

November 30, 2021

Ontario Ministry of the Environment

Reference: [Submit a comment | Environmental Registry of Ontario](#)

Thank you for accepting comments with respect to your new SO2 emission reduction target for industries in Sarnia.

I am a father, a professional engineer, and a resident of Sarnia who was born locally in Petrolia, Ontario. I have worked in almost all of the industrial plants here in Sarnia. I have installed 20 kw of solar panels personally and have been responsible for creating the first carbon negative (20,000 tonnes/year) greenhouse in North America in this area. Energy creation in Canada is a strategic need for all of us. We rely on outside suppliers at our peril. Please listen to what I have to say and forward this note to your superior after you have read this.

No one agrees more than I, that we need to leave this earth at least as good as we found it but we need a well published plan to align everyone's efforts. I view this task as a massive effort on scale with the war efforts. That magnitude of effort does not happen without directed effort toward a scientific solution.

I would like to discuss the Ministry's planned path forward regarding this proposal. I would very much appreciate discussing these issues in person at much more detailed level. I very much disagree with the path that the Ministry is taking and outline what is arguably a more correct path following. Painting industry into a corner does not in any way solve the problem and in fact makes it much worse. These are mission critical, strategic suppliers for Canada and should not be pushed out of our country.

**Scenario 1:**

This is the current scenario that is being pursued by the Ontario Ministry of the Environment. It basically involves raising emission standards until the goal of lower or zero emissions are met and allowing the local industry to sort out how to reach that goal.

This would a great method if:

- The Canadian supply of gasoline, oil and plastic resin cannot be satisfied by regions outside of the Canadian realm of control. In this case, these products can and will be supplied by regions with much worse environmental and human rights. Since these products are supplied outside of our region, this scenario of progressively painting just our local industry into a corner will result in industry leaving. No one benefits from this result. Not local, not Canada, and not the earth. We need to pivot our thinking.
- A cost competitive solution exists that is used by all other competing facilities, making the playing field equal. There are NO solutions that move us totally toward the goal of zero emissions. Other competitors do not have the same economies of scale issues, and regulatory requirements. We need to pivot out thinking.

**Scenario 2:**

Specify the goals as the Ministry has done and provide support that industry can take to reach that goal.

This would be a great method if:

- We had a clear understanding of what the end picture looked like. Just like when oil was discovered here in 1857 and the technology around it was developed here, we could again be founders in the new energy realm. Please review what the end picture looks like below.

### **Scenario 2: Begin with The End In Mind**

This is a very high-level view of the problem with solutions that are practical and proven right now. A “Low Carbon” solution is not the end goal and is only “noise” in our quest to reach the end goal, slowing us down when we have little time. Why would we promote this path anymore?

In 1857 we were at the heart of the energy revolution. We have the skill set and desire to do it again. Together, we can accomplish this goal of zero emissions. Our current path is deadly. We need an immediate clear path on the best Energy Creation, Energy Storage, and Energy Transportation modes. Please prove me wrong.

#### **Energy Storage**

We need a way of storing energy in a dense form that does not pollute the environment in any way. “Low Carbon” solutions are not solutions.

- This dense energy storage in the past was in the form of Natural Gas, Propane, Gasoline and other hydrocarbons which were then oxidized in ICE or other engines. We need to pivot away from this mode of energy storage and use.
  - Capturing CO<sub>2</sub> from the air (at concentrations of 400ppm) together with hydrogen from water for use in creation of hydrocarbons is extremely costly and energy inefficient due to the relatively low concentrations of CO<sub>2</sub> in ambient air.
- Low energy storage can be done in batteries, but we need to pivot away from this mode of energy storage for the some of the reasons below:
  - Rare earth metals are scarce and costly to obtain.
  - Rare earth metals are primarily found in areas not friendly to western standards for the environment and treatment of humans.
  - It is a low-density storage medium.
  - The total cost of the end-product (lithium batteries for example) from an environmental perspective seems similar to that of fossil fuels. The pollution is just redirected from the air to land and water.
- Dense energy storage can be done by using liquified anhydrous ammonia (NH<sub>3</sub>).
  - Easy to create with electrical energy, water, and ambient air (70% of which is Nitrogen).
  - Stores as a liquid in low pressure vessels like propane. Can use existing natural gas storage capacity, lines and pumping systems.
  - Does not rust or degrade existing infrastructure for energy transportation.
  - Is more energy dense than gasoline or diesel fuels, and can be mixed with existing fuels to immediately reduce emissions.
  - Can easily be converted to hydrogen for fuel cell efficiency in the future.
  - Is environmentally friendly at low concentrations and is very water soluble.

- Is safe from an environmental point of view.
- Is easily detectable.
- Is not a long-lived greenhouse gas since it is quite reactive, forming plant fertilizers very quickly in the atmosphere.
- Dense energy storage can be done by using liquified hydrogen (H<sub>2</sub>) but we need to pivot away from this mode of energy storage.
  - Requires very high compression and low storage temperatures to liquify, resulting in nearly impossible and very expensive dense storage of energy.
  - Is an explosive gas.
  - Is difficult to detect.
  - Molecularly leaks out of every container.

### **Energy Transportation**

- We need a way of transporting energy to heat and power our homes using the existing infrastructure that we have already.
  - There is no chance that our existing electrical infrastructure can carry the energy required heat our homes. In addition, the transportation losses incurred from electrical transmission lines of about 20% is a significant loss to the environment.
- We need a way to charge our vehicles quickly and cost effectively.
  - We already have the infrastructure and knowledge to do this using anhydrous ammonia.

### **Energy Balance – How much do we need currently and where will it come from?**

There is a strong correlation between the amount of energy available per capita and the standard of living. This would not have a derogatory implication if energy was clean and freely available. Unfortunately, until now we have not been good stewards in the creation of energy. Let's lead that practice now.

We need to find out how much total energy is needed in Canada given the proper choices above. To put it in perspective, looking at the current Canadian Energy consumed, and assuming that energy conversion using electricity efficiency is 50%, just for our own Canadian consumption needs, we need to produce approximately 7 times more electricity (an additional 13.8 Petajoules) than we currently do. This does not include the fact that currently we export 80% of our energy in the form of fossil fuels and it would be prudent to service this market as well using our existing infrastructure.

We need to immediately see reality and dictate that nuclear energy is our only immediate solution that will not pollute the environment. We had a great nuclear program in Canada, but we neglected it and it is not producing what we need. There are nuclear technologies that we should be leading in, not the least of which is thorium salt reactors and modular reactors. We should take the lead at recycling spent nuclear fuel for so many reasons.

Let's get our act together folks. The timeline for building is decades and we don't have that much time remaining. We have the skill and desire to make Sarnia and Canada a leader in the new energy revolution. Please help us do it. Please provide the path, and funding to allow us to do this.

Supporting Documents

<https://www150.statcan.gc.ca/n1/daily-quotidien/210121/dq210121d-eng.htm>

“Use of NH3 fuel to achieve deep greenhouse gas reductions from US transportation

[Rare Earth Elements: Where in the World Are They? \(visualcapitalist.com\)](https://visualcapitalist.com)

