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In This Issue:

PEI ADAPT Council Hosts Biofuels Forum and Biodiesel Workshop November 9-10

130 enthusiastic participants, mostly farmers, met for a day to discuss the potential for PEI crops to contribute to reductions in greenhouse gas emissions and greater energy self-reliance on Prince Edward Island.

After a day of discussions, 60 producers attended a workshop to learn how to make biodiesel for running their farm equipment.

During the forum host of speakers including Premier Pat Binns, Energy Minister Jamie Ballem, Richard Ablett, the CEO of the Atlantic Bio-Venture Centre; Michael Main, a research associate at Nova Scotia Agriculture College, as well as Roger Samson, REAP Canada and Will Proctor, the Agriculture Innovation Officer for the department of Agriculture, Fisheries and Aquaculture, tackled the question "Can P.E.I. Agriculture be a Net Energy Producer?"

Other presenters also included Ray Carmichael, the Chief Executive Officer of Greenway Oils Inc.; a farmer led initiative to develop and distribute biofuels, John Houke of Foxcreek Consulting Services.

The two workshop leaders included, Steve Fugate,owner of Flying F Bio Fuels (see www.ffbiofuels.com) Tiffin, Iowa and Ron Truitt, CEO of Green Eagle Energy, New Bethlehem, Pennsylvania

In the summer of 2004, Fugate started the Yoderville Biodiesel Co-op. He has developed the Ester Machine, which now powers over a dozen vehicles within the co-op. The Ester Machine is capable of processing 40 gallons of oil every 1.5 hours. The company is currently manufacturing a mobile biodiesel production/demonstration unit. The Biodiesel Travel Unit will be able to produce up to 500 gallons a day. A "super ester" machine is also in the works that will allow for production of 15,000 gallons of biodiesel a month.

Ron Truitt and his son Wayne, run Green Eagle Energyfrom their home in New Bethlehem, Pennsylvania. The firm has developed a Biodiesel Fuel Processor that will convert new or used vegetable oil into high quality Biodiesel fuel for about $.75 cents per gallon.

"Biodiesel fuel is very simple to make," Truitt said. " It's made by chemically altering the molecular structure of any organic oil through the use of a chemical catalyst and an alcohol." To do this, he said the oil is simply heated to a designated temperature and then the mixture of catalyst and the alcohol are added to the oil. This is then mixed for a period of time and then allowed to set for a few hours.

The company runs all of its equipment on biodiesel fuel including excavators, pavers, tractors and trucks.

Although Truitt claims that biodiesel can be mixed with any regular diesel fuel in any ratio. He says that when biodiesel is mixed at a 50% or higher ratio it leads to a reduction in engine noise, a smoothing of the engine, a noticeable change in the smell of exhaust, more power and up to 20% more fuel mileage.

Word is that the participants found that the level of discussion, starting with government policy followed by scientific theory and progressing hands on experiences with both liquid and solid fuels made for a stimulating day; one that will most likely result in significant uptake of further experimentation.

During lunch and nutrition breaks, participants were able to inspect various biofuels displays including a biodiesel processor, grass and grain furnaces and solar energy equipment.

In the afternoon, Roger Samson and Will Proctor ignited significant interest with their presentations on the economic potential of using Island grown grasses and grains to burn as fuel for heat and electrical generation.

Copies of most of the speakers presentations will be available on ADAPT’s www site: http://www.gov.pe.ca/af/agweb/index.php3?number=69584&lang=E

Ethanol’s Potential: Promise or Threat?

By Sylvia Welke

Touted by many as the answer to pollution, greenhouse gas emissions (GHG) and dependence on foreign oil, production of ethanol from plant biomass is rapidly gaining momentum worldwide. Almost everyone, it seems, is on the ethanol bandwagon. China, South American and African countries are eagerly following Brazil, the world leader in ethanol production.

Here in Canada, Prime Minister Stephen Harper announced that 45% of all gasoline sold by 2010 in Canada will contain 10% ethanol and that all should contain 5% ethanol by that time. For some, the government should have gone even further. The Saskatchewan Government, for instance, was lobbying for at least a 10% ethanol blend for all gasoline by 2010 in order to provide the province's farmers with an economic boost.

Saskatchewan is only echoing the general excitement around and investment in ethanol, which is part of the broader group of biofuels. According to an Environment Canada definition biofuel "is any automotive, domestic, commercial or industrial fuel derived from recently living organisms or their metabolic byproducts, rather than natural resources, such as petroleum, coal, and nuclear fuel."

Canada is a minor player in terms of ethanol production with Brazil, the world leader, producing 45.2% of the world's total (or 16.5 billion litres according to 2005 figures) from sugar cane and the United States, 44.5% (or 16.2 billion litres) from corn. Ethanol fuels around 40% of Brazil's non-diesel vehicles compared to just under 3% of such vehicles in the U.S.

Ethanol supporters complain that Canada is lagging behind many countries when it comes to legislating the use of ethanol noting that even the anti-Kyoto U.S. government has introduced its Renewable Fuels Standard which will require the use of 28.4 billion litres of biofuels for transportation by 2012 and has mandated that many government vehicles use B20 (20 % ethanol blended gasoline) for the past 10 years.

The European Union in its support of the Kyoto Protocol and its desire for greater energy security plans to meet nearly 6% of its transportation fuel needs from biofuels by 2010 in all of its member states. Germany and France, in particular, have announced plans to rapidly expand both ethanol and biodiesel production, with the aim of reaching the EU targets before the deadline. Many other countries around the world are following suit and are looking into mandating ethanol blends provided they can meet the biofuel supply and increase local production.

ETHANOL IN BRIEF
One acre of corn can produce 300 gallons of ethanol -- enough to fuel four cars for one year with a 10% ethanol-blend.
Global ethanol production more than doubled between 2000 and 2005, and comprises about 1.2% of the world's gasoline supply by volume (slightly less by transport distance traveled due to its lower energy content).
Demand for world oil has increased by around 5% in only two years (2002-2004) due in large part to the increased consumption in China (just under 30%), in Canada (10%), in the United Kingdom (about 7%) and in the U.S. (about 5%).
Ethanol production is touted to create 100 times more jobs than in the fossil fuel industry. In Brazil, it accounts for half a million direct jobs.

Yet, despite the hype about ethanol, is it all it is cracked up to be? The production of ethanol has become a topic of much debate with its proponents claiming it to be key in the energy crisis solution while critics point to its negative environmental and economic impacts.

Ethanol's Potential

Supporters of the ethanol industry (and they are in the majority) most often cite the potential for ethanol blended gasoline to reduce greenhouse gas (GHG) emissions from transportation as justification for increasing production. Those in favour of increasing ethanol production also believe that most currently produced biofuels generally have a positive GHG balance. That argument is based on the idea that energy crops sequester soil carbon as they grow and that no new carbon is released in contrast to fossil fuels.

This is particularly true for dedicated energy crops (e.g. sugar cane or fast-growing hybrid poplar plantations) and crop or wood waste residues. However, the technology for converting such high-cellulose feedstocks is still very expensive and not yet competitive with the conventional ethanol production process. For example, switchgrass and hybrid poplar have the potential to reduce GHG emissions between 70-110% and waste oil and harvest residues between 65-100% while corn and wheat between 15-40%.

Given rising oil prices and the decreasing cost of ethanol production, the economics are starting to turn around from just a few years ago. A recent report, sponsored by the German Federal Ministry of Food, Agriculture and Consumer Protection (BMELV) estimates that ethanol production in both Brazil and the United States is less than the current cost of gasoline. And if oil prices continue on their upward trend, authors of that report suggest that up to 75 % of the American transport fuel could consist of biofuels.

Biofuel production has the added appeal of creating jobs and keeping money within the national economy. For instance, the economic savings with the use of biofuels can be considerable when oil imports are avoided. Brazil can attest to this with savings of about $120 billion (reduced oil imports and avoided interest that would have been paid on foreign debt) over a 30 year period. And then there are carbon credits which would put ethanol production in very good economic stead.

The Energy Balance

The debate over the energy balance of biofuel production is heated. Critics suggest that for most energy crops, particularly corn, more energy is required to produce ethanol than the energy it can supply. Pimentel and his co-workers, for example suggest that the production of ethanol from corn is highly inefficient using nearly four units of energy per unit of energy used. In other words, ethanol from corn uses 29% more energy than is derived from it and would cost tax payers considerably more than conventional gasoline (in both subsidies and production costs).

Ethanol supporters say that while the negative energy balance was a fact a few years ago all common biofuels (e.g. from corn and sugarcane) exceed an energy balance of one now with improved energy efficiency in agriculture and ethanol refining. In contrast to Pimentel's work, a recent University of Minnesota study showed that ethanol produced from corn produces 25 percent more energy than it consumes but admits that the energy gains of ethanol are modest at best. Researchers for the United States National Corn Growers Association see Pimentel's work have – surprise – a different view and see his research as fear mongering, claiming that he used old and/or irrevelant data.

The energy balance most certainly depends on the feedstock used (e.g. corn or hybrid poplar), the distance traveled to processing and the amount and type of energy required to process the feedstock (i.e. is the plant coal-fired or is co-generation used?). In the case of corn, a fossil fuel intensive crop, it is easy to see how ethanol produced from it makes little economic and environmental sense.

Ethanol's Potential Threat

Ethanol production from plant biomass is not the panacea it appears to be for a whole host of environmental, ecological and social reasons. The move to increase ethanol production has its critics who at the very least are cautious about growing crops for fuel rather than for food. Others are not just cautious but believe industrial scale ethanol production requiring vast acreages of agricultural land poses a major threat to food production and could lead to mass starvation.

Why? High-priced oil is making our traditional food crops look more interesting in the form of fuel. Wheat, corn, sugar cane, soybeans, canola and palm oil at the gas pump rather than on grocery store shelves? Yes, when food and feed crop prices are low and oil prices high. Those commodities will go the highest bidder, in this case biofuel production. Therefore, vegetable oils trading on the European market may end up at service stations as biodiesel instead of in the grocery store.

The world's farmers in both hemispheres can now not only produce for the food processing market but an increasingly competitive biofuel market. Consider this: In 2004, the U.S. used 32 million tons of corn to produce ethanol and although this represented a mere 12 % of the country's corn crop, it would have fed 100 million people.

Many developing countries, however, see biofuel production as an opportunity to provide an income for their farmers and as indicated above a way to decrease imports and foreign debt while at the same time profiting from their good year-round growing conditions (which gives them a strong comparative advantage in the world market).

However, countries need to look at the balance between food and feed production, and the benefit from lower oil imports through the production of biofuel. If, for example, the European Union wanted to provide 10 % of its energy needs with biofuel, it would have to convert 70% of its agricultural land into energy crop production, reported an OECD study. The U.S., Brazil and Canada would have to convert about 30, 3 and 0.3 % of agricultural land, respectively.

The rate of agricultural land conversion varies depending on the energy crop used and the transportation of the energy crop to the processing facility. High transportation costs increase land requirement with the current ethanol production technology. Proponents believe that less land will be required as production technology advances and yields of energy crops increase.

Also as technology is refined, cellulose-based feedstocks could be used such as corn stalks, woody residues, wood from fast-growing plantations and even leaves. This would reduce not only the cost of ethanol production but also reduce the market impact on food and feed commodities. Still the technology of cellulosic conversion to ethanol is in its infancy, leaving the threat of agricultural land conversion to biomass crops real.

From another angle, some critics say that ethanol blended gasoline will actually cost the consumer more giving the high-priced technology involved in its production, the transportation required and the process of blending ethanol with gasoline.

The Environmental Downside of Biofuel

But it is not only agricultural land and its conversion that are at stake. Expanding sugarcane production in Brazil into the Amazon basin for the purposes of biofuel production puts plant and animal diversity at risk. The same could be said for the hundreds of acres of mono-cultivated corn for fuel in Iowa that are hardly an example of biodiversity and run the risk of increased disease and pest problems.

Corn, the principal supplier of ethanol in North America, is hardly environmentally benign. It is pesticide and fertilizer intensive and has significant releases of nitrogen, phosphorus and pesticides in its runoff. These compounds easily make their way into human and animal drinking water sources. There is also increased potential for soil erosion and eventual loss in site productivity. This could, say ethanol proponents, be minimized if ethanol were produced from crop residues and dedicated crops that used significantly fewer inputs than corn.

The increased demand for non-food ethanol crops such as wood or wood residues could result in pressure on forest land and lead to increased cutting and thus, greater land degradation. Instead wood biomass should focus on the use of existing wood residues, for example from pre-commercial thinning; harvesting and processing residues; and dedicated woody crops.

When fossil fuels are used in the ethanol production process, be it for the production of fertilizers and pesticides used in growing the corn feedstock for ethanol or for fueling the ethanol production process (e.g. coal or nuclear), GHG are emitted even if at a reduced rate (about 12% according to most studies) compared to fossil fuels. Furthermore, when forested land is converted to the production of biofuel, be it ethanol or biodiesel, as in the Brazilian rainforest, then the carbon that was stored is released both in terms of the wood that is cut and the increased decomposition that follows in soils.

The goal of society at this point in time should be no emissions or very low ones rather than a small reduction in GHG emission over the current rate. The increased use of inputs for growing energy crops, the conversion of forested land and the use of fossil fuel for the production of biofuel do not present a likely scenario for achieving this.

The question of genetically-modified organisms also arises with the production of energy crops. Brazil, for example, plans to use GMO soybeans for its biofuel production. The use of GMO crops in fields has the potential to spread to non-GMO crops. Genetic modification is also implicated in the biofuel conversion process where organisms such as yeasts are used to ferment the feedstocks, however, here the organisms are at least in isolation. Hybrid poplar or other fast-growing trees for ethanol can also be genetically modified and thus, have consequences in terms of forest ecology. Of course, there are proponents of ethanol who do not believe that GMOs are necessary for efficient production.

Human health

With increased concentrations of ethanol in gasoline, the amount of smog producing substances produced will increase endangering even further the health of humans, particularly children, the elderly and the immunocompromised. Ethanol also increases emissions of acetaldehyde and formaldehyde upon combustion – both known carcinogens - up to 70%. Increased use of ethanol may also increase atmospheric levels of peroxyacetylnitrate (PAN), a genotoxic (causing damage to genetic material) substance.

Increased exposure to ethanol with its increased use may also other health effects including developmental toxicity, central nervous system dysfunction, teratogenicity (birth defects), reproductive disorders and cancer. While data is still lacking, some studies suggest that these impacts on human health may already occur at low ethanol exposure. The increase in trucking, the most efficient way to transport ethanol, would further impact air quality.

Organic biofuel?

Researchers in Denmark have suggested that organic farming in that country has considerable potential to provide national bioenergy. Biogas, for example, could be derived from livestock manures and from grass/clover production. Some canola oil for biodiesel is already being manufactured but acreage could be increased while short-rotation alder plantations for combustion could be planted on set-aside areas and on permanent grasslands.

Thus, according to their models, organic biofuel crops could lead to 20% reduction in oil consumption and 25% reduction in energy consumption for housing and machinery. Ecologically sound biofuel production should aim, as organic agriculture has done or tried to do, for a relatively closed energy cycle. At the same time, it will ensure lower energy consumption per unit energy produced, water quality protection, recycling of nutrients, reduced nitrous oxide emissions and increased soil carbon storage.

The Danish study points to the possibility of integrating ethanol production at the small, local scale into existing agricultural operations without threatening agricultural land but possibly contributing to reduction in oil use.

The bigger picture

Even proponents of ethanols generally agree that ethanol is only part of the solution and given the potential threat of ethanol to agriculture, and organic agriculture specifically, and to the environment, human health and social well-being it should remain a small part. Surely driving less (and using mass transport more) and driving smaller, less-polluting vehicles is a key ingredient to a healthier planet and its inhabitants. Redesigning cities to facilitate cycling and walking to work and amenities and conversely discouraging vehicular traffic is essential to a solution. Sprawling suburbia is not. Electric and/or solar powered vehicles? Perhaps they are part of the answer too. All of these potential solutions imply social change which is always more difficult and long-term (i.e. less politically appealing) than a quick-fix solution like a seemingly “green” fuel.

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Used Cooking Oil to Fuel China's Expanding Car Fleet
by Yingling Liu, Worldwatch Institute; October 12, 2006

Biodiesel fuel is proving beneficial to China's caterers, the auto industry, and the environment in general.

With annual consumption of edible oils approaching 22 million tons, the country generates more than 4.5 million tons of used oil and grease each year, roughly half of which could be collected through the establishment of an integrated collection and recycling system.

Enter a typical Chinese restaurant, and it's not hard to notice the chef's generous use of cooking oil. Famous for their fried, stirred, and boiled offerings, China's kitchens also generate millions of tons of cooked oil residue each year.

Historically, this waste has had two destinations: either it is discharged into local sewage systems (and thus often referred to as "ditch oil"), or it is covertly reused in substandard kitchens, contributing to frequent food-poisoning incidents. In recent years, however, the oil has found a third incarnation: as fuel for the nation's rapidly growing automobile fleet.

Biodiesel is a non-toxic, biodegradable fuel that can be made from a range of organic feedstock, including new or waste vegetable oils, animal fats, and oilseed plants like palm. Used in its pure form in diesel-engine vehicles, or blended with gasoline to boost car performance, biodiesel has significantly lower emissions than petroleum-based diesel when burned. According to a 1998 report by the
U.S. National Renewable Energy Laboratory, it results in carbon monoxide reductions of approximately 50 percent over regular diesel, and carbon dioxide reductions of 78 percent, on a net lifecycle basis.

China's biodiesel production began in 2001, initiated by a group of businessmen in the chemical industry who knew that the fatty acid residues from salad oil production could be processed into automotive fuel. At the time, the oil wastes cost 1,700 yuan (US $212) per ton, while the price of petroleum-based diesel was 2,800 yuan (US $350) per ton. With little research or information available, the group began to design simple equipments and to experiment with fuel production, relying on their own business savvy and expertise in chemical production.

After achieving success with the salad oil wastes, the group expanded its feedstock to other inexpensive supplies, such as used oils, waste animal fats, and wild oilseed plants. Unlike their U.S. or European counterparts, who have relied mainly on fresh vegetable oil or soybeans to process biodiesel fuel, China's entrepreneurs have had to focus on waste oil sources from the very beginning, constrained by the shortage of new vegetable oil in the world's most populous country. With their flexibility and ingenuity, however, they managed to make a profit without any government subsidies.

As world petroleum prices rise, and as China becomes increasingly reliant on imported fuels (diesel demand continues to outpace supply by some 50 million tons annually), the government has since stepped in to boost the fledgling biodiesel industry. In 2004, the Ministry of Science launched its biofuel technology development project; the following year, the government initiated a special agricultural and forestry biomass development program, setting a nationwide target for annual biodiesel production of 2 million tons by 2010 and 12 million tons by 2020.

China has also intensified its research and development in biodiesel technology with a series of government-led research programs and a special fund dedicated to this endeavor. Researchers have achieved several technological breakthroughs, enabling producers to diversify their feedstock and cut costs.

By 2005, the feedstock cost for biodiesel production in China had decreased to less than 2,000 yuan (US $250) per ton, less than half of the 5,000 yuan (US $625) per-ton cost that resulted from the use of U.S. or European technologies. Even though China's biodiesel is sold at a cheaper price than petroleum-based diesel, producers still earn a profit of roughly 1,500 yuan ($187) per ton.

Market incentives and increased government support have enabled biodiesel production projects to mushroom nationwide since late 2005. Before 2004, only three companies (in Hainan, Sichuan, and Fujian provinces) engaged in the fuel's production, with a combined annual capacity of 40,000 tons.

Today, however, China boasts more than 100 biodiesel production facilities, attracting not only the private sector, but also state-owned enterprises and foreign investors. Unlike the trial projects of previous years, which averaged an annual output of only 10,000 tons, many facilities now under construction are projected to produce more than 200,000 tons a year. In 2005, China manufactured 110,000-120,000 tons of biodiesel fuel; in 2006, production is expected to reach 1 million tons.

The frenzy in biodiesel expansion has brought environmental concerns, however. Although the main feedstock used in China is still old cooking oil, grease, and animal fats, the industry is eyeing the establishment of vegetable oil and oil-tree plantations out of a fear of resource constraints. Some manufacturers are already processing biodiesel from rapeseed, soybeans, and cottonseed, while a handful of others are establishing or planning to establish plantations of oilseed crops such as Jatropha curcas and Chinese pistachio (Pistacia chinensis) in the country's forest-rich southwest and ecologically sensitive central region. Blind expansion of oil-producing crops, however, has the potential to encroach on arable lands for food production or lead to deforestation and ecological degradation.

So far, China's feedstock constraints are not pressing. With annual consumption of edible oils approaching 22 million tons, the country generates more than 4.5 million tons of used oil and grease each year, roughly half of which could be collected through the establishment of an integrated collection and recycling system. Those 2 million tons of "ditch oil" alone would guarantee the smooth operation of all current biodiesel production lines. In the longer term, however, it would be appropriate to use only marginal lands for establishing oil-tree plantations, to minimize biodiesel's looming threat to the environment.

For further Information: www.worldwatch.org/taxonomy/term/53

Pumpkin Power Dawns for African Mobile Phone Networks
By Lucas van Grinsven, European Technology Correspondent,
From: Yahoo News; Wednesday October 11, 2006

AMSTERDAM (Reuters) - Palm and pumpkin seed oil could soon be generating electricity to help power mobile phone networks across Africa under a plan to replace fossil fuels with sustainable biofuels made from crops grown by local farmers.

Swedish telecoms networks group Ericsson and South African cellphone operator MTN said on Wednesday they want to start replacing diesel with biofuels in electricity generating stations powering mobile phone base stations in rural Africa.

Supported by the GSM Association's development fund, they will start with a project in Nigeria to use biofuels for power generators supplying mobile base stations located beyond the reach of the electricity grid.

"We're planning to replicate this in Uganda, Rwanda and Kenya. India and Bangladesh have also expressed interest," said Ben Soppitt, program manager emerging markets at the GSM Association (GSMA).

Starting in Nigeria, Africa's most populous nation, fuel will be processed from palm, groundnut, pumpkin seeds and jatropha.

The crops to generate the biofuel will be cultivated close to the base stations, helping local farmers, cutting dependency on fossil fuels and reducing fuel transportation needs. The cost of fuel, including security to protect transport and storage, can be 80 percent of the cost of a rural phone network.

MTN operates in 21 countries in Africa and the Middle East and had 31 million subscribers, while Ericsson is the world's biggest mobile phone networks company with around 30 percent market share.

Africa Takes the Lead

"The early adoption of biofuel-powered mobile networks would place Africa at the forefront of a new wave of innovation," said Karel Pienaar, chief technology officer at MTN.

Soppitt said the mobile industry could be the world's first to put alternative energy at the core of its operations.

"Ericsson has been working on this for a while, and with their significant market share the entire market will move with them," he said.

Rural areas in emerging economies where most new mobile phone subscribers come from are often not connected to the electricity grid, which means that the base stations to connect mobile phone users to the network are powered by generators.

In Nigeria, 75 percent of the country is not grid-connected.

Fuel consumption by these base stations can be significant. Ericsson estimates 25,000 liters of fuel are needed every year to power a base station. The same amount would power close to 20 cars, each driving 20,000 kilometers, for a year.

Worldwide, tens of thousands of new base stations are erected every year, most of them in rural areas as operators aim to expand the coverage of their networks. There are currently close to 2.5 billion mobile phone users on the planet.

The GSMA hopes that the introduction of biofuels will be significantly cheaper than using diesel, and hopes for total cost reductions of 30 percent or more.

"You need to achieve a 30 percent improvement to create sufficient momentum for change," Soppitt said.

Ericsson estimates around 0.5 square kilometers of palm oil crops are needed to generate the fuel for 20 base stations, the equivalent of 83 football fields.

The crops will be processed into fuel at local facilities.

Ericsson will control farming methods, making sure crops are not genetically manipulated, are grown sustainably and do not require fresh clearing of land by cutting forests.

Solar and wind energy are also being investigated as alternative power sources for remote base stations.

Exploring a Green Power Strategy for Atlantic Canada

Pollution Probe, working with the Marine & Environment Institute at Dalhousie Law School, conducted a workshop on Exploring a Green Power Strategy for Atlantic Canada. The focus of the workshop was on the use of Green Power for electricity generation. The Atlantic Region, along with other regions in Canada, is facing expanding demand for electricity, rising energy prices, aging infrastructure and energy security issues. It is also facing air quality issues with their related health impacts and obligations related to climate change. The main objectives of the workshop were to begin a process to build consensus for a green power vision and strategy for the Atlantic Region and to identify the elements needed for a green power vision and strategy for the Atlantic Region.

Check out the full report at:
http://www.pollutionprobe.org/Reports/Towards%20a%20Green%20Power%20Vision%20and%20Strategy%20for%20Atlantic%20Canada.pdf