



**Submission for Nova Scotia
Department of Energy's
Energy Strategy and Climate
Change Action Plan**

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Nova Scotia's Energy Path

Decades ago, energy crises forced Nova Scotia to choose an energy path for the future; that choice was to exploit the local coal resource because it was cheap and effective and supported local employment. It is now evident that this was the wrong choice due to the high carbon intensity and pollutant emissions of coal. The results are the anthropogenically-induced climate change to which our fossil fuel based economy and society contribute, along with the air quality concerns that directly affect the health of Nova Scotians and add to our health care costs. Now is the time to alter our carbon intensive energy path by taking a long-term, sustainable approach to meet our needs, thus ensuring a prosperous and healthy Nova Scotia for years to come.

Emission Reduction Target and Associated Costs

Although Clean Nova Scotia strongly supports the absolute nature of the GHG emission reduction target as set out in the Environmental Goals and Sustainable Prosperity Act, we also believe that a more stringent, science-based target should be implemented; a minimum 25% absolute reduction of provincial GHG's below 1990 levels by the year 2020 and a minimum 80% absolute reduction below 1990 levels by the year 2050 should avoid dangerous climate change.¹ This long-term view for decisions that influence our energy path is vitally important because life cycle analyses often yield different results (environmentally, economically and socially) than short-term perspectives and climate change is a long-term problem.

Reducing our carbon emissions by this level will require major investments, both in the short and long-term. However, a recent report by former chief economist and Senior Vice-President of the World Bank Sir Nicholas Stern states that failing to tackle climate change will cost between 5 and 20 per cent of global GDP and could cause more human and financial suffering than the Great Depression and both World Wars combined; fortunately, the knowledge and technology currently exists to reduce our dependence on fossil fuels and would only cost about one percent of global GDP.² We believe that this investment is not only necessary to prevent disastrous consequences, but will stimulate the economy and employment, and reduce healthcare and infrastructure costs, including rebuilding in coastal areas, in the long term.

In their Fourth Assessment Report, the IPCC estimates that "Climate change policies related to energy efficiency and renewable energy are often economically beneficial, improve energy security and reduce local pollutant emissions", while other mitigation options can provide sustainable development benefits such as avoided displacement of

1 Bramley, M. 2005, The Case for Deep Reductions: Canada's Role in Preventing Dangerous Climate Change, David Suzuki Foundation and the Pembina Institute, [online], Available: http://pubs.pembina.org/reports/Case_Deep_R_E.pdf [2007, November 20].

2 DEFRA (Department for Environmental Food and Rural Affairs) 2006, Oral statement by David Miliband on climate change – Monday 30 October 2006, [online], Available: <http://www.defra.gov.uk/corporate/ministers/statements/dm061030.htm> [2007, November 22].

local populations, jobs and health improvement.³ Moreover, “In all analysed world regions, near-term health co-benefits from reduced air pollution as a result of actions to reduce GHG emissions can be substantial and may offset a substantial fraction of mitigation costs.⁴ Therefore, Clean Nova Scotia strongly recommends the swift introduction of policies and programs for the purposes of climate change mitigation in order to provide the greatest long-term environmental, economic and social benefit.

Emission Cap and Trade, Taxing and Prices

Cap and Trade

A “cap and trade” system for carbon emissions is an idea mentioned on page 18 in the Department of Energy’s ‘Consultation Paper: Nova Scotia’s *Renewed Energy Strategy and Climate Change Action Plan*’. Clean Nova Scotia feels that implementing a “cap and trade” regime would complement the provincial absolute carbon emissions reduction target by ensuring that compliance is encouraged and more easily achieved. However, it’s important to note that although the cap and trade proposition is ideal to meet longer-term goals in the bigger picture, the ability to purchase carbon credits should not be seen as a licence to emit. Higher levels of regulation and more incentives for industry to become sustainable should be implemented to reduce the chances of this occurring.

Carbon Taxes and Pricing

Nova Scotia’s high use of coal for power generation (about 72-74%) results in a very high carbon emission factor of about 929g of CO₂ equivalent for every kWh used in the province.⁵ This is unacceptable and must be lowered to reduce our carbon intensity by creating disincentives for fossil fuel consumption and more incentives for using less and/or renewable energy. Fossil fuel subsidies should be significantly reduced or eliminated to discourage the consumption of fossil fuels.

Other effective initiatives would be to implement a ‘carbon tax’, a ‘tax shift’, two-tiered pricing and a renewable energy development incentive:

- Page 11 of the Department of Energy’s ‘Consultation Paper: Nova Scotia’s *Renewed Energy Strategy and Climate Change Action Plan*’ suggests that an option for increasing energy efficiency and conservation is to create a guaranteed source of funding for energy conservation, efficiency and demand reduction measures. Clean Nova Scotia strongly supports the introduction of a ‘carbon tax’; this would increase the cost of carbon-based fuels to not only provide a guaranteed source of funding but also act to discourage fossil fuel consumption and corresponding GHG emissions. This funding could also be used to provide

3 IPCC (Intergovernmental Panel on Climate Change) 2007, Summary for Policymakers of the Synthesis Report of the IPCC Fourth Assessment Report (AR4), [online], Available: <http://www.ipcc.ch/> [2007, November 22].

4 IPCC (Intergovernmental Panel on Climate Change) 2007, Summary for Policymakers of the Synthesis Report of the IPCC Fourth Assessment Report (AR4), [online], Available: <http://www.ipcc.ch/> [2007, November 22].

5 MacIntyre, A. 2005, Personal Communication, November 6.

- incentives for public transit, provide low or no interest loans for low-income earners (to assist them with energy efficiency/conservation initiatives), as well as to provide incentives for the deployment of renewable energy;
- A 'tax shift' could increase taxes on fossil fuels while at the same time decrease taxes that are unrelated to fossil fuel use by a corresponding amount. In this way, the government receives the same level of revenue overall while society pays the same amount of tax – on average - in the end. This would work to discourage excess fossil fuel consumption and encourage more sustainable choices because of the increased cost of fossil fuels. In principle, a 'tax shift' starts to factor in the external costs associated with the use of fossil fuels (climate change, health care, etc.). This may be employed on a large scale such as – for example - increasing fuel taxes and decreasing income taxes, or on a smaller scale by increasing taxes on inefficient vehicles and decreasing taxes on fuel-efficient vehicles;
 - Two-tiered pricing for electricity where the first 500 kWh per month is charged a certain price but any power above that is charged at a higher rate. This would discourage over-consumption of electricity because less power will be used if the cost is higher for that power. The increase in revenue would create a guaranteed source of funding that could be then used to invest in energy conservation, efficiency, Demand Side Management (DSM) and the development of renewable energy; and
 - Introducing a financial incentive for the development of renewable energy would help to encourage the widespread adoption of sustainable energy. This may include initiatives such as grants/rebates for the purchases of renewable energy system equipment and the introduction of standard offer contracts (this is covered in a later section titled 'Renewables').

Certain sectors of industry rely upon fossil fuel consumption and are heavy polluters; these sectors should be held more accountable. For example, self-employed contractors with heavy-duty trucks obtain tax write-offs for the fuel expense, and may ignore fuel efficiency recommendations such as avoiding idling and not carrying excess weight when avoidable.

Energy Efficiency and Conservation

As noted on page 10 in the Department of Energy's 'Consultation Paper: Nova Scotia's *Renewed Energy Strategy and Climate Change Action Plan*', the single most effective way we can lower our GHG footprint while also addressing higher energy prices and energy security is to significantly increase energy efficiency and conservation at all levels (individuals, business, government and industry). Clean Nova Scotia highly recommends investment in energy efficiency and conservation because – apart from previous reasons mentioned - this approach creates new, local jobs and opportunities as well as a reduced need for expanded generation; this will ensure NS's competitiveness on a global scale.

A Road Map to Leadership

In Clean Nova Scotia's strategic plan, *A Road Map to Leadership* (2007), our first goal says, "**Nova Scotia leads the country in reduction of fossil fuel use.**" The goal identifies a target of a 25% reduction in energy usage by 2012. We feel that there are several effective strategies that will help us get there:

- The **EnerGuide for Houses** program suite. We urge Conserve NS and the NS government to continue the EGH and EnerGuide for New Houses programs, and to assist the federal government in addressing software issues related to the program. These programs create real, measurable, long term energy savings;
- Support for homeowners who want to undertake retrofits. In addition to providing financial incentives, continued education and awareness is important to help homeowners recognise and identify benefits to their finances, health, property and the environment as well as to provide homeowners with skills to undertake basic maintenance;
- We must identify ways to assist and educate lower income Nova Scotians in achieving energy efficiency. The REAP pilot was a start, but Clean Nova Scotia suggests seeking effective ways to streamline the process of identifying and approving lower income homeowners and providing them the retrofits they need to ensure long term energy savings in a timely and respectful manner;
- Transportation (fuel) efficiency must be addressed seriously, including looking at provincial solutions for tourism and the trucking and shipping industry. The feasibility of rail service resumption must be seriously assessed and opened to public response. Before more highways are built, a serious plan for encouraging fuel efficiency and sustainable provincial transportation must be in place, with enforceable legislation. This will include accountability for speed limits, since higher speeds lower fuel efficiency;
- The province should work with municipalities and private industry to ensure that there is accessible public transportation in place that meets the majority of needs in the most-populated areas of the province; and
- Incentives must be attached to technology and infrastructure improvements for the neediest citizens, as well as institutions that assist them - churches, senior centres, non-profits and for business and industry as well (especially small businesses). These may include low or no interest loans that are to be used for energy efficiency or conservation upgrades.

Transportation

It is Clean Nova Scotia's position that in order to effectively decrease Nova Scotia's emissions, the government needs to take a proactive approach to transportation. Due to a combination of factors, Nova Scotians depend heavily on their vehicles. These factors include first, a lack of alternative transportation in most rural areas of Nova Scotia

(including bus, shuttle and rail), and secondly, poor city planning. Nova Scotia has seen the largest decrease in urban density in Canada.⁶

- There are approximately 1.64 motor vehicles for every person in Nova Scotia, the majority (95%) being light trucks and cars.⁷
- Nova Scotians drive more kilometres per capita, per year than most other provinces.⁸
- The average car makes 2,000 trips of 3 kilometres or less - trips that could presumably be made by foot, bicycle or public transit.⁹

While on a positive note, Nova Scotia's average light vehicle fuel efficiency has improved slightly from 2004-2006¹⁰, over one quarter (26%) of Nova Scotia's GHG emissions come from the transportation sector.

There is an opportunity to influence the way citizens get around to achieve significant results and meet the provincial goals and commitments proposed in the Climate Change Action Plan. We can reduce the number of cars on the road, reduce fuel consumption from private vehicles, and reduce the number of kilometres driven per year.

A large part of the solution for Nova Scotia lies in modal shifts from road transport to rail and public transport systems, facilitating non-motorised transport (cycling, walking), land use and transport planning and the use of second generation biofuels. The concerns that will be addressed here focus on reducing vehicle fuel consumption and encouraging carpooling.

Goal: “Adjust how we use transportation.”

Action: Offer incentives for purchasing fuel efficient vehicles.

In 2006, Canadian consumers drove sales of new motor vehicles to the second highest annual sales level on record: 47,738 new cars were sold in 2006; 28,376 were cars, up 8.1 % from the year before.¹¹ Nova Scotia was among six provinces who reported increases in sales of new passenger cars exceeding the national average of 2.1%. Considering the amount Nova Scotians use their vehicles, increasing the general fuel efficiency of personal vehicles will have a considerable impact on our overall emissions.

6 Urban density (people per hectare) is used to assess land use efficiency and accessibility. In general, declining urban density implies movement away from sustainability because residents of dispersed communities tend to use more land and travel more by motor vehicle than residents of more compact settlements. Available evidence indicates that Nova Scotia's urban density diminished by 36% between 1971 and 1996—one of the sharpest provincial declines in the country. GPI, Sustainable Transportation in NS, 2006.

7 In 2006, the population of Nova Scotia was approximately 913,462, with 555,453 road motor vehicles registered in the province; 525,214 weighing less than 4500 kg. Statistics Canada, 2006, Motor Vehicle Registrations

8 Transport Canada, 2005, Passenger Transportation, Light Vehicle and Fleet Use

9 June 4, 2001 (from The Halifax Herald, By Joey Fitzpatrick - PERSONAL AFFAIRS)

10 Going from 11.1 L/100km to 10.8 L/100km, Canadian Vehicle Survey, Annual, 2006

11 New Motor Vehicle Sales: 2006 in Review, Statistics Canada

There are two general methods for encouraging the purchase of fuel efficient vehicles. One option is to use a negative incentive plan, and the other is to implement a positive incentive plan (as seen by the surtax/rebate program offered by the federal government).

The Manitoba government decided to further encourage their citizens to make environmentally sound choices, offering to rebate three percentage points of the provincial sales tax on the purchase of new fuel-efficient vehicles.¹² The rebate would apply to cars with a fuel efficiency rating of at least 6.5 litres per 100 kilometres, and a rating of 8.3 litres per 100 kilometres or better on minivans, sport-utility vehicles and light trucks.

The benefit of a provincial rebate on top of the federal program is that the federal tax on inefficient vehicles tends to disproportionately affect rural residents, where larger vehicles are often necessary for road and winter conditions. Nova Scotia has the opportunity to take a proactive role in meeting its citizens' needs, while reducing its average light vehicle fuel efficiency. By offering a rebate on a wider range of fuel efficient vehicles that meet an agreed upon fuel efficiency, they will level out the disparity created by the federal tax, and benefit both rural and urban residents.

Action: Build high-occupancy vehicle (HOV) lanes

Provincial governments could take a leadership role to reducing the number of vehicles on its roads. Instead of widening roads to accommodate more cars - exacerbating the problem of overcrowded roads and traffic congestion in urban centres - these extra lanes could be used as high-occupancy vehicle (HOV) lanes during peak hours, encouraging people to leave their cars at home, and utilizing vanpools, carpools, buses and rideshare programs. While public transportation in Nova Scotia is concentrated in urban centres, there is an urgent need to reduce the number of cars on the road. HOV lanes would permit buses and vehicles transporting more than three people to use HOV lanes, including buses and shuttle services. The motivation of time savings by driving in the HOV lanes, and potential financial savings associated with carpools would increase motivation to carpool and to use alternative transportation.

Action: Reduce highway speed limits

One significant way to increase fuel efficiency is to reduce speed limits on the highways to 90 km/hr – 100 km/hr. Due to aerodynamic drag, the average vehicle's fuel efficiency drops exponentially when the vehicle exceeds 90 km/hr. Driving 120km/hr instead of 100 km/hr can increase your fuel consumption by approximately 20%.

There is a disconnect between provincial programs like DriveWiser which promote fuel efficient behaviours such as slowing down on the highways, and current highway speed limits. Communicating mixed messages leads to confusion among the public. Along with continued public education, leadership is needed at the provincial level. Reducing

¹² CBC News, April 26th, 2007

maximum highway speeds to 100 km/hr everywhere in the Nova Scotia would ensure messaging is consistent, and that most importantly, there is potential with enforcement for a decrease in vehicle emissions.

Community Outreach and Education

Energy efficiency plays a key role in the *Renewed Energy and Climate Change Action Plan* as stated on page 10:

Reducing energy demand is the single most effective way we can lower our GHG footprint while also addressing higher energy prices and energy security. A significant part of our *Climate Change Action Plan* must involve measures to encourage Nova Scotians to use less energy. These issues include fuel efficiency for vehicles; energy conservation in our homes and buildings; and energy efficiency in our electrical generation and industrial processes.

It also stated on page 11 of the plan under “options for energy efficiency and conservation” that a “guaranteed source of funding for energy conservation, efficiency, and demand reduction measures” could be created, “similar to that enjoyed by the Resource Recovery Fund Board.”

Both the Department of Energy and Conserve Nova Scotia currently fund climate change and energy efficiency initiatives in Nova Scotia, supporting the work of non-profits such as the Ecology Action Centre, ACAP-CB and Clean Nova Scotia in developing and delivering programs. The Climate Change Centre - a program of Clean Nova Scotia - has a mandate of delivering climate change and energy outreach education to all Nova Scotians, with a particular focus area on faith groups, First Nations, youth and educators and post-secondary institutions. CCC staff come into direct contact with people of all ages from different communities in Nova Scotia, permitting CCC staff to see first-hand that Nova Scotians are interested in climate change science, energy efficiency, and renewable energy systems. Nova Scotians want to learn about these issues and, most importantly, want to learn how to take action. Clean Nova Scotia therefore supports the statements on page 10 and 11 of the plan, and encourages the Department of Energy to continue to place importance on the need for education and outreach on climate change and energy issues in Nova Scotia.

Electricity Revenues & demand side management (DSM)

Clean Nova Scotia recommends an aggressive energy efficiency and conservation initiative. Increasing to 10% the amount of electricity revenues used to promote demand side management (DSM) plus renewable energy sources would lead to the lowest long-term cost for power and the greatest long-term reduction of GHGs.

DSM would ensure that peaks loads are managed to ensure that new generation will not be required for a much longer period of time; this would provide more time to develop a sustainable energy path. Some examples of DSM initiatives could include the integration of smart metering, programmable thermostats and the introduction of peak shedding or load cycling for devices such as air conditioners.

Cogeneration and Combined Cycle Systems

Two effective ways to implement energy efficiency on an industrial scale are the use of cogeneration (or combined heat and power – CHP) and combined cycle generation. A cogeneration system utilises the significant amount of waste heat from a thermal power plant in applications such as other industrial processes. A combined-cycle natural gas power plant uses the waste heat from the gas turbine to raise steam, which is then used to drive a steam turbine to produce more power, thereby increasing the efficiency from about 35% to over 55%.¹³ Both of these approaches significantly reduce primary energy consumption and therefore GHG emissions. As a result, Clean Nova Scotia strongly supports the integration of both cogeneration and/or combined cycle generation into our diversity mix wherever practically possible.

Heating Options

Table one¹⁴ compares the CO₂ equivalent of several different sources of residential heating in Halifax.

Table One¹⁴: CO₂e emissions from various sources of residential heating in Halifax

Residential heating system	Total mass of CO₂ equivalent (kg)
Electric furnace	374865
Oil furnace	157587
High efficiency air source heat pump	161854
Ground source heat pump	131811
High efficiency natural gas furnace	104994

Note: these values are taken over a 20 year lifetime

According to Caneta Research Inc., the least carbon intensive form of residential heating in Halifax over a 20 year lifetime is through the use of a high efficiency natural gas furnace. However, due to the long-term dwindling domestic supply of natural gas and the high primary energy requirement to liquefy, transport and then boil the gas (see the later section titled 'Natural Gas' for more details), Clean Nova Scotia has reservations about the long term environmental impacts and payback that might be realized by widespread adoption of natural gas as a heating source in Nova Scotia.

Alternatively, the use of a ground-source heat pump in Halifax utilises renewable energy and offers the next lowest emissions of GHG s (emitting a total of 131 811 kg of CO₂ equivalent over a 20 year lifetime). As a result, Clean Nova Scotia recommends promoting ground-sourced heat pumps that can deliver efficiencies of 300-400% and significant GHG reductions when compared to other, more conventional ways of providing heat. Although these values are obtained from a publication that is eight years

¹³ Ontario Power Authority 2007, Electricity Contracts - Natural Gas Simple Cycle / Combined Cycle Projects, [online], Available: <http://www.powerauthority.on.ca/Page.asp?PageID=924&SiteNodeID=236> [2007, November 22]

¹⁴ Caneta Research Inc. 1999, Global Warming Impacts of Ground-Source Heat Pumps Compared to other Heating and Cooling Systems, Prepared for Natural Resources Canada.

old, these figures are still very relevant because the power generation diversification mix in Nova Scotia has not changed significantly over the past eight years.

District Heating and Cooling

District heating possibilities should be explored wherever possible as a means to considerably reduce our GHG emissions given the large degree to which electric resistive heating is used in the province; resistive heating using electricity (the highest quality form of energy that is associated with many losses) has an extremely high primary energy consumption, whereas district heating can utilise the waste heat (lowest quality form of energy) from certain processes, thus significantly increasing overall efficiency.

District cooling can offer reductions in GHG emissions for buildings currently using air conditioning, as opportunities exist to utilise low-carbon sources of energy such as Halifax Harbour water and/or geothermal energy.

Building Practices

Since Nova Scotia uses a very high proportion of carbon-based fuels for building operation, another very effective way to reduce the use of fossil fuels is to incorporate energy efficient design and construction practices into building regulations; widespread adoption of passive and active solar design for heating and cooling would greatly reduce the carbon dependency of buildings. A case study¹⁵ on an energy efficient demonstration home (Integer House in Garston, UK) reported that the home consumes only 50% of the energy of a comparable building, while using mostly standard or prefabricated elements during its construction. Furthermore, analysis¹⁶ of twelve monitored energy efficient institutional and commercial buildings supports this finding with overall energy savings compared to base-case buildings of the same size and function in the same location of about 47%.¹⁷

Setting a standard for new construction was wise, but the province must seek ways to encourage the EnerGuide rating to be used in all transactions for homes. Developers and real estate agents must be aware of the longer term value of the EnerGuide rating system.

Page eight of the Department of Energy's 'A Background Paper to Guide Nova Scotia's *Climate Change Action Plan*' states that government - being the largest purchaser and employer in the province - can play a role not only in cutting emissions, but also in creating a market for greener products and services. Clean Nova Scotia agrees that government purchasing of energy efficient products can expand demand for these products and lower their overall cost as a result of economies of scale, making them more affordable for more widespread adoption. Furthermore, governments can also provide

¹⁵ Wilhide, E. 2002, Eco: An Essential Sourcebook for Environmentally Friendly Design and Decoration, Quadrille, UK.

¹⁶ Gordon, H. T., Rittleman, P. R., Estoque, J., Hart, G. K. and Kantrowitz, M. 1986, 'Passive solar energy for non-residential buildings', Advances in Solar Energy vol. 3, New York: Plenum Press, pp. 171-206.

¹⁷ Balcomb, J. D. 1992, Passive Solar Buildings, The MIT Press, Massachusetts.

incentives for energy service companies (ESCO's) in order to encourage energy efficient purchases and/or retrofits where financial obstacles exist.

It is also important to consider sustainable urban planning practices to assist with GHG reductions. This would allow for higher levels of adoption of passive solar design and construction principles as lots/homes have guaranteed access to the solar resource. These sustainable passive solar design and urban planning principles are most effective when the layout of the roads and house lots are aligned properly to ensure solar access.

Clean Nova Scotia acknowledges that new home construction in Nova Scotia has a small turnover of only about 5000 new homes per year. However, acting now to ensure that sustainable planning and building principles are taken into consideration as soon as possible is the best route to take to ensure maximum long-term cost savings and GHG reductions. Failing to implement sustainable building principles as soon as possible will lead to greater GHG emissions as the operation of buildings will require more carbon based energy. Furthermore, failing to act now will lead to expensive retrofits in the future that are usually harder or even impossible to undertake.

Decentralised Generation (DG)

While eventual failure is inherent in a large, centralised power generation and distribution system, smaller scale, decentralised (or distributed) generation (DG) is inherently stable and resilient. Furthermore, the energy losses (and GHG emissions) incurred from the transmission and distribution of power – which amounts to an average loss of 7% in NS¹⁸ - are dramatically reduced with the use of DG. As a result, Clean Nova Scotia supports the development of DG wherever practically feasible.

Renewables

Renewable energy (RE) has been used for millennia. There are many benefits that are gained through the use of renewable energy. These include, but are not limited to: a dramatic reduction in greenhouse gas emissions (mitigates climate change); reduction of pollution in our air, water and earth as well as lessening our ecological footprint, thereby preserving biodiversity; promotion of distributed generation (reduces transmission and distribution losses); greater energy security and long-term cost savings.

It is estimated that from 2001 to 2013, renewable sources of electricity in Nova Scotia will grow from 10 percent to 19 per cent (see page seven of the Department of Energy's 'Consultation Paper: Nova Scotia's *Renewed Energy Strategy and Climate Change Action Plan*'); the proportion of renewable sources of electricity in the generation mix should be higher than 19 per cent in 2013 in order to maximise the benefits mentioned in the preceding paragraph. This is especially important for Nova Scotia given that over 70 per cent of our power is still expected to come from coal (the most polluting and carbon intensive of the three major fossil fuels).

¹⁸ MacIntyre, A. 2005, Personal Communication, November 6.

Clean Nova Scotia approves of the widespread development of RE and, as noted in our Strategic Plan, would like Nova Scotians to be able to make educated opinions and decisions about renewables both at the home-scale level as well as on the larger, commercial scale.

Feed-in Tariffs

Clean Nova Scotia supports virtually all forms of RE when they result in an overall reduction of GHGs relative to the other available options. Unfortunately, many Nova Scotians are discouraged from investing their hard earned money into RE projects that don't offer any financial payback. This was evident when Stefan Tylak (Programs Officer of the Climate Change Centre at Clean Nova Scotia) attended the Community Consultation 'Role of Government in an Environmental Economy' on September 19th, 2007; a member of the community expressed that she was discouraged from installing a wind turbine on her property because of the lack of any financial reimbursement for power generated beyond her own personal requirements.¹⁹

Deregulation is mentioned in the Department of Energy's 'Consultation Paper: Nova Scotia's *Renewed Energy Strategy and Climate Change Action Plan*'. However, more work must be done to facilitate a smoother entry to market for smaller energy producers. Policies and procedures to assist municipalities investing in renewables must be in place. Right now, a patchwork of by-laws is being created at the municipal level regarding placement of wind turbines and other details; this patchwork may make it more difficult to attract wind energy producers in the future. As well, work must be done to allow public forums and public education in municipalities to answer public concerns about what the transition to renewables might mean for their health and property values.

Page eight in the Department of Energy's 'Consultation Paper: Nova Scotia's *Renewed Energy Strategy and Climate Change Action Plan*' states that incentives and policy directions can be used to encourage renewable energy projects as technology becomes available. Not only is there technology currently available, but global experience has demonstrated that feed-in tariffs or standard offer contracts (SOCs) that guarantee the power from an independent RE generator will be purchased at a set, *premium* price for a set time (on the order of decades to reflect the lifetime of most RE systems) act as an effective incentive to strongly encourage the development of RE generation. This would offer significant improvement over the current system in NS whereby unless the project contract has succeeded in a limited request for proposal (RFP), any credits awarded for surplus power generated are only carried over for 12 months and under no circumstances are generators able to get financial reimbursement for excess power generation.

Ontario, who has relatively recently implemented SOC's for RE projects, provides an excellent example of how SOC's can spur RE development. Construction is underway on a 40 megawatt (MW) solar photovoltaic farm in ON; this will be the largest solar farm in North America and among the largest in the world! Since SOC's act as such an effective incentive for RE development, Clean Nova Scotia urges the introduction of a

¹⁹ Tylak, S. 2007, Personal Communication, November 22.

competitive, provincial RE feed-in tariff or SOC to stimulate development of RE and put us on a more sustainable energy path.

More Nova Scotians are showing an interest in going 'off grid'. A public education program around the realities of this would be very well received, as Clean Nova Scotia has proposed in our Strategic Plan. Nova Scotians would benefit from knowing what types of renewable energy systems might work with their home, what the pros and cons of each are, and what the logistics of these types of systems are, along with a realistic assessment of the costs involved.

Wind Power

The energy produced by a wind turbine throughout its 20 - 25 year lifetime (in an average location) is 80 times larger than the amount of energy used to build, maintain, operate, dismantle and scrap it.²⁰ From another point of view, it takes only about three months for a wind turbine to recover all the energy required to build and operate it.

It is noted that on page six of the Department of Energy's 'Consultation Paper: Nova Scotia's *Renewed Energy Strategy and Climate Change Action Plan*' that technical challenges are associated with the intermittent and unpredictable nature of wind energy. While wind power is intermittent relative to other power generation sources, this should not discourage wind power development because currently only 2.6 per cent of Nova Scotia's generation capacity comes from wind power and significant growth in wind power could occur before this becomes a problem. Furthermore, there are several ways this issue may be addressed; more advanced meteorological predictions allow for greater certainty about power generation contribution, while a greater number of wind turbines spread out in various geographic areas of the province smoothes out the variable power generation. Additionally, it is also possible to develop wind-powered pumped hydro storage wherever practically possible in order to buffer this intermittency.

Clean Nova Scotia strongly recommends using our world-class wind resource for RE development as part of the diversification in our power generation mix.

Tidal and Wave Power

Nova Scotia is home to the world's highest tides (a record of over 16 metres), which is an excellent source of renewable energy. The Bay of Fundy is potentially North America's best site for tidal power generation, not just because of the extreme tides but also because the outstanding resource is located so close to an existing power grid and potential customers.

Page 18 of the Department of Energy's 'Consultation Paper: Nova Scotia's *Renewed Energy Strategy and Climate Change Action Plan*' states that without Canadians investing in the development of ocean energy technologies, opportunities will be

²⁰ Peace Energy Cooperative 2004, Wind Energy Facts, [online], Available: <http://www.peaceenergy.ca/windpower.html> [2007, November 23].

minimal. Clean Nova Scotia encourages the Nova Scotia government to proactively identify barriers to this and work to overcome them. For instance, to invest upfront in the environmental assessments that will be required to bring these projects to fruition, and to explore provincial tax incentives to encourage this type of investment. Establishing a fair feed-in tariff system will also attract investors.

Clean Nova Scotia strongly supports investing in research and development of tidal energy in the province not just as a way to generate renewable energy but also to provide global leadership in the field of tidal power development. Wave energy also offers a substantial resource that should have more research devoted to it given the substantial resource available from Nova Scotia's extremely long coastline of over 7 500 km.

Solar Energy

Solar energy offers significant potential as a low-carbon energy supply technology. Solar thermal systems can displace significant quantities of GHG emissions due to the high energy requirement for water and space heating, while photovoltaic (PV) technologies currently have GHG emission factors in the range of 25-32g of CO₂e per kWh (and could decrease to 15g of CO₂e per kWh in the future).²¹ In comparison, NS's current power generation system emits - on average - about 30 times more carbon dioxide equivalent than PV, thus allowing solar PV technology to offer an opportunity for massive GHG reductions.

While it is noted on page six of the Department of Energy's 'Consultation Paper: Nova Scotia's *Renewed Energy Strategy and Climate Change Action Plan*' that technical challenges are associated with the intermittent and unpredictable nature of RE, solar energy is often very predictable, especially on a synoptic scale. As a result, the technical challenges noted should not discourage the development of solar energy.

Biomass

Biomass can offer a carbon neutral solution if done properly and even utilise streams that would otherwise be waste; Clean Nova Scotia encourages the use of biomass in this manner, but not in such a manner that it would adversely impact on our waste diversion rates. This would include landfill gas utilisation and anaerobic digestion from sources such as forestry residues, animal and human waste streams. Even in colder climates such as ours, it is possible to maintain the temperature required for the sustained biological reaction by utilising the waste heat from the power generation process; since the power generation is on the order of only about 30% efficient, most of the remaining 70% of energy is waste heat that can be used to maintain the required temperature of the digester. In the case of the HRM, anaerobic digestion would be an ideal solution to two problems; sewage treatment and carbon intensive sources of energy.

²¹ Alsema, E.A., Wild-Scholten, M.J. de and Fthenakis, V.M. 2006, Environmental Impacts of PV Electricity Generation – A Critical Comparison of Energy Supply Options, ECN Publication, [online], Available: <http://www.ecn.nl/docs/library/report/2006/rx06016.pdf> [2007, November 22].

It is noted on page five of the Department of Energy's 'Consultation Paper: Nova Scotia's *Renewed Energy Strategy and Climate Change Action Plan*' that ethanol from corn (among other bio-fuel sources) are raising major global concerns.

Clean Nova Scotia encourages the government of Nova Scotia to recognize that producing ethanol from corn is not an ideal course of action even if NS has 40 000 hectares of under-utilised farm land to grow crops for such a purpose (as is noted on page seven of the Department of Energy's 'Consultation Paper: Nova Scotia's *Renewed Energy Strategy and Climate Change Action Plan*'). The energy return on investment (ROI) is very low for corn-based ethanol and the threat to food supplies and costs is too high – as was seen in Mexico City riots that were mainly due to high food prices primarily as a result of U.S. energy policy that dictated increased use of ethanol from corn.

Since only 8% of the food eaten in NS is locally grown, the 40 000 hectares of under-utilised farm land in NS should be fully developed through investment in sustainable agriculture to provide local food. This will assist in lowering our carbon footprint by displacing the need for imported food that contributes to unnecessary GHG emissions.

In reference to the statement on page seven of the Department of Energy's 'Consultation Paper: Nova Scotia's *Renewed Energy Strategy and Climate Change Action Plan*' that biomass fuel is considered carbon neutral because forests use CO₂ as they regenerate, Clean Nova Scotia would like to ensure that it is understood by all parties that biomass is only carbon neutral under the condition that forests are allowed to regenerate after being replanted; even then it is often difficult to ensure that these regenerated forests are managed properly well into the future. This may be an ongoing future challenge that should not be ignored.

Future Renewable Energy Development

The Department of Energy's 'Consultation Paper: Nova Scotia's *Renewed Energy Strategy and Climate Change Action Plan*' notes (page 6) that higher costs are associated with many renewable sources. Although this may be true in the short-term, many forms of RE are very cost-competitive compared to traditional fossil fuels when viewed longer-term. Short-term thinking and planning have led to many of our current environmental challenges. A long-term approach is needed to accomplish our long-term, sustainable goals.

Although many industries claim that the development of renewable energy will be detrimental to the economy, there are in reality huge financial, environmental and health benefits to be gained. As an example, Germany's renewable energy industry now employs over 130 000 people.²² Additionally, the share price of Denmark's Vestas Wind Systems, the world's largest wind turbine maker, increased more than 20 times over in the first three years of being floated on the Copenhagen stock exchange!²³ RE

²² Christianson, R. no date, Danish Wind Co-ops Can Show Us the Way, [online], Available: <http://home.cc.umanitoba.ca/~umkrajag/Danish%20Wind%20Co-ops.pdf> [2007, November 22].

²³ Time Warner 2001, Danish wind turbine firm heads for UK, [online], Available: <http://edition.cnn.com/BUSINESS/programs/yourbusiness/stories2001/wind.turbine/> [2007, November 22].

development will bring new investment, new local jobs and opportunities, reduced GHG emissions and cleaner air. Nova Scotians, especially younger citizens, are looking to the government for a promise that their future is sustainable and viable if they stay here. Investments made for the long-term good of their province will provide that promise.

Of course, there are barriers to the development of renewable energy such as vested interests in other resources, personal resistance to change and lack of knowledge and understanding. However, the dwindling supplies of cheap fossil fuels and concerns over climate change and energy security should encourage the government to implement policies that will help to drive the development of renewable energy in Nova Scotia.

Coal/Carbon Sequestration

There is much research into 'clean coal' and 'carbon sequestration' technologies, which include; electrostatic precipitators, scrubbers, high-efficiency and low NO_x (oxides of nitrogen) burners, fluidised bed technology, carbon capture and storage (CCS) and even ocean fertilisation. Page 12 of the Department of Energy's 'Consultation Paper: Nova Scotia's *Renewed Energy Strategy and Climate Change Action Plan*' notes that clean coal and/or carbon sequestration technologies currently remain unproven and as such it is difficult to predict their role.

Clean Nova Scotia agrees that these techniques don't offer at present any solutions effective enough to justify the continued burning of coal, as none can effectively reduce CO₂ emissions in order to mitigate climate change impacts. Technological solutions can even make other problems worse; for example, installing SO₂ scrubbers to increase local air quality may lower the overall efficiency, thereby increasing CO₂ emissions.²⁴

Until these techniques prove to offer effective, significant reductions in GHG emissions, Clean Nova Scotia does not recommend relying on this potential technology to justify the continued dominant use of coal-fired power plants to provide power to the province.

Natural Gas

It is noted that it states on page 16 of the Department of Energy's 'Consultation Paper: Nova Scotia's *Renewed Energy Strategy and Climate Change Action Plan*' that the province is converting government facilities to natural gas as supplies become available to support the expansion of the distribution system and that expansion of the natural gas infrastructure into other markets – including Truro and New Glasgow – is also possible.

Since natural gas is the least carbon intensive and burns the cleanest of all the fossil fuels, it is expected that it will be a transition fuel to a less carbon intensive society. However, although Canada's unconventional and Arctic production of natural gas are both expected to increase, and liquefied natural gas (LNG) imports into Eastern Canada are expected to

²⁴ Department of Energy 2005, *Energy Strategy Volumes: Volume 2, Part V – Coal*, [online]. Available: <http://www.gov.ns.ca/energy/AbsPage.aspx?id=1247&siteid=1&lang=1> [2007, November 23].

begin by the end of the decade, those supply increases are not expected to be sufficient to offset a decline in conventional production in Canada's largest producing basin, the Western Sedimentary Basin²⁵.

Unfortunately, transporting LNG requires a lot of energy to liquefy, transport and then boil the gas. Clean Nova Scotia therefore believes that imported LNG is not the best option for NS to take for meeting future energy needs due to the significant level of GHG emissions associated with the high primary energy requirement.

As LNG is not recommended as a good option, and as a result of the short domestic lifetime of natural gas supplies, flexibility should be built into the developing natural gas infrastructure in order to minimise waste when system conversions will take place.

Nuclear Energy

With respect to nuclear energy, Clean Nova Scotia is aware that NSPI is prohibited from constructing nuclear plants but that it is possible to import nuclear power from New Brunswick; it is stated on page 14 of the Department of Energy's 'Consultation Paper: Nova Scotia's *Renewed Energy Strategy and Climate Change Action Plan*' that strengthening transmission interconnections to allow the potential for imports and exports or even setting a requirement for a portion of clean energy imports is an option for meeting electricity requirements.

Clean Nova Scotia does not support the option of using nuclear power from elsewhere to help meet demand in NS (or the development of any new nuclear power plants, regardless of their geographical position for that matter) for several reasons:

- There is no safe long term solution for the disposal of waste that remains radioactive for many thousands of years;
- The design, approval and construction of nuclear power plants not only takes decades from beginning to end, but also results in significant emissions of GHGs (from cement manufacturing, etc.) at a time when we need reductions as opposed to increases in GHG emissions;
- The ongoing operation of nuclear power plants emits GHGs through the mining, enrichment and transportation of uranium fuel, and so it is not GHG-emission-free even during operation;
- Although large nuclear facilities are often touted as being economically favourable, Ontario provides evidence that this is not the case after its high investment in nuclear power. After investing billions of dollars into nuclear energy, the province is still paying for this decision. As a matter of fact, Ontarians pay a 'debt retirement charge' on their power bill which is mostly as a direct result of the province's stranded nuclear debt; and

²⁵ Energy Information Administration – *Official Energy Statistics from the U.S. Government 2007*, *International Energy Outlook 2007: Chapter 4 - Natural Gas*, [online], Available: http://www.eia.doe.gov/oiaf/ieo/nat_gas.html [2007, November 22].

- Nuclear plants also use large quantities of water for steam production and cooling; not only can this affect lakes or river bodies when this water is drawn from them, but the higher temperature and pollutant levels - such as heavy metals and salts - of the discharge water often has a detrimental effect on water quality and aquatic life.

Conclusion

Clean Nova Scotia believes that Nova Scotia can have reliable, sustainable energy as well as a clean environment. Opportunities abound for Nova Scotia to meet our global GHG reduction responsibilities while becoming more – not less – globally competitive. Now is the time to alter our carbon intensive energy path by taking a long-term, sustainable approach to meet our needs, thus ensuring a prosperous and healthy Nova Scotia for decades to come.