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RENEWABLE ENERGY

Renewable Energy: Industry that Works for Us

Introduction

There are two clear economic advantages to renewable energy as compared with traditional energy projects. They are labour intensive, and they focus on sustainable local resources. This means more local jobs for a greater duration of time[1].

Since renewable energy sources don't run out, the cost to generate and transmit power will be stable over time. The purchase of renewable energy yields up to 20 years stability of energy rates and energy sovereignty[2].

Local support for renewable generation depends largely on the possibility of local ownership, through Community Feed-in-Tariffs (FITs) and government start-up capital. Community owned renewable energy projects will progress more smoothly and complement the unique characteristics of each region. A competitive market and community involvement will yield success in innovation and cost-lowering development[3].

Newfoundland & Labrador has the capacity to reduce the price of electricity and heating for homeowners, while effectively combating the impact of its Greenhouse Gas (GHG) emissions, which contribute to the global threat of climate change.

We can transition to clean renewable technologies and effect energy savings through strong efficiency standards, renewable energy and more. Wind, solar, geothermal and hydroelectric can work in harmony and supply more than enough energy to meet global demand[4]. Our province has access to all of

these sources and the added potential for wave and tidal energy development.

Zero Energy Home

A "Zero Energy Home" is one that produces as much energy as it consumes. A case study in Newfoundland combined a 10 kW wind generator, passive solar building techniques and other efficiency measures to turn an R-2000 house into a net zero energy user. The energy system and its installation cost approximately $44000 in total[5]. Net zero homes tend to overproduce electricity, and net metering allows them to sell this excess to the grid (B. Maneckjee, personal communication, July 5, 2012)[6].

How to Jump-Start a Renewable Economy

The vision for our renewable energy mix should emphasize best practices from world-wide experience. FITs are a cost-effective way to ramp up renewable energy production[7]. Ending subsidies to traditional fuels will provide a more equitable market in which renewable energy companies can compete. Small and medium scale renewable energy projects tend to be more innovative and cost-effective. FITs should be sought through competition and should pay lower rates over time according to inflation and increase in profits[8].

Small and medium scale renewable projects provide reliable power. If power is intermittent or goes down at one station, other stations can serve as back-up, which prevents emergency situations. Smaller projects have lower repair and maintenance costs[9]. Amory Lovins explains, "Electricity demand comes in myriad small pieces interspersed with a few bigger ones; electricity supply can do the same thing."

Government can do simple no-cost things to help renewable energy developers, such as provide waste materials to renewable energy companies free of charge. CanSolAir will put public stores of aluminum cans to use for solar space-heating (Jim Meaney, personal communication, July 5, 2012)[10]. A large set of diverse policies must take force together with a vision to future prosperity and health.

Wind: Our Renewable Ace in the Hole

Wind energy is a sophisticated renewable energy technology and accounts for 200 GW of electricity potential around the world, as of 2010[11]. Wind turbines turn the sun's energy into mechanical energy and then into electricity, which can feed into the province's electricity grid. Newfoundland has the greatest average wind speeds in the country, with maximum speed

during winter months, which is an advantage for space-heating energy demand[12]. The yearly average wind speed in St. John's is 23.3km/hour[13], while wind turbines can generate electricity as long as wind speed is over 13km/hour[14]. In favourable locations, wind power costs 4-7 cents per kWh, which is in the range of fossil fuel prices[15]. One of the three wind farms operating in Newfoundland generates enough electricity to make up for 160,000 barrels of oil a year at the Holyrood thermal generating plant[16].

Solar: Harnessing the Sun

We can use the sun's energy for hot water, space-heating and electricity through a variety of passive solar, active solar and photovoltaic (PV) technologies. In St. John's, average daily solar radiation on a horizontal surface in kWh/m2/day ranges from 0.83 in December to 5.33 in July[17]. Considering that Germany, the country with the most installed solar capacity based on an average solar radiation of 2.8 kWh/m2/day, Newfoundland has great potential.

Passive solar refers to building techniques and materials for construction, such as South-facing windows, well-insulated windowpanes and double layers of gypsum for walls. These contribute to the building's capture and retention of solar heat. Shutters and shade-giving trees are some of the passive solar mechanisms that reduce heat in summer months and act as windbreaks for the winter.

Active solar technologies often use heat-transfer liquids, which flow to air and water storage areas and distribute solar energy into water pipes for air ventilators. These systems usually require back-up, since solar radiation is intermittent.

Concentrating solar power (CSP) systems use a mechanism to turn heat into electricity, while PV contains a material that converts solar radiation directly into electricity. CSP systems operate at a utility-scale, while PV units can be small-scale. Installations of PV arrays on walls, windows and roofs are becoming attractive across Canada. In Burnaby, British Columbia, the Institute of Technology powers one building's lighting using PV[18].

Solar water heaters are more cost-competitive than most solar technologies, often with a payback period of two years or less[19]. Air-solar-heat pumps capture heat from outside air during winter time and from inside air during summer time and transfer it to the opposite area. When the outside temperature is 10°C, air-solar-heat pumps transfer 3.3 kWh of heat for every

1 kWh of electricity input. Natural Resources Canada reports that Grand Bank and St. John's could both efficiently use air-source heat pumps[20].

Geothermal: Breaking the Surface

Geothermal systems use the earth's heat retention for the water and air we use indoors. This involves pipes travelling underground containing heat transfer liquids. Geothermal provides constant energy, so it can complement intermittent power sources. Ground Source Heat Pumps are competitive with oil and electric heating once the capital cost factor is stretched across the system's lifetime of geothermal energy generation. They could reduce Maritime and Quebec GHG emissions by 7 Mt by replacing heating oil[21].

Biomass: Power from Waste

Biomass is a GHG neutral technology, since it uses organic matter, which would release CO2 in natural decomposition, and converts it into heat and electricity. Biomass includes wood, residues from plants, and organic waste. Charlottetown has a co-firing energy-from-waste plant that takes landfill material and produces steam for space-heating. Proper assessment of the landmass resources and resulting emissions make many biomass processes effective, clean and renewable[22]. The forestry industry in Newfoundland, which is in decline, could profit from energy generation. There are already two wood pellet plants, and there is potential for biomass from waste wood[23].

Wave & Tidal: Innovation Opportunities

The ocean presents an immense resource of renewable energy, since water is 1,000 times denser than air and thus has 1,000 times the potential of wind energy. Installation costs and undersea transmission present challenges to these technologies. However, further research and development should yield mature power systems at competitive prices[24].

Reconsider Lower Churchill & Muskrat Falls

The current trend in oil-fired electricity demand is declining reliance. Small-scale hydro, wind and other renewables should more than suffice to replace the Holyrood power station.

Price signals that moderate consumption and variable rates to reflect the demand conditions would enable Newfoundland & Labrador to meet all their energy needs with more efficiency — more energy for less[25].

In its independent analysis of the Lower Churchill project, Manitoba Hydro International states that, though it is the least-cost of the two options Nalcor

analyzed, this could change because of the scale of the project and the high risk of error in the analysis's key inputs. Nalcor also failed to employ best practices in its design of the overland transmission line for this project and ignored the review's recommendations[26].

Nalcor touts the potential Greenhouse Gas (GHG) emissions reductions from Muskrat Falls and Lower Churchill. However Dr. Murray Rudd of Memorial University is skeptical, citing the variation of the fuel types necessary for operating the hydroelectric projects, the potential reliance on coal-generation and the potential developments in the electricity market over the next decade[27]. Dr. Rudd points out the total absence of a guarantee that Lower Churchill will displace conventional fossil fuels. Given the competitive prices for large scale subsidized energy sources, it may be renewables in development that Lower Churchill power eclipses from the market[28].

In addition to renewable energy funds, FITs and an end to fossil fuel subsidies, pricing carbon is a fair and economical way to boost renewable energy generation. Pricing systems have succeeded in meeting and indeed surpassing the renewable energy targets of the countries which brought them into force[29].

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