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**WITHOUT TRUE LEADERSHIP AND OWNERSHIP, ALTERNATIVE ENERGIES WILL NOT
SUCCEED:
THE NEED FOR POLICY CREATION AND RENEWAL AT THE FEDERAL, PROVINCIAL
AND MUNICIPAL LEVELS.**

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ABSTRACT

It is clear that Ontario, indeed, Canada as a whole, has the ability to evolve as a world centre of excellence in alternative energies. **All alternative energies should continue to be considered, discussed and developed, including wind generation, fuel cells, solar power, bio mass and alternative fuels, to name but a few.** In this way, all fields of alternative energy generation will benefit by gaining momentum from areas of successful development. It is this holistic view of alternative energies that will provide the most significant benefit to our environment, our businesses and industries, and, perhaps most importantly, our homes.

There is rapid growth in renewable energy worldwide. More wind power generation systems have been built worldwide in each of the past six years than any other form of power; however, due to its historic reliance on nuclear, fossil and large hydro energy production systems, Ontario has not benefited from this trend. Ontario is now experiencing a shortfall in electrical production as a result of the fact that no fossil or hydro plants have been built in more than ten years. This problem can be alleviated with new, renewable power generation. The Kyoto Accord and public opinion will quickly result in these projects becoming mandatory for Canada. What is now needed is a set of holistic policies at all levels of government: federal, provincial, and municipal. These policies should cover all the forms of alternative energies that can be utilized. Strong and effective leadership is paramount in order to achieve these policy goals, if the drive toward recognition and utilization of alternative energies is to succeed. The impact on types of systems and energies that can be utilized will be discussed, as will the need for public education in order to achieve our goals.

INTRODUCTION

The Kingston area, to give just one example, has an enormous potential to generate clean, renewable power from wind and small hydro projects, and thus could see local investments of \$100 million within less than five years. Local manufacturing, development, construction and service jobs would be created within the Eastern Ontario region. It is estimated that about 35% of the investment in renewable energy would be made in area businesses. Federal and provincial incentives have been announced that make this initiative possible if carried out now. Simple and cost effective additions to these programs would guarantee that the rush to renewable energy systems, seen in the US, would begin in Kingston. However, due to slow implementation and /or poorly thought-out processes, this investment is not happening. Eastern Ontario area politicians are in a position to demand that these programs be implemented so the area can benefit from the resulting private investment. This is a template that could be followed in other areas of the province and the country.

THE CHALLENGES

To use this area as our continuing example, Eastern Ontario is served primarily by electricity generated from the fossil-fired Lennox Generating Station, plus nuclear power from the Darlington plant near Toronto. Small hydro plants on the Rideau system also provide limited local generation. Minimal local employment is thus provided, and there are no incentives to capitalize on the burgeoning demand for new power generation. An internationally acclaimed hydro manufacturer is located in Eastern Ontario, although local sales from this firm are non-existent. Kingston has the industry and skills to manufacture energy generation products, particularly for hydro and wind power. Kingston is also a centre of excellence and possesses strong research and technical skills to link to the growth of renewable energy. These skills must be developed at home before they can be exported to the quickly growing market of the northeastern US.

Provincial policy has long favoured the expansion of nuclear power, to the detriment of all other sources. This policy focus has resulted in billions of dollars invested in the GTA and western Ontario. However, these investments are paid for by provincial taxes and provincially supported debt that is then spread throughout the province. There is no potential, under the current regime for eastern Ontario, to do more than pay heavily to subsidize expansion elsewhere.

To look at this matter in a more global context, we need to consider the sway that the world's developed countries hold over energy politics. As energy industries restructure to cope with both more competition from utilities deregulation and increased environmental regulation, cost-competitive renewable energy sources become more interesting to investors. Widely distributed renewable energy technologies foreground the importance of large sunny and/or windy land areas relative to more geographically concentrated underground hydrocarbon resources. Increasingly, local alternative energies will be able to produce sustainable energies at a lower cost than fossil fuel imports or transports from remote domestic sources.

Energy politics is an important aspect of world politics. In world politics, the U.S. is now the only four-fold military-economic-political-technological superpower. Europe is a three-fold economic-political-technological superpower. Japan is a two-fold economic-technological superpower. Russia remains a military-technological superpower, and China is a political superpower on the way to becoming an economic one. The significance of these facts of current world politics is that the U.S. and Europe dominate but no longer unilaterally control world energy politics, which determines world energy trade, investment, and technological progress through trade investments. Almost all the leading energy companies are still American or European. They have a vested interest in protecting energy, in the sense that they protect access to the countries that are rich in foreign oil.

As Charles Abt suggests¹, the options open to the U.S., Europe, China and Japan to reduce energy import dependence include resort to more domestic coal at heavy environmental cost (except in Japan), resort to an unpopular (in the U.S. and Germany) buildup of nuclear power (which France has accomplished), and investing in indigenous renewable resources such as solar and wind and biowaste and the technologies to make them cost-competitive with domestic coal. All four great powers are pursuing these options which, if pursued effectively, reduce dependence on energy imports, limit the ability of foreign oil and gas producers to raise prices arbitrarily, provide examples for poor countries even more energy-import dependent (such as the Philippines), and improve relations with industrial allies and energy-importing developing countries. Why should Canada not pursue the ability to be a leader among nations increasing reliance on alternative energies, blessed as we are with the rich resources to do so?

Considering our close ties with Europe, which has already taken a lead in environmentally sustainable energy development, why should we not be in the vanguard of this much needed change in policy focus?

THE OPPORTUNITIES

To return to our local example, Eastern Ontario possesses considerable electricity generation potential. There is well-established small hydro generation potential, as well as considerable wind generation potential along the shores of Lake Ontario and the St. Lawrence River. Both hydro and wind potentials are focused in the area of Kingston and the Islands. Tapping into this resource would bring a considerable number of jobs to the area, encourage local manufacturing and service, and attract tourism, research and development dollars. In short, eastern Ontario could become self-sufficient in power, attract investment and increase the quality and reliability of the local power supply.

The provincial government has stated that it wishes to see additional generation built in the province. It has also indicated strong support for renewable sources. However, the reality is that power shortfalls are encouraging US coal-fired producers to export large volumes of energy to this province, at high prices. The limited tie-line capacity out of the province, plus ongoing problems with the nuclear program, means that future local power shortages are likely.

The rest of the world, particularly Europe, has already caught on to the necessities of lessening its reliance on fossil fuels, and in developing sustainable alternative energies. Wind and solar power play an ever increasing role in Denmark, the Netherlands, Britain and Germany along the North Sea coastlines, Norway and Sweden, the Iberian peninsula, and the Adriatic; and solar energy is becoming fully exploited in southern Spain and France and Italy and Greece. Even the large underutilized hydroelectric potential of the Balkans is being developed.

Europe is a model for the rest of the world, and Canada can emulate it in North America. Europe has shown that it can substitute non-greenhouse gases-emitting renewable energy for coal and oil, first with hydroelectric power in Switzerland and Norway, then with nuclear power in France, in the last decade with wind turbines in Denmark, energy-independent solar-powered buildings in Netherlands and Germany and England, and energy-conserving and non-polluting electric vehicles in France and Italy and Germany. However, all of these things are only possible with political support and political will, and those two things will not happen without strong leadership first from outside our three levels of government, and then later, hopefully, from within.

POLICY CONCERNS

Provincial policy has left the Ontario market bereft of the Power Purchase Agreements ("PPA" a sales contract for electricity) needed to encourage new generation. Although it leads the way towards a deregulated electricity market, provincial policy seems short on real incentives to encourage new energy development in the Province of Ontario. Various tax measures have been provided, although the renewable energy industry is quick to point out that these are not enough to bring on new generation¹. Ongoing shortages of capital and debt cripple the private power industry, the very industry that will lead this investment.

Federal policy to purchase green power in Ontario via a PPA was announced about two years ago and has since been delayed seven times. It appears likely that this program, which has encouraged wind power in most other provinces, will not benefit Ontario in the near future.

However, without a power purchase agreement, no developer can obtain the needed debt financing nor risk venture capital. This hurdle effectively prevents the projects from proceeding. We feel that the help of local politicians is necessary to resolve the issue of power sales. Support could take the form of:

- Encouraging the federal government to make good on its promise to buy green power in Ontario, and/or
- Encouraging the provincial government to follow the recommendations of the Select Committee on Alternative Fuel Sources

Companies like Canadian Renewable Energy Corporation (CREC) and GAIAPower, Inc would like to maintain their focus on the finance, construction and operation of renewable projects in the Kingston area and elsewhere. They are continuing to spend money acquiring land options, studying the renewable resources and maintaining Kingston offices. However, without local changes at a political level their projects will not proceed. Support from the political arena is now critical to see a renewable energy project built.

Of course, the world picture is also complex. U.S. President George W. Bush has proclaimed that the U.S. government will not ratify or comply with the 1997 Kyoto Protocol on greenhouse gas emissions, global warming and climate change. In May his administration revealed a new energy policy, which included building 1,300 new electric power plants over 20 years, a \$2-billion subsidy for the coal industry, reviving a dead nuclear power industry with new subsidies, rolling back clean-air regulations, and drilling for oil and gas in fragile areas previously off limits. Conservation and alternative energies received only a footnote.

To quote an editorial from Canadian Dimension²: “There is a mountain of evidence demonstrating that an alternative energy policy is available. North Americans have barely touched energy conservation and efficiency. Public transit, railroads and greater fuel efficiency for vehicles are policies that are being adopted elsewhere. Solar energy has a great potential, the technology is improving every day, and it is cheap when all costs are considered. Even in the United Kingdom, photovoltaic roofs are being installed on houses. The American Wind Energy Association claims that the wind power potential in North Dakota, Kansas and Texas would be enough to provide all U.S. national electricity needs and could be developed much quicker than power plants. The U.S. Bonneville Power Administration put out a request for bids for 1,000 megawatts of wind-generating capacity and received enough bids to build 2,600 megawatts. Wind energy now costs between \$0.04 and \$0.06 per kilowatt-hour, which makes it competitive with coal, and well below the U.S. average cost of \$0.085. There is no energy crisis. There is an emissions crisis. And there is a political crisis.”

Clearly, under circumstances such as those described above, entry into the market for ANY alternative energy is discouraged. This is the situation we must work to change.

At present the political debate has mainly dealt with **how much** we tax, not **what** we tax. This is unfortunate, for what we tax is important. In most countries the governmental budget relies largely on personal income taxes (salaries and wages) and corporate income taxes that are also taxes on investment and capital gains. These taxes exist alongside the GST, provincial taxes and property taxes.

Our present taxes fall mostly on just those activities that make the economy productive: work, savings and investment. Naturally, such taxes discourage people from undertaking these vital activities. A better system would place more of the tax burden on activities that make the economy unproductive and that should be discouraged like resource waste and pollution.

Environmental taxes (charges) are one of several incentive based instruments of environmental policy. Such taxes and charges are mechanisms for dealing with the systematic failures in market incentives that arise when individual actors do not pay full costs (external costs) of their activities.

Shifting the tax burden away from economic 'goods' toward environmental 'bads' seems to be inevitable in effective and environmentally friendly policy. Economic productivity and environmental protection are not incompatible and that is why economy would benefit from this shift as a whole.

LEADERSHIP: THE TIME IS NOW

Where groups of interested parties come together to press their point is the locus of change for political power and policymaking. To give a small example, at least in the global context, our local group, SWITCH, is a wonderful example of a number of parties, with diverse and sometimes competing interests, coming together to form a powerful lobbying force. I would just caution that the ideal for such groups is that they be able to set aside any individual agendas in recognition of the greater good that the group as a whole may derive from the power of numbers.

Local political involvement is required in order to:

- Obtain public funding to upgrade facilities so as to facilitate alternative energy development. For example, this could include initiatives such as the one to upgrade the interconnection from Wolfe Island to Kingston. This may involve the creation of a public – private transmission company to service Wolfe Island generation;
- Implement a pilot renewable procurement programs to assist in resolving the issues the Federal government is having in implementing green power purchases in Ontario.
- Create a commitment from the federal government to purchase power from local renewable sources for use in its local area facilities, whatever they may be. Large-scale institutional purchases of green power would help to translate into sales to other commercial interests.

Yet another brief example of how private concerns can help to develop alternate energy resources, with benefits accruing to the local economy is CREC's completion of a 3 MW small hydro project in Englehart, ON, where it spent half of the \$6 million capital cost of the project on services from within the Englehart community

DIRECT APPLICATIONS OF ALTERNATIVE ENERGIES

In countries where alternative energies are on the move, all tend to complement one another. It is this holistic view that can help lobbying efforts to change policies. But, to start in a small way, we can all look at ways of using alternative energies, even in our homes. From there, we can evolve larger commercial and industrial uses. Direct applications give us the opportunity to increase conventional awareness of these technologies and their uses. That being said, we will need also to consider changing our view on such matters as how we design and build our houses. Much of our savings, both economically and environmentally, will come from the benefits realised by increasing energy efficiency in our homes and workplaces, in addition to organizing ourselves for waste management and recycling in a completely different way; for example, appropriate sorting of waste materials for use in biomass technologies. There are opportunities to improve on how we do things at all levels.

SOLAR:

Solar energy applications are readily available in many parts of the world, given that the technology has advanced to the point that plain good daylight is sufficient for most needs, such as hot water, direct heating, and electricity. Once again, design can play an integral part in how we use the sun's energy in our homes; for example, if we build our homes in such a way that, even without solar arrays, we use the energy that enters our windows efficiently, we can contribute to direct heating. Cynics will point out that this may be detrimental to cooling, say, on a hot summer day. But here again, design and efficiency can help. Designing a home layout so that the use of the sun is directional, and complemented by insulated aluminum blinds to negate unwanted heat, is but one way of handling one specific and oft-cited drawback.

To give a larger, and more specific example, we have only to look at the new developments in the buildings here at Queen's. The Integrated Learning Centre's photovoltaic arrays have a second function: they act as sunshades for the building's windows.³ Once again, we have an example of functional design coupled with power generation capabilities, all in the service of familiarizing future generations of engineers with the concept of renewable and alternative energies.

Another specific direct application that is becoming of interest, particularly in developing countries, is the solar cooker. Some of these are even capable of storing their excess energy in batteries for 2-3 days, thus providing an effective source of food preparation even on less than ideal days.

WIND:

In an area like Kingston, it's hard to deny the attractiveness of wind generation as an alternative energy. Blessed as we are with an abundance of wind and more than adequate wind speed, it seems difficult to imagine why we have to fight to develop this potential.

Globally, the present wind technologies are at, or nearing, their peak. Anything beyond a 5 mega-watt turbine seems unlikely. The focus now should be on advancing wind as a viable alternative energy, and on identifying the most practical sizes and installations of the technology in order to benefit remote areas. For example, Vergnet Canada, the Canadian arm of the French turbine manufacturer, has some interesting models that are simple to install and maintain, and do not require large-scale foundations and installation costs. These would be particularly attractive for installations in Canada's far North.

The attractiveness of these technologies also appeals to the individual consumer. There are those who have erected small generators for themselves to supply a specific on-site need; it seems to me that many people are revisiting the benefits of not having to rely completely on the regular grid, particularly after our spectacular ice storm a few years ago. I have even fielded calls from a group hoping to build a small community that wanted to use wind, primarily, to service their individual homes up in the Quinte region.

Certainly, it will be interests such as these that continue to drive the grass roots toward more usage of sustainable energies.

BIOMASS:

It will also be necessary, I believe, to consider the hybridization of alternative energy systems. Certain technologies lend themselves well to combining with others, and biomass energy production is certainly one of these.

While Biomass includes wood, crop residues, municipal waste, sewage and other organic materials that can be converted for power production and transportation fuels, including ethanol and biodiesel, it seems likely, looking at the global research that is now occurring, to focus on biogasification as a good candidate for our homes and offices.

The conversion of waste materials to useable energy has, at times, been a controversial subject, but with advances in technology it is clearly now a viable alternative energy. The key to being able to use our waster effectively, however, whether on large scales or smaller scales, is proper sorting. So, using up your own household waste, including organic garden materials as well as our other “garbage” is a scalable concept that grows to encompass commercial applications to industries and others.

We should not forget that we can also reclaim some of the by-products of such energy production by reclaiming the water that is produced, another significant environmental saving.

I am tempted to state that Walkerton’s disaster would not have happened if the vast quantities of animal manure in Southern Ontario had been used in a meaningful way to produce energy instead of polluting the ground water. Communities in Western Denmark along the Atlantic Coast have for many years combined energy production from wind and biomass, this way also becoming self-sufficient.

Some time in the future I can visualize small bioreactors in every household converting organic waste, sewage, garden waste etc. into gas for cooking, heating and electricity.

FUEL CELLS:

Fuel cell technology is an exciting field that I will not say much more about, being in the company of some of the experts from our area who can say much more than I on the subject. But it, and the other numerous alternative energy technologies now available to us, needs to be developed and advanced in ways that are complementary to each other.

Not too long ago during the National Summit for Innovation and Learning in Toronto, I met one of the leading Canadian Car Manufacturing Executives and we discussed the fantastic opportunities fuel cells offer for cars, for households etc. But when I learned that his perception of the prime source of energy to fuel the cells was based on atomic energy we can see that we still have to create awareness around the many alternative opportunities.

It is my plan to install a fuel cell central heating and electricity generating unit as soon as a household unit can be bought for below \$10, 000 CDN. Based on Kingston Fuel Cell Technology Inc. this will happen within the next 3 to 5 years. Exciting perspectives!!

CONCLUSION

The success of the future alternative energy policies, not just in Canada but also globally, lies in partnership, experience sharing and multilateral learning, particularly where interested parties can work together to effect policy and political change. Only with this type of holistic approach to leadership will alternative energies succeed.

The International Energy Agency⁴ notes that the prices for renewable energies have fallen over the past five years to a point where “most are now cost competitive with fossil technologies when all values are considered.” This entrance of these technologies into the mainstream should be a cause for rejoicing, but instead we find ourselves fighting to give them the recognition they deserve. This is largely because although the market is robust, it is growing from a fairly small base, and requires continuing education efforts on all of our parts.

The agency goes on to say that “a long-term commitment and strategy are needed to ensure renewables are not sidelined, bypassing their full potential . . . a policy framework must be created that will provide a more level playing field because rules, laws and systems have built up over the last century, based primarily on fossil-fuel based systems.”

For alternatives to survive, indeed, flourish, our governments must rectify past imbalances of those old approaches. Our new policies must lead the dynamic changes underway within the energy sector, but at the same time they must also reflect our priorities socially, economically and environmentally. We need to start by requiring, as does the European Union, that a specific percentage of generation must come from renewables. Even with the backwards steps that national policy has taken in the U.S., many states are including such policies in their own portfolio standards.

Let us move forward together into the future by ensuring that we succeed in obtaining the policies and policy changes that we know are crucial. Let us put aside our differences, at least in this one arena, and subjugate our various agendas to the greater good of our lives and our planet, and make alternative energy production a vibrant part of the energy sector.

If we understand Kyoto as a symbol for change, Canada will benefit greatly from betting on renewably energy and overall holistic thinking! Together with a reestablishment of a true “agri-culture” and a move away from massive farm industries that destroy our environment, we can create a new direction in industry, mining, forestry and farming which will create millions of sustainable jobs and show the leadership for which the rest of the world is looking.

REFERENCES

¹ Abt, Charles C. “The Future of Energy, for the Perspective of the Social Sciences,” <http://wire0.ises.org/wire/publications/perspec.nsf> , 1999

² Canadian Dimension, “The Bush-Chretien Energy Policy,” www.canadiandimension.mb.ca/v35/ed35_4.htm, July/August 2001

³ Queen's University, "Queen's harnesses sun with first solar-electric paneled building," http://qnc.queensu.ca/story_loader.php?id=3ef897043d141, June 24, 2003.

⁴ Refocus Weekly, "Most renewables now are cost competitive with combustion sources, says IEA," http://www.sparkdata.co.uk/refocus/fp_showdoc.asp?docid=8300418&accnum=1&topics=, July 30, 2003.