

## How can renewable energy benefit remote communities?

In the news lately has been the plight of First Nations communities in Canada. Very often, these communities are remote and isolated from other communities. The isolation has adverse effects not only on the local economies but also on the physical and mental health of the communities' aboriginal inhabitants.

On the recent Attawapiskat crisis, Federal Minister of Health, Dr.

Jane Philpott stated:

"When I think that there are communities in our country where young people in groups are deciding that there is no hope for their future, we must do better, we have to find a way to go forward."

These remote communities are very often located in Canada's north and are surrounded by vast, renewable energy resources (ie, wind and hydroelectric). Because of their remoteness, there has been no way to harvest these resources and transport them to southern communities where renewable electricity is desperately needed. Indigenous people are ideally suited to husbanding these resources and ensuring that harvesting renewable energy resources are done in a sustainable manner. Investing in renewable energy in Canada's North would create vibrant and prosperous northern First Nations communities.

Hydrofuel Inc. is currently working on a system to store renewable energy chemically in the form of anhydrous ammonia (NH<sub>3</sub>). The University of Minnesota has already pioneered this technology with their small-scale wind to ammonia project. We are working with UOIT to develop utility-scale chemical storage of electricity using anhydrous ammonia. Remote NH<sub>3</sub> production may be safely and economically transported by a variety of means including pipeline, rail, and ship. This is far more economical than building and maintaining thousands of kilometers of overland and undersea high voltage power lines. As one of the world's most manufactured commodities, surplus NH<sub>3</sub> can be readily sold as a fertilizer or as a chemical feedstock. Our goal is to make NH<sub>3</sub> the carbon-free motor fuel of the future today.

### MITACS

Project: Comparative assessment of NH<sub>3</sub> production and utilization in transportation systems for Ontario

### MITACS

Report - GREEN TRANSPORTATION FUEL: AMMONIA

Green ammonia is manufactured from nitrogen from the atmosphere and hydrogen from water using electricity ultimately from the sun. Brown ammonia is manufactured from fossil fuels. When ammonia reacts with oxygen, it once again becomes nitrogen and water. We believe that green ammonia is the ideal carbon-free fuel because:

- It is the one of the highest-manufactured chemicals in the world.
- It contains more hydrogen than liquefied hydrogen per unit volume.
- It is handled and transported very much like LPG.

- Very small leaks are easily detectable by the human nose without the complexity of added odorants.
- Any spills dissipate into the atmosphere, where photo-dissociation breaks it down without any greenhouse gas effect.

For more information about using ammonia as a carbon-free fuel and energy currency, the Iowa Energy Center and NH3 Fuel Association are excellent places to start.

Hydrofuel Inc is working with UOIT to commercialize their ammonia synthesis technology, including the microwave dissociation of methane into hydrogen and carbon black. You may be interested to know that Japan is also working on developing ammonia as a carbon-free fuel. Visit the 2015 NH3 Fuel Conference to see what the Japanese are working on.

We believe that anhydrous ammonia is the ideal carbon-free fuel that is Bill Gates's "energy breakthrough".

The Globe and Mail: Bill Gates urges boost in funding for 'energy miracle'

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Insider: THE BILL GATES INTERVIEW: An energy miracle is coming, and it's going to change the world

Globe & Mail: Mr.

Gates is backing several battery companies, but said progress has been slower than proponents had hoped. The big breakthrough would come if researchers can find a cost-effective way to use solar energy to create liquid fuels, thereby eliminating the storage conundrum, he added.

The generation of renewable energy rarely matches electrical demand in the grid. Here in Canada, we have vast renewable energy resources that are far from the areas of the continent that need it. Very often, those energy-rich areas are within First Nations territories. We believe that First Nations can benefit from these renewable energy resources with the manufacture of anhydrous ammonia.