an Exxon-Valdez-like oil spill that would spread across Lake Huron, Lake Michigan and Georgian Bay and "cause unimaginable damage in the Great Lakes and cripple economies that depend on the lakes."[62]

In December 2013, three U.S, senators asked the federal government to check on the safety of Line 5. Senators Dick Durbin of Illinois and Carl Levin and Debbie Stabenow of Michigan shared their concerns with the U.S. Department of Transportation about Line 5's increased capacity, saying a leak or rupture would have devastating impacts on the region's environment and economy. Michigan-based FLOW for Water, which promotes public trust solutions to save the Great Lakes, calls Line 5 "the greatest threat to the Great Lakes that no one seems to know about" and is leading a major campaign to have the pipeline shut down.



A diving expedition by the National Wildlife Federation captured video footage of broken supports and piles of unknown debris on portions of Line 5.

Photo: National Wildlife Federation

Pipelines in Canada

There are big plans for pipeline expansion in Eastern Canada as well. Line 9 was built from Sarnia to Montreal during the energy crisis of the 1970s so refineries in Quebec could have secure access to Canadian crude. This was part of a national energy policy designed to bring western oil to eastern Canadians and help build a more unified country. At that time, Canadian energy prices were regulated to be lower than imported energy prices and Canadian energy was allowed to be sold at higher rates to foreign customers.

This all changed with the signing of the Canada-U.S. Free Trade Agreement and NAFTA. The powers of the National Energy Board to regulate energy in Canada's favour ended and, with deregulation, Montreal refineries could now get cheaper imported crude brought in by pipeline from Portland, Maine than from western Canada through Sarnia. So, more than a decade ago, Enbridge, the pipeline's owner, reversed the flow direction of Line 9 so that it could ship imported oil into central and Eastern Canada. It has been importing foreign oil through the Portland-Montreal pipeline to the Westover refinery located north of Hamilton on Lake Ontario and the Sarnia terminal located at the southern tip of Lake Huron.

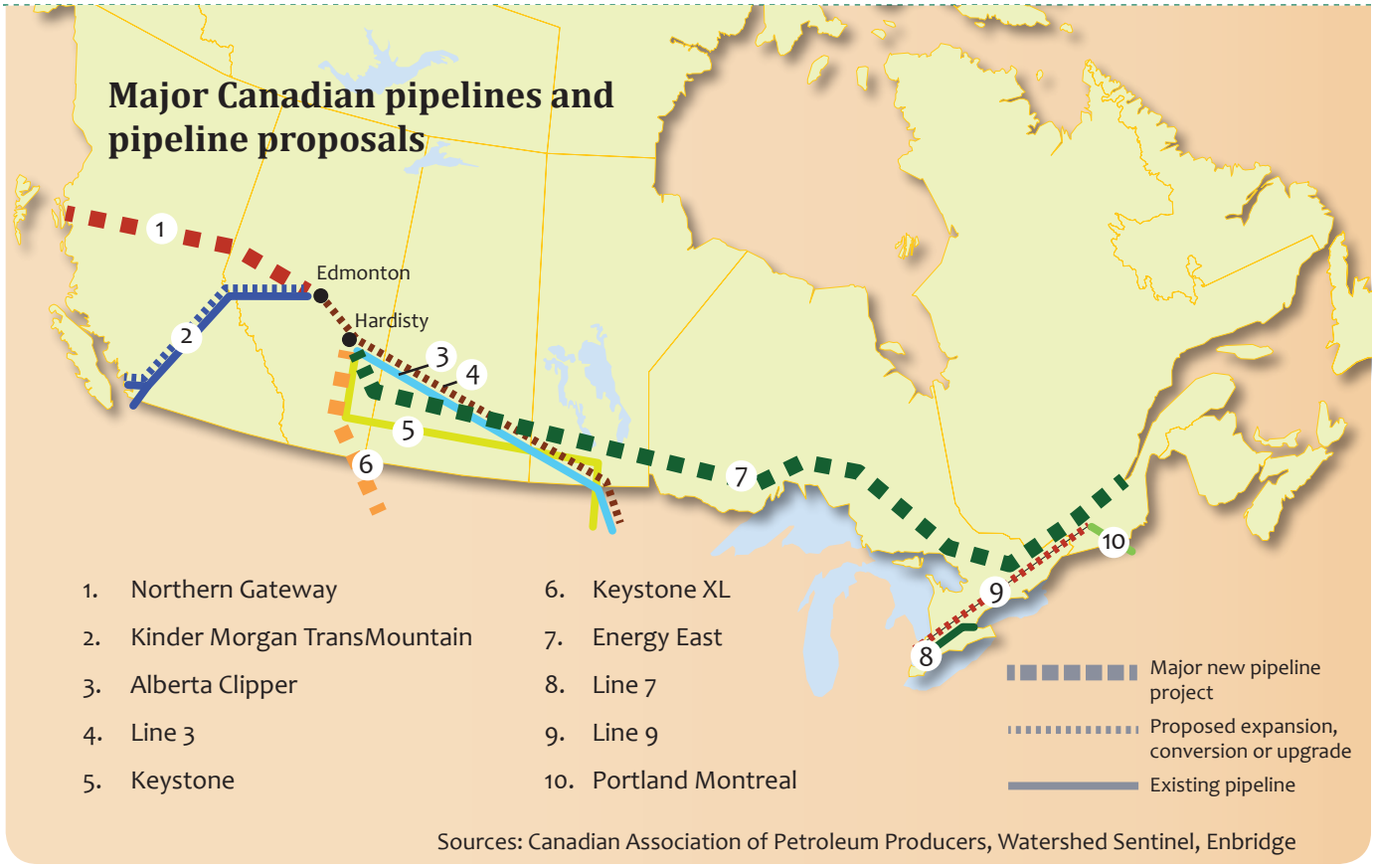
However, the oil industry is looking to utilize all available pipelines to deal with the glut in Alberta's oil output, and Quebec refineries are eager to buy this currently cheaper source of oil. So Enbridge sought approval to once again reverse the flow of Line 9. The National Energy Board approved the direction change of Line 9 between Sarnia and Westover in 2012 and in March 2014, approved the application to reverse the section known as 9B, which would carry oil to refineries in Montreal. Enbridge has also been granted a capacity increase for Line 9 from 240,000 barrels a day to 300,000 barrels.

The oil industry is looking to utilize all available pipelines to deal with the glut in Alberta's oil output.

People and communities all along the route have raised strong concerns as Line 9 travels through crowded urban centres as well as along the entire northern shoreline of Lake Ontario and along the St. Lawrence to Montreal. First Nations communities have been particularly vociferous in their critiques of Line 9.

While initially intended for conventional crude, Line 9 will now also carry fracked oil from the Bakken fields via Line 67 and Line 5. *The Toronto Star* notes that the fracked oil that exploded in the Lac-Mégantic tragedy is the same oil that Enbridge plans to pump through the aging Line 9 pipeline.[63] Critics also worry that the pipeline will carry some tar sands crude, something the company does not deny. Enbridge spokesperson Graham White says that the company's customers are primarily light crude refineries, but says Line 9 will ship a small portion of heavy crude.[64]

There may also be plans to ship Line 9 energy by marine transport. The *Edmonton Journal* reports that advocates want to see Alberta bitumen piped to Sarnia where some refining would be done. From Sarnia, the oil would be



shipped through Line 9 to Montreal, and then on to Saint John, New Brunswick either by barge or rail.[65]

The issue is complicated by the longstanding desire in Canada to wean Eastern Canada off foreign oil, the bulk of which comes from controversial energy projects offshore in Saudi Arabia, Venezuela and Algeria, and is associated with extensive pollution from trans-ocean tanker shipping. Unifor, the union that represents Canadian workers in the oil industry, has opposed all export pipelines, but argues for a national energy and environmental strategy and a Canada-wide energy grid so that Canadian energy resources can be used to meet the needs of Canadians. To this end, Unifor supports the Line 9 project to strengthen the east-west energy grid but sets several conditions, including that the oil is not for export (a possibility if the Maine-Portland section of Line 9 is ever reversed), that the renovated pipeline meets strict environmental and safety standards, and that Enbridge wins approval for the project from affected First Nations.[66]

In early January 2014, the National Energy Board approved an application to expand flows in a lesser-known Enbridge pipeline, Line 7, which runs from Sarnia to Westover. The current volume in the 56-year old pipeline is 147,000 barrels a day and the approval means that flow will increase to 180,000 barrels a day. There were no public hearings and the city of Hamilton through which Line 7 runs, was given no notice of the change.

Energy East

Another major proposed eastern pipeline on the Canadian side of the Great Lakes already has a large coalition of concerned people and groups forming to oppose it. TransCanada Corp. is aggressively promoting Energy East, a 4,500-kilometre pipeline that would stretch from Alberta to ports in Quebec, Saint John, New Brunswick, and potentially Cape Breton, Nova Scotia. Energy East would carry at least 1.1 million barrels per day of western crude, including tar sands bitumen, and fracked Bakken shale gas, making it the largest oil pipeline in North America. The majority of the oil it carries would be for export to Asia, the U.S., and possibly Europe.

The project would consist of converting one of TransCanada's existing 3,000 kilometre 55-year-old natural gas pipelines to allow it to carry bitumen, and connecting it with a new pipeline to carry the oil through Quebec and on to the east coast. In January 2014, this aging pipeline experienced a massive natural gas explosion close to Winnipeg that left more than 4,000 people without heat. A month later, CBC reported that it had uncovered a critical report the National Energy Board had effectively buried for several years about a July 2009 rupture on TransCanada's Peace River Mainline, part of the same series that is to become Energy East. The rupture sent 50-metre tall flames into the air and razed a two-hectare wooded area.[67]

Many individuals and organizations, including the Council of Canadians, are campaigning against the proposed Energy East pipeline.

Alberta's Pembina Institute reports that the crude production needed to fill this pipeline would generate the equivalent in greenhouse gas emissions of adding more than 7 million new cars to the roads each year.[68]

Energy East would traverse the northern tip of Lake Superior and across the top end of the Great Lakes, including the St. Lawrence River Basin watershed, threatening many water systems that lie within the Basin. The most remote part of Energy East pipeline – some 75 kilometres of rugged forest without roads – is close to the Nipigon River crossing. A rupture there could go undetected for quite a while and result in millions of litres of flow down the Nipigon into Lake Superior. Energy East would also cross through 180 different indigenous communities, many of which have already declared opposition to the project.

In its preliminary project description filed with the National Energy Board in March 2014, TransCanada outlined more details about its plans to build a port in Cacouna, Quebec, just north of Rivière-de-Loup on the St. Lawrence River, near the Valero Energy refinery. The description states: "The Cacouna marine terminal will be located on the eastern shore of the St. Lawrence River in the immediate vicinity of the existing Port of Gros-Cacouna, Quebec. The marine terminal will be developed to support the loading of crude carriers which have a capacity of 700,000 to 1.1 million barrels of oil through a two-berth arrangement and a single trestle.

Local residents are very concerned that any accidents involving either the pipeline or marine shipments along this route would put the already endangered beluga whale population at greater risk.

Offshore drilling

The United States has banned offshore oil and gas drilling of any kind in the Great Lakes. While Canada prohibits offshore oil drilling in the Great Lakes, it does allow onshore drilling for oil under the Great Lakes, as well as offshore gas drilling. Canada has 500 offshore gas wells in Lake Erie and 23 that run under the Lakes from shore. The Ontario Ministry of Natural Resources estimates that there are about 156 million barrels of oil and 1 trillion cubic feet of gas on the Canadian side of Lake Erie. One Canadian company, Dundee Energy Limited, reportedly holds shares in more than 900,000 gross acres of Lake Erie for natural gas extraction. Unless Canada follows the U.S. lead with a gas drilling ban, exploration of these energy sources could pose a grave threat to the Great Lakes.[69]

The Gulf of St. Lawrence is threatened by new proposals to explore and drill for oil in the Gulf itself. The Quebec government is embracing an oil economy in order to become energy independent. The first drill is proposed for "Old Harry," located just 70 kilometres from the Magdalen Islands. The government also recently announced plans to fund exploration on Anticosti Island, a still untouched piece of wilderness larger than Prince Edward Island.

The Harper government is paving the way for these projects in the St. Lawrence, having watered down the Coasting Trade Act and gutted the Centre for Offshore Oil, Gas and Energy Research – the only agency that had the ability to assess offshore projects; the Environment Canada unit that responds to oil spills emergencies; the Canada Centre for Inland Waters – the most important scientific monitoring agency for the Great Lakes; and the marine pollution monitoring program of Fisheries and Oceans.

Allowing condensate to be shipped on barges may pose very serious risks to the people and natural environment of the Great Lakes.

Gas transport

There is also a projected surge in the production, transportation and refining of natural gas in the Great Lakes region largely due to the increase in fracking. In January 2014, the Ontario Energy Board approved Enbridge and Union Gas' proposed $686.5 million gas pipeline expansion in the greater Toronto area to carry shale gas from the U.S. Enbridge is working with Detroit-based DTE Energy and Houston-based Spectra Energy Corp in another project called the Nexus Gas Transmission system, to bring Utica shale gas into southern Ontario. The project will cost between $1.2 billion and $1.5 billion.[70]

Andrea Harden-Donahue, energy and climate justice campaigner for the Council of Canadians, says it is no coincidence that these companies are seeking approval just as promotion for the Energy East pipeline is heating up. Ontario and Quebec have been receiving conventional natural gas from the Prairies through TransCanada's Mainline, the 55-year-old pipeline the company is proposing be converted to carrying tar sands crude. "Talk about a bad idea," says Harden-Donahue. "Replace conventional gas with imported fracked gas – which is wrong on so many levels – in order to ship tar sands crude in an old pipeline over precious rivers, streams, farmlands, through communities and indigenous lands to reach eastern ports for export."[71]

Royal Dutch Shell is moving ahead with a 1.51 million litre (400,000 gallon) per day liquefied natural gas (LNG) plant and terminal on the St. Clair River near Sarnia, Ontario. The company says this terminal is part of a planned "Great Lakes Corridor Project" to supply LNG fuel to all five Great Lakes and the St. Lawrence River, and will promote this fuel to the fleets of ships that ply the Lakes.[72] Marathon, the largest refinery in the Utica shale field in Ohio is planning to ship condensate by pipeline and eventually by barge to several destinations, including Canada.[73]

In contrast to heavy oil, little research has been done on the environmental and human health impacts of condensate – liquid hydrocarbons gathered from the production process. But anecdotal reports of serious health effects from condensate spills are growing.[74] Allowing condensate to be shipped on barges may pose very serious risks to the people and natural environment of the Great Lakes.

Nuclear waste

While nuclear power is not a new source of energy, the amount of waste it has produced in the Great Lakes region is becoming a very serious problem in terms of disposal, and the methods being proposed put the Great Lakes in danger. Nuclear energy production – and its waste – can therefore be seen as a form of extreme energy.

As Ontario Waterkeeper points out, nuclear power is responsible for providing most of Ontario's baseload power, and there are plans to refurbish and extend the operation of the Darlington and Pickering nuclear plants, both of which are on the shores of Lake Ontario. Waterkeeper says that already the ecosystems, biodiversity, and numbers of fish in Lake Ontario have been devastated by hydroelectric development linked to these nuclear power generation facilities. As well, the facilities release radioactive particles such as tritium into neighbouring waters where the chemicals break down the cell structures of aquatic organisms.[75]

The newest nuclear threats to the Great Lakes, however, is to move spent radioactive generators by ship across the Lakes, bury radioactive nuclear waste into deep geologic deposits in close proximity to the Lakes, and move liquid nuclear waste by trucks on highways that border the Lakes.

In 2013, intense opposition put a stop to Bruce Power's plan to ship 16 radioactive steam generators the size of buses across the Great Lakes, down the St. Lawrence River and out onto the ocean to Sweden for recycling. The company, located on Lake Huron, insisted that even in the case of a shipping accident, the project was safe. But many First Nations, municipal governments and environmental groups disagreed, fearing an accident would leave several of the Lakes contaminated with radiation. Sarnia Mayor Mike Bradley, who opposed the project, said that people need to have more respect for these waters. "The biggest invasive species on the Great Lakes is man," he said.[76] Concerned groups and communities have not stopped being vigilant about proposals to ship nuclear waste on the Lakes as the Canadian and Ontario governments are clearly prepared to permit this practice.

Nuclear waste has been building up for decades on the Canadian side of the Great Lakes. For more than 40 years, massive amounts of ore and chemicals have been used to refine tiny amounts of radium and uranium. In the 1970s and 1980s, more than 100,000 tonnes of contaminated soil was gathered from the Darlington plant in Port Hope and transferred to Chalk River for storage.[77] In 2011, the largest radioactive waste clean-up in Canadian history was launched with plans to retrieve an estimated 1.2 million cubic metres of contaminated soil from around the Darlington site – enough to fill 500 Olympic-sized pools.[78]

Now the Ontario government is seeking communities to "host" about 2 million highly radioactive bundles of nuclear waste in deep underground deposits, and several are within throwing distance of the Great Lakes. One community considering taking in this waste is Schreiber, which is located on the north shore of Lake Superior. Five other communities located on or near Lake Huron have also been identified. Due to strong community opposition, two sites – Saugeen Shores and Arran-Elderslie – have been dropped from the list for high-level waste although they are still in the running for low and intermediate-level repositories. But three others – Brockton, South Bruce and Huron-Kinloss – are still on the list.

Scientists warn that the waste will remain dangerously radioactive for up to 100,000 years,

and that digging shafts hundreds of metres deep in order to deposit it could risk setting in motion geological processes no one can predict. Hydrogeologist Wilf Ruland, testifying for the Ontario Environmental Law Association before an October 2013 provincial hearing on the proposed sites, added that below the layers of limestone and shale that the company says will seal the waste, is another stratum of rock where water is under extreme pressure and if that water managed to infiltrate the dump area, it could blast radioactive waste back up to the surface. *The Toronto Star's* Thomas Walkom reminds us that the doomed citizens of Fukushima were also told their nuclear facility was safe, but a devastating earthquake changed everything.[79]

As well, trucks carrying liquid nuclear waste could soon be travelling from the facility in Chalk River, Ontario to South Carolina across the Niagara River at the Peace Bridge between Fort Erie and Buffalo. Pending approval, the plan is to secretly transport 23,000 litres of nitric acid solution containing highly enriched uranium under armed guard. The project will require as least 179 shipments of this highly toxic material.

Although community opposition saved Saugeen Shores from high level nuclear waste, communities in the region are still at risk from the planned low and intermediate-level repositories.

Photo: Council of Canadians

Trade deals protect Big Oil

The major energy companies, all of which are invested in the tar sands and many of which are invested in fracking, are very powerful and wealthy. Shell has bigger revenues than the combined GDPs of Pakistan and Bangladesh, the sixth and seventh most populous countries in the world. Sinopec, one of China's leading energy companies, is bigger than Singapore. Exxon Mobile is bigger than Sweden. The five largest energy corporations control the equivalent of 2.5 per cent of global GDP and have made more than $1 trillion in profits since the millennium.[80]

Leading climate environmentalist Bill McKibben calls Big Oil a rogue industry, "reckless like no other force on Earth (…) Public enemy number one to the survival of our planetary civilization." [81]

As the North American energy grid grows, so too does the pipeline network to carry the oil and gas. Enbridge has grown exponentially since its inception more than 60 year ago. In 2013, Enbridge was listed by the *Globe and Mail* as number 12 of Canada's biggest 100 companies by revenue, and Enbridge Energy Partners, owner and operator of the company's U.S. liquids pipelines, is listed as number 381 of the 2013 Fortune 500 corporations.

Both the energy companies and most of the pipeline companies operate across North America. All the big American energy companies are heavily invested in the tar sands and many Canadian pipeline companies are linked to projects in the U.S. Enbridge, for example, operates in 20 U.S. states as well as in a number of Canadian provinces. So these companies have a vested interest in protecting their holdings in one another's jurisdictions and seek ways to prevent local environmental or health and safety rules from challenging their holdings.

In this they have a friend in NAFTA, the first trade agreement to allow a corporation of one country to bypass its own government and directly sue the government of another country if the corporation believes its right to profit has been affected by a law or practice in that country. Chapter 11, the investor state clause of NAFTA, allows American corporations operating in Canada – and Canadian corporations operating in the U.S. – to sue for financial compensation if any changes are made to the policies or practices under which they first invested.

Legal experts say that if the government of Alberta were to ever limit the current water access of the energy companies operating in the tar sands American companies could sue for huge sums of compensation from the government of Canada. Alberta lawyers Joseph Cumming and Robert Froehlich warn that cancelling or limiting water licences would be seen as a form of trade-illegal expropriation, costing the Canadian taxpayer potentially billions of dollars. Equally worrisome, they say, is that the threat of such compensation might prevent the Alberta government from taking such a step in the first place, allowing American energy corporations to dictate Canadian policy.[82]

Equally, Enbridge could use Chapter 11 to fight attempts in the U.S. to limit its scope, stop it from carrying tar sands bitumen, or actually stop a pipeline construction due to local opposition.

Chapter 11 has already been used in ways that could negatively affect Canada's freshwater heritage. In 2002, SD Myers, an America company specializing in the disposal of hazardous waste, including PCBs, was awarded over $8 million from the Canadian government for loss of profit after Canada banned the trade of PCBs to protect its water. In another trade

Photo: Council of Canadians

Tar sands campaigners challenge Canada-EU trade talks in Brussels.

dispute, Canada awarded U.S. forestry giant AbitibiBowater $130 million in compensation for the "water rights" it left behind when it abandoned its operations in Newfoundland in 2008, thus establishing a dangerous precedent whereby a foreign corporation can claim ownership of local water supplies.

Currently, Lone Pine Resources, an American energy company, is suing the government of Canada for $250,000 because of Quebec's moratorium on shale gas fracking from under the St. Lawrence River.

The corporate rights embedded in NAFTA are also integral to other trade and investment deals. Both Canada and the U.S. are currently in negotiations with the European Union to sign trade agreements that would give the same kind of investor state rights to European companies, and both are supportive of the Trans-Pacific Partnership, which would extend those rights to many Asian countries. Canadian economist and trade lawyer Dr. Howard Mann, with the International Institute for Sustainable Development, calls the Canada-EU Comprehensive Economic and Trade Agreement (CETA) the most pro-corporate investment treaty Canada has ever signed.[83]

The Canadian government is also negotiating an investment deal with China, which will give CNOOC, the Chinese state-owned energy company that recently invested $15 billion in the tar sands, the right to sue any future government that tries to re-introduce the freshwater laws gutted by the Harper government. The Hupacasath, a First Nations community on Vancouver Island, launched a legal challenge to the Canada-China Foreign Investment Promotion and Protection Act (FIPA), on the grounds that the deal interferes with their treaty right to manage resource development on their territory. By signing the deal, the government is creating obligations to corporations that supersede its obligations to Canada's Indigenous peoples.

Given that Energy East oil would be destined for Europe, India and China, these, and other new investor-state deals, would give many more foreign corporations the right to dictate Canadian energy policy.

Preventing a Great Lakes carbon corridor

The move to create what Gaetan Caron, CEO of Canada's National Energy Board, calls "a shared energy vision for North America" is well underway. At their February 2014 meeting in Toluca, Mexico, Canadian Prime Minister Stephen Harper, American President Barack Obama and Mexican President Enrique Peña Nieto agreed to hold a meeting of North American energy ministers later in the year to further cooperate on energy issues. Mexican officials noted that their government has recently opened up the country's energy supplies to foreign interests and called for more collaboration on energy, saying that each should use their energy strengths to make North America a manufacturing powerhouse.

Suddenly, the Great Lakes and St. Lawrence River are becoming a crucial corridor for the transport of a burgeoning North American energy industry and a "liquid pipeline" for some of the worst forms of oil and gas produced on Earth. North American energy and pipeline companies are barely waiting for regulatory or political approval, and are entirely bypassing public consultation and public opinion, as they move quickly to expand our dependence on fossil fuels across the continent. In doing so, these corporate giants are dictating energy policy for years, perhaps decades, to come.

Having persuaded governments to invest heavily in their extreme energy projects and the transportation systems to move the products, energy companies have committed future generations of political leaders to justifying the untold billions invested in pipelines, trains, barges and tankers. Meanwhile, unlike Europe and some other parts of the world, governments in North America are putting very little investment – political or economic – into sustainable energy alternatives. If we allow this new generation of extreme energy to become our only major source of energy, our dependence on it will grow, as will the destruction of our air and water.

We must say no to a Great Lakes carbon corridor.

Photo: Doug Thomas

Banning extreme energy on the Great Lakes

It is crucial that the people of the Great Lakes and the St. Lawrence River strongly oppose the plans to have their watershed used as a conduit for these energy sources. To that end, we need to create a united movement to assert our rights and responsibility to protect the watershed while there is still time. This movement should have very clear goals and demands.

To protect the Great Lakes and the St. Lawrence River we must:

- Ban all transport of tar sands bitumen on, under and near the Great Lakes and St. Lawrence River.
- Ban all transport of fracked oil and gas on, under and near the Great Lakes and St. Lawrence River.
- Ban all transport of fracking wastewater on, under and near the Great Lakes and the St. Lawrence River.
- Ban all transport of nuclear waste on, under and near the Great Lakes and St. Lawrence River. This includes marine transport of spent fuel rods, burial of nuclear waste in deep geologic deposits, and truck transports of liquid and solid nuclear waste.
- Stop the Energy East Pipeline.
- Oppose the planned capacity increase of pipelines moving bitumen and fracked oil, including Line 67, Line 6B and Line 9.
- Shut down Line 5 altogether.
- Support the phase-out of bitumen and fracked oil currently carried in pipelines running near the Great Lakes and St. Lawrence River.
- Ban oil and gas drilling in the Basin entirely.

We also need to adopt tough Basin-wide restrictions on chemical, toxic and sewage pollution with serious enforcement standards and mechanisms, and adopt the precautionary principle in all federal, state and provincial laws pertaining to the Great Lakes.

It is also crucial to remove any reference to water as a service, good or investment in any trade or investment agreement. As well, corporations should have no right at all to stop domestic or international protection of water, and Canada and the United States should join the growing list of countries that are refusing to negotiate any trade agreement that contains an investor-state clause.

We must also establish a process for citizens and communities living on the watershed to sue corporations and governments that knowingly pollute local water sources as a violation of their human right to clean water.

Promoting a sustainable energy future

The people of the Great Lakes and the St. Lawrence River must also support existing campaigns to end our dependency on extreme energy while we transform to a sustainable energy future based on conservation, infrastructure retrofitting, and renewable energies such as wind and solar.

Communities must be involved in the decision making process in sustainable energy strategies and policies. A true Commons is based on a co-management model, and requires true collaboration between communities and government. Regulatory agencies must have the ability to implement public recommendations. Environmental implications need to be fully considered and addressed before proceeding with any major project, and power generation must remain under community management and control.

Governments must be persuaded to invest in energy conservation, energy efficiency and alternative energy sources. The climate crisis makes a just transition off of fossil fuels – as quickly as possible – an absolutely necessity. This will not happen, however, if all the resources and political support continue to flow to the fossil fuel industry.

An international movement has developed to oppose the expansion of the tar sands in northern Alberta. Common to all the groups belonging to this movement is the demand to stop the expansion of the tar sands as a first step to reducing further destruction. The Council of Canadians stands in solidarity with First Nation communities in the region whose rights have been violated in the rush to develop this extreme energy source. We also recognize the necessity for a plan to meet our energy needs be based on both the principles of energy security and ecological sustainability.

Similarly, coalitions and networks have come together to call for bans on fracking. Quebec has placed a moratorium on fracking in the St. Lawrence River Valley and almost 200 municipalities in New York State have either banned fracking altogether or placed a moratorium pending further study. Communities are also coming together to fight the transport and disposal of fracking waste into local water supplies. Dozens of New England towns have adopted "tar sands free" resolutions to oppose sending tar sands through ExxonMobil's Portland-Montreal pipeline.[84]

Canadian environmental groups have banded together to stop the construction of new nuclear reactors in Ontario where two are now planned. Greenpeace Canada, Lake Ontario Waterkeeper and Northwatch filed an application for review in Federal Court and are represented by lawyers from Ecojustice and the Canadian Environmental Law Association.

A fracking waste pond in Bradford County, PA is surrounded by a wind farm.

Photo: Flickr user dfbphotos. CC BY 2.0

Promoting Public Trust

To truly protect the Great Lakes and St. Lawrence River, we need to promote a highly effective governing principle called the Public Trust Doctrine. In my report, *Our Great Lakes Commons: A Peoples' Plan to Protect the Great Lakes Forever*, I called for the Great Lakes to be named a Commons, a public trust and a protected bioregion, and laid out the principles and legal framework to help move us forward with this vision. I explained that public trust law underpins in law the universal notion that certain natural resources – especially air, water and oceans – are central to our very existence and must be considered the property of the public. Governments, acting as trustee, must protect these trust resources for the common good and sustain them for the long-term health of the ecosystem.[85]

Under public trust law, all competing uses of Great Lakes water should have to pass a test, not just of fairness of access, but also that they will not draw down the future capacity of the watershed and that they respect indigenous rights to the land. (It is important that public trust be implemented in way that is respectful of long-standing community and treaty rights of First Nations.) Public trust offers a body of principles that combines public good, public control and public oversight with the long-term protection of the watershed. It sets the stage for an agreed upon "hierarchy of use" whereby some uses of the water, such as to supply drinking water and water to protect the ecosystem, take precedence over others.

Jim Olson, a Michigan-based environmental lawyer and champion of public trust law, says the time has come to adopt a "a shift in paradigm, framework and principle." Public trust, which has a rich history in the United States, establishes outer limits on all government and private sector actions and should be used to protect all aspects of the hydrologic cycle. Olson reminds us that water passes through a complex set of cycles affecting waterways, soil, air, forests, plants, animals and humans.

"For these reasons," writes Olson in the *Vermont Journal of Environmental Law*, "a possible answer is the immediate adoption of a new narrative, with principles grounded in science, values and policy, that views the systemic threats we face as part of the single connected hydrological whole, a commons governed by public trust principles. (…) The most obvious whole is not a construct of mind, but the one in which we live – the hydrosphere, basin, and watershed through which water flows, evaporates, transpires, is used, transferred, and is discharged in a continuous cycle."[86]

Conclusion

Imagine that the alarm had been sufficiently sounded in time decades ago to pull everyone together to stop invasive species from entering the Great Lakes and St. Lawrence River. Imagine if before the invasion, it has been possible to foresee the massive cost to the environment, native species, fisheries, local industry and tourism that invasive species would bring, and a united front had grown up around the Basin to prevent a coming disaster. That is precisely where we are on this newest threat to the Great Lakes.

Our growing dependency on fossil fuels and more extreme forms of energy is cause for great concern for many reasons. But when it starts to put at risk the most important water source in North America, and one that holds 20 per cent of the world's freshwater, the stakes become very high. We are living on a planet running out of clean, accessible water. There is an urgent need to adopt a new "water ethic" that puts protecting water and restoring watersheds at the centre of our lives if we and the planet are to survive. Allowing the transport of chemical-laden toxic energy sources near or on the Great Lakes and St. Lawrence River is an act of sheer folly. We can – and must – say no.

There is an urgent need to adopt a new "water ethic" that puts protecting water and restoring watersheds at the centre of our lives if we and the planet are to survive.

Photo: NASA

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