

Recommendations to the Ontario Climate Change Plan Energy Round Table

Before I continue with what I wrote for the Round Table and my specific suggestions, I wanted to point out how happy I was about some broad consensus around the table at the meeting. I was relieved to know that there is general agreement that:

1. Climate change needs to be addressed.
2. An integrated plan with cooperation between ministries, departments and levels of government is necessary.
3. Higher energy prices are a useful mechanism to encourage the necessary changes.
4. Steadily lower energy caps must be enforced.

These ideas are the cornerstone of what I wanted to say. The rest are details.

I would also like to recommend that whatever committee is in charge of climate change view a recent clip located here:

<http://www.informationclearinghouse.info/article15809.htm>

Every day I read of more indications that climate change may be worse than we thought. This is the most frightening clip about global warming I've seen to date, in part because it is well documented and responsibly reported. I can only hope that a sober recognition of the potential risks will urge our governments to act responsibly for our children and grandchildren.

I thank the organizers for the opportunity to address the Round Table and encourage further dialogue.

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Global warming is the moral imperative of our time and we are not doing nearly enough to address it. In fact we are rapidly losing the battle.

On Tuesday, for example, the BBC reported that the Global Carbon Project noted a sharp increase in global emissions of carbon dioxide, from about 1% annually in the 1990's to 2.5% annually since 2000. There were 7.9 gigatonnes of carbon emissions last year, up from 6.8 Gt in 2000. This parallels figures released earlier this month by the World Meteorological Organization.

At these rates, we'll end up towards the high end of emission scenarios considered by the IPCC, which would imply a rise in global temperatures approaching 6 degrees Celsius by the end of the century. The only example of such a rapid temperature rise in the geological record corresponds to the Permian

extinction, when 90 percent of the existing life forms, including virtually all animals larger than a cat, were wiped out. We cannot confidently predict the results of this kind of warming, but neither is this the kind of thing we should be toying with.

Public consciousness about global warming has focused on the Kyoto targets for 2012, which for Canada are 6% below 1990 levels. However, the 2012 targets were only intended as a first stage, a tiny baby step toward the much more substantial reductions that would eventually be necessary. Targets of 80% emissions reductions over 1990 levels by 2050 have been adopted by many jurisdictions, including 8 states of the USA. A world with 80% fewer carbon emissions will look dramatically different from the one we live in, so significant planning is necessary. This planning should be done while the Kyoto target is achieved through simple efficiencies. We have already wasted a great deal of time and emissions have increased in Canada instead of dropping.

This wasted time is significant for 2 reasons. First of all, it makes it much harder to implement the more dramatic reductions necessary because we have not set the stage to make them happen. Second, it means that we must make those final cuts much more rapidly than we had planned. Because the trajectories were based on limiting the total carbon that we release into the atmosphere, releasing more carbon during this initial period means that we must release less later. We should never have permitted our carbon emissions to grow once we recognized the risks of global warming.

George Monbiot, in his book *Heat: How to Stop the Planet from Burning*, points out that the combination of rising emissions and unexpectedly rapid effects of global warming are leading scientists to revise the timetables for acceptable emissions reductions. He promotes an 80% cut globally by 2030. Canada's cut will be even greater – 94% by 2030. The reason for this is that we cannot expect significant reductions from the developing world. It would be unfair to ask the people in developing countries, who will shoulder the greatest burdens of the global warming to which they barely contributed, to make the same proportional cut in emissions as the wealthy developed nations whose negligent greed has created the problem in the first place and who continue to emit many times the amount of carbon as their counterparts in the developing world. To reach a level of per capita emissions that is evenly distributed throughout the world, Canada must make a 94% cut. According to Monbiot's calculations, we must make that transition over the next 24 years, and the bulk of the emissions cuts must be made within the next 5 years.

We should have a national strategy to meet and exceed Kyoto targets and we should be negotiating international agreements to bring other countries on board. Without a national strategy, it is imperative that the provinces seize the initiative.

In the United States, the lack of a national commitment to combat global warming has induced some states, and specifically the 2 largest economic engines, New York State and California (itself the 7th largest economy in the world) to implement their own effective strategies. Partly as a result of this, the United States record of addressing emissions has not been as bad as ours.

Now that Stephen Harper has openly challenged our Kyoto commitments, there is no possible excuse for inaction at the provincial level. Manitoba and Quebec have pledged to meet the Kyoto requirements and are implementing strategies. Most of the implementation, particularly on energy, will have to be done at the provincial level anyway. There are economic benefits to acting now, such as the development of wind, solar and geothermal industries, a renewal of our transportation fleet and so on. There will also be economic consequences for our failure to act. France is advocating a tax on countries that do not address rising emissions.

However, economic opportunities should not be our principal motivators. Even if mitigating climate change were to have huge economic costs, we would need to do it for reasons of moral obligation and quite possibly survival.

Monbiot suggests that the reason more progress has not been made on reducing emissions is that our consumption habits are closely related to our incomes rather than to our needs. Without firm caps on the total energy we use, energy savings in our homes will only lead us to buy more stuff, using almost as much energy, or even more. Energy savings in industry will only make products cheaper, so more will be produced. We urgently need caps, and we need to enforce them. There are a variety of ways of choosing and enforcing caps. The important thing is that they be enforced.

With proper caps in place, we can still achieve our Kyoto reductions through simple efficiencies like changing our air conditioners, refrigerators, computer screens and lights, and by increasing the efficiencies of our automobiles. However, no amount of LED lights or fuel efficiency could possibly achieve a 94% cut in emissions. To achieve that kind of cut, we will need to live rather differently, and it will become vital for governments to show leadership in developing, communicating and implementing the transition to a more sustainable economy. Work on these dramatic changes needs to begin immediately, even as we are working to achieve our Kyoto targets.

It is my belief that the single biggest barrier to achieving emissions reductions has been the lack of a coherent direction. People have demonstrated tremendous willingness to embrace changes for reasons of civic responsibility – from green bins to Peaksaver to eliminating herbicides from lawns. If people are told that we are working toward walkable communities, they will plan accordingly. If people are told that visiting loved ones in China contributes to the environmental devastation that the Chinese already suffer and that communicating through video over the internet is a saner practice, they will act accordingly. The public is waiting for leadership from its elected representatives. When there is no leadership, inertia takes over and trends keep moving inexorably in the same direction.

A coherent plan helps people make decisions while planning for the future. If we tell people that energy costs may be 5-10 times higher in 10 years, buying a house with high heating bills will suddenly seem unwise, even if it is affordable today. Energy efficiency in new construction will be encouraged, and builders will more readily embrace changes to the building code which make these changes mandatory.

It would be prudent to have some overarching ministry or committee have oversight over the whole process, with authority to intervene in the decisions of other ministries when decisions are made that would contribute to global warming. To get to the kind of cuts that will be necessary, whether it's 94% by 2030 or just 80% by 2050, a commitment to beating back global warming will have to become the overriding imperative of almost all government planning. Efficiency will have to become our religion, and absolute caps will have to be firmly enforced.

The Plan

My aim here is to offer some suggestions for what the world of 2030 would look like with 94% fewer emissions, to suggest some timelines for implementation and some goals that are immediately achievable. I am not an expert on any of these issues and recognize that the details will have to be worked out. In any case, however, it is my strong feeling that some sort of planning is urgently needed,

whether or not the plan worked out has much to do with my personal suggestions.

In order to develop a cohesive vision for a world with 94% fewer emissions, we must be prepared to break with the neat divisions of government ministries – Energy, Transportation, Health and so on, and recognize that an integrated plan will bridge them all. However, for the purposes of the Energy Round Table, I've identified 3 major uses of fossil fuels in Ontario – heating, electricity and transportation, and attempted to tackle the ways of implementing the necessary dramatic cuts in all of them.

Heating

Space heating is the most simple fossil fuel use to address. We need to work toward its virtual elimination. It is possible today to build structures that are so well planned and insulated that they require no heating at all. These structures have significant incidental benefits such as the elimination of fan noise and a dramatic reduction in air dryness. Because the costs of installing a heating system are eliminated, the costs are surprisingly low, less than 10% higher than standard construction. The most significant barriers to the elimination of space heating in new construction are the lack of professional expertise in construction techniques, resistance in the construction industry to differential standards and simple inertia. All of these barriers can be overcome if the construction industry is informed of a steady province-wide program to introduce better building practices. Rising energy prices will make these structures more attractive, too.

In the meantime, plenty of familiar building guidelines exist that are far superior to the current standards. The Province wasted a great deal of time in consultation to achieve building standards that are frankly pathetic. LEED, Energy Star and/or R2000 could be applied to all new construction tomorrow. They are familiar to builders and require only more substantial insulation and triple-pane windows rather than any novel building techniques. The cost increases are easily recoverable in reduced heating costs, especially if these become the new standard and if energy costs include externalities.

We should simultaneously work to adopt even more stringent requirements – on the model of the German passivhaus, which is heated entirely by passive means. There is no reason why these couldn't be brought in over the next four years or so.

Existing buildings pose a more difficult problem. Many older structures can never be economically insulated even to today's highest standards. Nonetheless, it is critical to implement an aggressive retrofit plan to reduce the heating loads of existing structures as much as humanly possible. This means generous financing for retrofits, mandatory retrofits for rental properties, and steadily rising minimum standards for all buildings. If the federal government refuses to reinstate the Energuide program, Ontario must do so and we must expand it substantially. Germany has committed to completely retrofitting its entire housing stock over the next 20 years. Ontario should implement a similar program. Again, higher energy costs which include externalities would also help to encourage retrofits.

Electricity

Conservation

We need to implement very aggressive conservation plans. There is such a vast abundance of good

ideas that I'm certain I won't even remember all the ones I've heard about, but here's a start. Implementation can be achieved through some combination of education, financial incentives, market encouragement and regulation, whatever is most appropriate.

Any good conservation plan should begin with higher energy prices. The external costs of electricity should be included in its price. Health care costs attributable to electricity generation and transmission should be collected on the energy bill and applied to health, for example. As it stands, because health is a separate ministry, our ballooning health program is forced to absorb the costs of many poor policies such as permitted emissions into air and water, and generation over conservation. People would be healthier and would spend less money overall if they had to pay immediately for the negative consequences of their choices. Environmental, climate change and any other externalities should likewise be recovered.

Conservation should also be covered on the energy bill. This can be done either by adding a surcharge to pay for government conservation programmes or to allow power generators to claim “negawatts” (reimbursements for virtual power plants created through conservation rather than generation).

Regulation, education and subsidies for upgrades and retrofits should be used in addition to the market signals of higher energy prices,

Many electrical appliances and gadgets remain on standby mode when turned off. California has already decreased the electrical demand on standby through regulation. These regulations can simply be adopted. We could also consider simply prohibiting the sale of all devices with standby mode.

We need to discourage electrical appliances when mechanical appliances can perform the same function through education or, eventually, through regulation.

We should encourage the replacement of old inefficient appliances with newer models. We should set high minimum efficiency standards in refrigerators, freezers, lightbulbs, computer screens, air conditioners, washers, dryers, stoves and other appliances. We should work to continually refine these standards and develop ways of cooperating with other provinces, states and countries to share research and standards development. We should consider mandating that new appliances be built in ways that enable them to be retrofitted to higher standards rather than being thrown away.

We should begin a campaign to eliminate unnecessary electrical gadgets. This may seem extreme, but so are 80% emissions cuts. It is apparent that without fossil fuels (and cheap oil and natural gas are soon to end, whether or not we address global warming), our energy will be more constrained. Even if we resort to more environmentally dubious forms of generation (like nuclear and clean coal), and certainly if we don't, we will urgently need to prioritize the use of our precious energy. We need to evaluate the benefit of every bit of energy we use, and try to eliminate any uses that aren't truly necessary.

Generation

The OPA Supply Mix recommendations are outrageously unsuited to addressing climate change. While it is understandable that energy professionals adopt a conservative approach for energy planning that focuses on tried and true methods, it should be readily apparent to anyone who takes climate change seriously that our “tried and true” methods are killing us. A conservative approach to global warming leads to dramatically different conclusions.

I'd like to address nuclear power plants first. While nuclear plants are sometimes promoted as a means of addressing global warming, I'd have to say they are a truly desperate measure which ignores the broader lessons that the warming globe should be teaching us. What we should be learning is to use all our resources in efficient and continuous cycles. We should be learning that extracting resources at tremendous rates and dumping residues puts incredible and sometimes incalculable burdens on the environment that sustains us. We should be drawing the conclusion that if maintaining the lifestyle we have requires splitting atoms, then we should reconsider our lifestyle choices.

Nuclear power plants use vast amounts of fossil fuel in construction, extraction, refining, transportation and decommissioning. Even if some of these steps could be performed using non-fossil energy sources, nuclear energy would remain far more expensive than sustainable alternatives, especially if the costs of energy included externalities. For example, we have 1/3 of the world's fresh water supply here in Canada, plenty of it in Ontario. With our small population, we should expect our lakes and rivers to be pristine. Instead, our tolerance for tritium is higher than anywhere in Europe. We allow the nuclear industry to dump it and absorb the attributable health care costs from cancers and other illnesses, as well as any damage to other life forms. We have not yet even figured out how to dispose of the nuclear waste we have, and the risks of nuclear power are incalculable but unacceptably high. We know this because no nuclear power plant is insured. The population is expected to absorb the costs, and no provision has been made to set aside even the most nominal of funds to address a potential catastrophe.

Plenty of low-impact methods of generation exist. We need to explore them all, while jumping aggressively on the most promising and economical, notably wind. There is enough wind potential in Ontario to provide for all our electricity needs. The principal objection to wind by planners has been its intermittency. This can be overcome by spreading the turbines around and by creative methods of offsetting demand, which I'll discuss below. I favour dispersing wind turbines by paying farmers to place one or two on their fields. This practically eliminates the noise concerns of large wind farms, and permits land areas to continue to be used for agriculture with minimal interference and provides a financial incentive to accept wind turbines in rural areas.

We need to stop the construction of all fossil fuel generating stations and invest the money in conservation. The Suzuki Foundation notes that power plants fueled by natural gas are so expensive to build and operate that they end up operating alongside the coal plants they were intended to replace. As a result, in order to recover the costs for their investment (and to save face), governments are discouraged from making the kinds of investments that are necessary in conservation. There is an additional concern about the looming scarcity of natural gas, with less than 10 years of proven supplies remaining, according to the Suzuki Foundation. While natural gas supplies may prove to last longer, it is clear that even if we maximize our efforts to make all structures as energy efficient as possible, we will undoubtedly reach a point where the demand to heat our homes exceeds the supply of natural gas. Natural gas scarcity has already caused winter deaths in England. This is the wrong time to discover new uses for it. The Suzuki Foundation no longer supports coal replacement. We should work toward the elimination of coal through demand management. Investment in new generation facilities from fossil fuels needs to be a reluctant last-resort option.

Generation from agricultural and forest waste should be cautiously pursued. It is imperative that we maintain healthy forests and adequate agriculture to sustain us. We will not be importing bananas from Costa Rica, nor bringing parsley in refrigerated trucks from Mexico in a low-carbon economy, so our agricultural areas need to be healthy and they need to focus on producing food.

Methane harvesting from organic waste on the farm and from household waste should be immediately

pursued. It is economical today and allows us to convert methane (which is a very potent greenhouse gas) to carbon dioxide (which is far less potent) while generating electricity.

Solving the peaks

Generation from fossil fuels is the traditional approach to meeting peak demand. Nuclear power can't address irregularities in demand, and large hydro mostly runs at capacity, providing baseload power. In order to eliminate fossil fuels in generation, we need to rapidly develop creative ways of shifting the time of generation to the time of use.

Toronto Hydro's Peaksaver programme addresses just this. The device that allows Toronto Hydro to remotely call on major appliances throughout the city to reduce their draw can be used in many other creative ways. This is effective, proven technology.

Toronto also uses Deep Lake Water Cooling to meet part of its summer cooling load. This can be expanded either by bringing in new pipes, or more economically by using an ice bank such as the model used in Chicago today, which cools much of the city centre by chilling lake water to ice at night when electricity is cheap and plentiful, and using the coolness to provide daytime cooling the following day.

George Monbiot recommends conversion of the automobile fleet to battery powered vehicles built along the lines of the Hypercar promoted by the Rocky Mountain Institute. He envisions the leasing of interchangeable car batteries which would be switched at service stations. A fleet of electric cars and some stockpiles of batteries could absorb the electricity produced overnight by wind power and deliver it during the day.

Market mechanisms could change the way electricity is used. If energy were cheaper when it was plentiful, and more expensive when it was in low supply, consumers would be encouraged to use it when it was most appropriate. Ultra-smart meters could automatically start switching things off as energy became scarce and expensive. They could also enable us to set our washers, dryers, dishwashers and other appliances to automatically turn on in the middle of the night.

Finally, there are a number of straightforward storage options. The cheapest is pumped hydro storage, which should be pursued wherever possible. Another exciting option which can be used virtually anywhere is the flow battery. VRB is a Canadian company that manufactures a Vanadium-based flow battery that has the unique characteristic that both sides have the same chemical composition, differing only in the charge. This eliminates the problems of "poisoning" across the battery and gives it a very long lifespan. It can be scaled up to tens or even hundreds of MWh of storage.

Our addiction to generation from fossil fuels must end. By investing in the technologies that allow us to shift the time of generation to the time of production, not only will we be eliminating the need for generation from fossil fuels, we will be preparing for a future where generation comes from intermittent and irregular renewable sources. We need to begin this conversion now.

Transportation

Our way of life centred around the automobile will have to end. Some automobiles may remain and may even help us to balance our grid. They will be lightweight, very efficient and eventually electric. However, ideas that attempt to salvage the car-centred lifestyle are misguided. This lifestyle has been

built up on the availability of a very cheap and clean energy source. Even so, the detrimental effects have been legion, going well beyond smog and global warming. They include the paving over of an enormous productive land area and the consequent destruction of related watersheds. To attempt to maintain this destructive obsession with even less energy-dense fuels is suicidal.

For example, I am very wary of the corn ethanol fad. The production of ethanol from corn is so energy intensive that some studies conclude that more energy is lost than gained. Even under optimal conditions, the energy produced is minimal. Still, the real problem is that we would be converting our vital agricultural lands to provide for our wasteful transportation habits, which is bad prioritization. I am Brazilian, and I've seen first-hand the devastation that a conversion to ethanol for fuel had on agriculture. Brazil has far more agricultural productivity than Canada, had a much smaller fleet of cars, and cane can be converted to ethanol far more efficiently than corn, yet still sugar became prohibitively expensive or unavailable as huge swaths of land were converted to feed the automobile beast. Pressure on the Amazon is not unrelated.

I cautiously support limited research into ethanol from straw. There is less concern about using straw than corn because straw is a byproduct of existing agriculture. It is either sold for other purposes or left on the land. It is unclear to what degree soil productivity depends on the return of the nutrients to the soil. While a field may appear to remain productive if the straw is removed for several years, it may eventually degrade. This has to be approached cautiously and in limited quantities while the results are closely monitored. If straw can be harvested for ethanol without degrading agricultural productivity, then it should be pursued.

Efficiency targets in the auto industry should be strictly enforced. These have already been established in California and adopted by many other states. Ontario could simply adopt the same targets tomorrow.

There should be an immediate moratorium on new road construction, and lane reductions should become the new priority. The space gained should be reverted to agriculture, used to grow shade trees or dedicated to public transportation. New homes will need to be within easy walking distance to stores, work and public transportation. Bicycles need to be encouraged through tax breaks or other inducements. Public transportation networks need to expand, both within cities and between cities, as much as possible on existing roads. They should be powered by electricity as quickly as possible. The priority, as all these changes are planned, should be to preserve as much soil as possible. Porous pavement options should be considered. We can't continue to use asphalt anyway.

Suburbs need rethinking. To eliminate the vast bulk of fossil fuels, we will need to turn to less intense energy sources, which implies that efficiency will become very important. Suburban living is fundamentally energy wasteful, even if we get beyond the reliance on the car. The distance between homes in the more dispersed suburbs makes the provision of electricity, water, natural gas and sewage more expensive per person. While some suburbs may eventually need to be abandoned, I think some thought should go into this. Suburban homes can usually be reasonably insulated. Large suburban lots in Ontario often sit on productive agricultural land which can be intensively farmed on a small scale. However, if we are to break with the pattern that every suburban house has multiple cars, then we must develop ways of effectively moving the inhabitants to where they want to go. This may mean encouraging the construction of stores in key locations (especially to sell local produce), interspersing residential communities with some workplaces, while putting some apartments into former office parks, planning local transit shuttles and developing hubs with express connections to other places. The details are beyond my expertise. In any event, new developments should not be permitted without carefully planned connections between work, retail, residential and public transportation all within easy

walking distance. As long as energy prices make wasteful choices attractive, the only way to force better decisions will be through legislation.

Which brings me to the carbon tax. I've previously argued for electricity pricing which includes externalities. How does one quantify the externality for global warming? The risks are speculative, but human annihilation is possible. If we are to rely on price mechanisms to encourage better choices, the price has to be high enough at least to force the meeting of progressively lower carbon quotas across the province. I don't know what this would be, but I can only imagine it would be very high. It also needs to be frequently revised to make sure we keep meeting our reduction targets. The only way to make this palatable is to dramatically reduce other taxes – such as income and health taxes. When the desired result occurs and less fossil fuels are used, the carbon tax will need to rise again to meet the next round of carbon reductions and cover government costs.

A carbon tax can be the principal mechanism for carbon reductions. It should not be the only one. For example, a carbon tax would simply be an intolerable burden for people who are living just within their means in leaky rented quarters. Legislation to force landlords to make reasonable retrofits should be introduced simultaneously, if not before. And care must be taken that no one ever goes without heat because they cannot afford to pay for it.

An alternative or complement to the carbon tax is a cap-and-trade policy. For this to be fair, the cap cannot be applied based on prior use, which would reward wasteful practices and punish efficiency, but rather must be traded openly. George Monbiot proposes a tradeable quota system even for personal use. Regardless of the system eventually chosen, a firm cap must be adopted and fair market mechanisms should be used to permit flexibility in our specific response.

Imports through shipping will be greatly reduced. Jet travel will be excessively rare if we make the necessary reductions to combat climate change. I understand that aviation fuel taxes are prohibited by trade agreements. If these cannot be changed, the only way to reduce jet travel to acceptable levels may be to literally tear up the tarmac on progressively more airports and let the take-off slots go to the highest bidder. We should definitely not be expanding airports. We should also consider the role that airships might play in aviation. While they are slower, they require far less energy and may play a critical role in the shift to a low carbon future. There may also be a renewed role for sailing.

Other Considerations

Industry

It is my feeling that where energy prices are high enough to bring down emissions to the targets we set, the market can largely determine which users survive. Imports will have to be looked at to create a fair market. I'd like to see some support for industry that facilitates a low-carbon transition, like wind power and insulation manufacturing. Not only would this facilitate the transition here, it would also make Ontario a competitive provider to other jurisdictions as similar transitions are inevitably made throughout the world.

Population

It will be much easier to reduce our carbon emissions if we don't permit our population to keep expanding. Much of the rationale for building roads, homes and power plants has everything to do with the expectation that Ontario's population will keep growing rapidly. While this is a reasonable assumption based on past trends, it makes meeting climate change targets which are already very

difficult to meet that much more so. Regretfully, we may need to press the federal government to reduce immigration. We also need to consider serious economic incentives to reducing family size, such as a large subsidy for the first child only.

Urban Planning

Any new developments need to minimize energy use through efficient delivery of infrastructure. Energy economy must be the mantra at every level of planning.

Water Use

One of the most energy intensive services is water delivery, and the system is not especially sensible. In Toronto, we draw enormous quantities of water from deep in the lake, treat it and pump it across the city to water our lawns and flush our toilets, then build houses that take perfectly usable rainwater and dump it rapidly into sewers, killing our rivers and creating overflow problems. In a more energy efficient world, rainbarrels, heat recovery from drains, and greywater use must become standard.

Waste

We need to reduce it. It wastes energy to haul to the dump, and buries a great deal of embodied energy. We need to reduce packaging through regulation or taxes. We need to eliminate unrecyclable materials altogether. We need to force manufacturers to deal with their products at the end of their lifecycles. We need to make sure everyone recycles. All new buildings must have handy recycling facilities. Stand-alone garbage cans should be prohibited in public-access buildings and discouraged even for home use – every garbage can should be accompanied by a recycling bin alongside it. Any place where food is served or consumed should have a mandatory green bin waste container as well. The categories should always be the same for every location in the province, and should be as easy as possible. When one place sorts out paper while another puts it together with glass and pop bottles while yet another doesn't recycle paper at all, people give up.

Conclusions

Let's get on with it. There's plenty to do and time's a-wasting.