

Background Notes for a Lecture

**“Energy Policies for the 21<sup>st</sup> Century:  
is Past Prologue or Poison?”**

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**Introduction**

New Brunswick and the Saint John area in particular is engaged in a debate about new energy infrastructure—nuclear, power lines, LNG re-gasification terminals, pipelines and refineries. In this respect this region, while unique in many ways, is not unlike the rest of the world—catching up on two decades of little or no investment in energy infrastructure. More than any other factor, history will probably show that it was the erosion of spare capacity all along the supply chain that led to the tripling of oil prices since 2002.

As a result, energy security is again a concern for the governments of most industrialized countries—indeed of all governments, rich and poor, oil importing and exporting. But energy security concerns have conflated with anxieties about climate change, triggered by images of dramatic weather phenomena around the globe and Al Gore’s film, **“An Inconvenient Truth”**.

The issues of course are linked. Neither is new. What is new is the degree of public conviction that mankind is the cause of rapid climate warming and that this will have severe environmental, social and economic repercussions. The 19<sup>th</sup> C French labour socialist politician, Alexandre Auguste Ledru-Rollin, once proclaimed, “There go my people. I must find out where they are going so I can lead them”. And so politicians are running to catch up with the electorate

As implied by the title of this lecture, we have been here before. Addressing climate change is an energy policy challenge and Canada has a wealth of experience to learn from, not necessarily all encouraging. The question is, ‘Will our political leaders innovate or will they continue to cater to the easy and time-worn palliative of writing cheques?’ Are Canadians conditioned to expect this old approach? The recent budget would suggest the current government thinks so.

This evening, to set the context for the local and national energy debates, I want to examine a few features of the global energy picture. I will be so impertinent to suggest that one element could eclipse Mr Gore’s ‘inconvenient truth’. It could become the ‘true inconvenience’ confronting mankind, and perhaps sooner than will climate change. A convincing case could even be made that it has already started.

I will also look at the energy landscape our governments confront in addressing climate change as it has become a proxy for energy policy. To do so, I will take a very high level quick-tour of the history of how Canada’s governments have viewed energy, recalling some of the principal themes that have dominated energy policy debate for the last half-century and ask if these hold relevance today.

I then will close with some propositions in line with the title of this talk, namely, “in designing energy policies for this century, does the past provide a deep well of options or has the well been poisoned?” To put it in a more maritime context, when a woman piously boasted to Mark Twain that she didn’t smoke, drink or curse, he pitied

her for she was like “a sinking ship with no freight to throw overboard.” Does Canada have any easy carbon freight to throw overboard?

### **The starting point**

Most of us would change our diets immediately if we were told that over 80% of the food we ate was slowly killing us.

This describes the globe’s energy diet. Eighty percent of the world’s primary energy comes from fossil fuels. For the last twenty years, energy outlooks by reputable institutions such as the International Energy Agency have repeatedly pointed to our dependence on fossil fuels and, that in the absence of major policy changes, our future energy requirements will be even more carbon intensive. Indeed, in its latest outlook, the IEA says we face an energy future that is insecure, dirty and costly.

One immutable fact stands out in these energy outlooks. And that is the acute asymmetry in the geographic distribution of oil and gas resources versus their principal markets.

- Eighty percent<sup>1</sup> of the world’s oil and gas resources are in a daisy-chain of countries starting in Nigeria, across North Africa, through the Middle East and the Caucasus and ending in Russia (**Figure 1**);
- The OECD countries, China and India consume two thirds of the world’s oil and 51% of the world’s gas, yet have only 8% and less than 10% of the world’s oil and gas reserves respectively.
- More than 75% of the world’s oil and gas resources are vested in, owned or controlled by state-owned companies; measured by reserves, 9 of the 10 largest oil companies are NOCs<sup>2</sup>.

This is not an assumption or the product of modelling; it is the starting point. The simplest, most obvious conclusion from this is that we face a future of increasing trade in oil and gas. The proliferation of projects to construct LNG terminals on the Atlantic coasts of Europe and North America merely reflects the irreversible decline of North America’s sedimentary basins and points to our increasing reliance on gas imports from the Middle East, North Africa and Russia.

But given the political, demographic, cultural and religious make-up of the resource-owning states, the resource/markets mismatch also points to several daunting challenges. The most glaring feature is that the world’s democratic countries (autocratic communist China too) increasingly depend on a group of nations that are manifestly undemocratic, in many cases led by despotic leaders, some ravaged by civil wars fought over petroleum rents, and by regimes whose hold onto power, given their demographics<sup>3</sup>, largely depends on ever-increasing the production and export of their resources. Based on depleting assets whose value is appreciating, this co-dependency is inherently unsustainable.

Thus, this resource/market mismatch more than anything else will define the geopolitics of hydrocarbons for the duration of their remaining exploitation—

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<sup>1</sup> Based on data in BP’s Statistical Review, 2006

<sup>2</sup> According to the Petroleum Intelligence Group, 13 of the top 20 oil and gas companies are NOCs.

<sup>3</sup> Up to 40% of the population of Middle East and North African countries is 15 years and younger; this age cohort in OECD countries rarely exceeds 20%.

exploitation that will be dominated by National Oil Companies subject to the political view of their state-owners. This, then, is what I consider a 'true inconvenience'; it poses a threat to global security as the world's largest oil consumers, the United States, China, Japan, Korea and India engage in a mercantilist race to secure access to oil reserves, some by using their military reach, others by turning a blind eye to the human rights abuses of odious regimes ruling the resource rich host countries. Canada's claim to being an 'energy super-power' is a consequence of this global scramble for resources; if the world's easy oil was accessible to the international industry, they would have little interest in the costly, exceedingly difficult oil in the oil sands.

The other major global issue, climate change, is inseparable from energy security. But viewed through a climate lens, energy policy today is far more circumscribed than it was in the early seventies when we replaced oil-fired power plants with coal and nuclear and were just beginning to dip into the vast pool of energy saving potential.

If the oil and gas resource/market mismatch confounds energy geopolitics, the distribution of the world's coal reserves certainly confounds the international politics of climate change. Over half of the world's coal reserves are in the U.S., China and India. Together they account for 44% of energy-derived greenhouse gas emissions. The IEA projects<sup>4</sup> that India and China will account for 4/5ths of the incremental demand for coal out to 2030. Since 2000 the world's consumption of oil and natural gas have increased 8.5% and 13% respectively while coal has increased by 24%. It would appear the world is totally ignoring the energy/climate dietician's advice.

Global emissions from the energy sector come from three broad sectors: power generation, 42%; transportation, 22%; and direct fuel-use in industry and in buildings, 36%. In Canada, power generation accounts for about 21%, while transport is more than 30%. That 30% compares to the 6% from producing oil and gas and the 4% from refining oil. The simple fact is that, for electricity, all the carbon is oxidized at the point of generation, but we consumers oxidize most of the carbon in oil products when we drive our vehicles. Therefore we should focus on the upstream in the electricity sector and on the downstream in the transport sector. However, policies that increase consumers' cost of the myriad conveniences offered by electricity and of the hedonic delights of personal mobility are politically fraught.

The major challenge in the electricity sector is meeting the growth in baseload demand with low or no carbon fuels. The best alternative to coal is nuclear. Hydro, if available, presents its own set of environmental and land-use issues and in some circumstances is not greenhouse gas neutral. However, greenhouse friendly fuels generated 75% of Canada's electricity in 2004. But this conceals enormous diversity in the carbon intensity of power generation between provinces and therein hides the political challenge.

As for reducing energy end-use, the record of policies aimed at increasing the efficiency of electricity use and of vehicles does not convince me that growth in their demand can be easily reversed. I know of no country in the world where electricity and transport use have not increased lock-step with increases in income, or GDP.

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<sup>4</sup> International Energy Agency, World Energy Outlook 2006.

While electricity use by most major appliances in Canadian homes has declined since 1990, energy consumed by small appliances has increased by nearly 42% and now accounts for the largest share (39%) of energy use by residential appliances (which together account for only 13% of residential energy use—the major uses being space heating @ 57% and water heating @ 25%; lighting is minor @ 4.5%). Tremendous gains have been made in improving the efficiency of the major appliances, such as furnaces and water heaters, but together they still account for over 75% of GHGs in the Residential Sector. The proliferation in the number of small appliances (gadgets, home entertainment centres and computers) has accounted for most of the 10% increase in household electricity consumption since 1990 essentially cancelling out the energy savings in major appliances.<sup>5</sup>

So, we face an up-hill struggle. The only periods since 1900 when Canada's carbon emissions dropped year on year at a rate equal to what would have been necessary to meet our Kyoto commitment was in the four years after the 1929 Crash and in the six years during the deep, double-dip recession between 1980 to 1985 (**Figure 2**).

Canadians recently learned from Eddie Goldenberg, the long-time senior advisor to the former Prime Minister, Jean Chrétien, and confirmed by former Environment Minister Christine Stewart, that the Cabinet knew that Canada could not meet the Kyoto target when they signed and ratified the Kyoto treaty on our behalf. Up to that point Canada had a pretty good record in environmental diplomacy. For example, our record on acid rain and reducing ozone depleting fluorocarbons stands out. Why did officials fail to convince politicians of the folly of this course of action? Did they know and not say? Did they simply not do their research? Either way, they failed in their duty. More likely, the political staff make the calculation that it was better to listen to and take advice from special interests and Non-Governmental Organizations, who have assumed the role of de facto regulators and policy advisors. If you measure nothing, you know nothing. But if you know nothing, you sign international treaties at best unwittingly or at worst, as we have seen in the case of Kyoto, cynically.

### **The Changing Themes and Goals of Canadian Energy Policy**

Formulating Energy Policy at the national level in Canada has been and always will be about managing the tensions inherent in our geography.

Several interrelated themes have had dominant influence on our preoccupation with energy policy.

- 1) First of all Canada resembles the world in terms of the geographic resource/market mismatch: the resources are in the under-populated, historically politically marginalized hinterland whereas the market is in the political, demographic, industrial/financial centre—Ontario and Quebec.
- 2) The 'Tyranny of Distance' separating resources from domestic markets.
- 3) A push/pull tension with the United States that saw bouts of 'continentalism' alternating with nationalism and provincialism and resistance to the natural, longitudinal southward pull on Canada's resources.

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<sup>5</sup> Source of data for the energy consumption and GHG emissions is Natural Resources Canada.

- 4) The fact that much of our resource base, especially oil and gas, is land-locked has either tied us to the U.S. market or generated calls on the central government to subsidize access to domestic markets.
- 5) Canada's 'Nordicity', with its sub-themes of Arctic sovereignty, Aboriginal rights and the sensitive northern environment.

There are certainly others. Rarely if ever have all themes played at once, although the current debate over the Mackenzie Valley Pipeline certainly comes close.

In the **fifties and sixties**, energy policy was subsumed by Western Economic Development: John Diefenbaker's 'Roads to Resources' program, the great gas pipeline debate, Cold War threats to our sovereignty over the North and a struggle to get the Americans to allow imports of Alberta oil. The U.S. imposed a price above the world oil price to protect its producers; Canada argued for and won access to the U.S. market, but the government had to launch the National Oil Policy, which contrary to its name imposed a discriminatory pricing scheme—world prices east of the Ottawa Valley but higher, U.S. prices west of the Ottawa Valley.

The **seventies** saw how external sovereignty events, namely the nationalization of oil in OPEC countries and the end of the Seven Sisters' hegemony, were mirrored in strengthened provincial control of resources while the federal government struggled to bolster security of supply for central and Atlantic Canada, by terminating export licences, building the Sarnia-Montreal pipeline and controlling prices, a move that severely eroded relations with the western provinces.

As the world price peaked, leading to the infamous energy budget, the National Energy Program of **1980**, Federal-Provincial tensions worsened. The NEP was a bi-partisan policy in, by and for central Canada, sold under themes of Fairness, Canadianization and made-in-Canada prices. The west saw it as the centre's appropriation of the rent on their resources. The NEP's pretext was a favourite bogeyman, the 'foreigner', namely OPEC and US oil companies. The ensuing federal/provincial battle saw Alberta cut production to eastern Canada, the only time that anyone has ever cut off my supply of oil. The political legacy of the NEP, more than any other past energy policy, severely limits Ottawa's scope to tackle greenhouse gas emissions from the upstream end of the oil and gas sector.

Then came the deep and double-dip recession and counter-shock from the **1985 oil price collapse**. With an artificially imposed surplus of gas and excess capacity in most other fuels and the regulated domestic price close to the softening world price, it was easy for the Mulroney government to promise market liberalization. The Energy Minister chanted in every speech, 'Jobs, Jobs, Jobs', contrary to economic reality, the new doctrine of market liberalism and the loss of jobs in the energy sector worldwide. Undeterred, like previous governments back to Diefenbaker, with infusions of cash, special uplifts and loans, the Mulroney government subsidized mega-projects including an oil sands plant (OSLO, which never materialized), two heavy oil upgraders, Hibernia and the Vancouver Island gas pipeline; it patched up relations with the provinces by deregulating oil and gas markets and signing the Atlantic Accords and soothed relations with the United States by signing the Free Trade Agreement.

By the **nineties**, Ottawa had lost its stomach for the project-by-project approach for oil sands, adopting a generic regime that explicitly recognized their huge front-end capital costs. This regime is now criticized as unnecessarily rich and ridiculed as a subsidy to one of the country's fastest growing sources of CO<sub>2</sub>.

This was the period of low oil prices and energy surpluses and, unfortunately, of labour. With more than 30 million unemployed in the OECD region, governments of the industrialized countries embraced globalisation, free trade and liberalization of network sectors such as telecoms, transport, gas and electricity. After all, these industries provide inputs, not ends in themselves. If competition forced them to reduce costs, went the logic, manufacturers and other firms would survive, retain jobs and hopefully create new ones. Energy Ministries disappeared in OECD countries and energy slipped off most government's policy agendas; as an official in the UK triumphantly announced, "Why do we need an energy policy? We don't have a policy for orange juice." Oil, gas and minerals and cutting trees were considered the 'old economy'.

If you visit Alberta today, you would question whether resources are the 'old economy'. True, in a total Canadian GDP of \$1.2 trillion, energy at around \$75 billion accounts for a relatively small share. Yet the oil and gas sector will spend \$40 billion in 2007, account for 25% of private sector investment and constitute 30% of the value of the Toronto Stock Exchange. It paid \$27 billion to governments in 2006 and oil and gas accounts for 15% of total exports. Given the nature of oil sands projects—massive construction projects—unlike the conventional oil industry, the sector has a very large employment impact, currently estimated to be 500,000 jobs across Canada—finally the 'jobs, jobs, jobs' chant has come true. So, governments will want to think carefully before they look at this sector to carry Canada's burden of meeting Kyoto's targets.

This is where we are today on the policy agenda. Have our past policies and energy battles hamstrung governments? Has liberalization of the energy sector limited policy makers to market-based instruments, and in the Canadian context are they feasible?

What are the policies that can work? The IEA devoted a large part of its recent World Energy Outlook to examining an Alternative energy scenario that results in a significant slowing in the rate of increase in global greenhouse gas emissions and halts the rise in emissions by 2015 in OECD countries.

Under its Alternative Scenario, policies that encourage more efficient production and use of energy contribute 80% of the avoided emissions; the remaining reductions come from fuel switching.

Efficiency:

- More efficient cars and trucks = 36%;
- More efficient electricity use = 30%
- Greater efficiency in energy production = 13%;

Fuel Switching:

- Renewables including biofuels = 12% and,
- Nuclear = 10%.

The following generic policy instruments should be considered:

- Standards and regulations governing efficiency of vehicles, new buildings and industrial emissions;
- Efficiency targets for industry and targets for non- or low-carbon fuel use;
- Tax incentives for efficiency and alternative fuels—carbon must be priced but there must be tax-shifting to ensure fiscal neutrality;
- For the longer term, urban planning that avoids creating energy and carbon legacies.
- Research and Development and Demonstration of new technologies, in particular Carbon Capture and Sequestration, and a policy signal that requires new plants with a life-span exceeding 15 years to be designed carbon-capture ready.

Can carbon taxes work in Canada? Economists tell us that an increase in the world price of oil acts like a tax. Yet we have seen very little reduction (so far) in the growth of oil demand from the price increase since 2003. Oil demand is concentrated in transportation and is notoriously inelastic to price changes. A carbon tax would have to be significant and increase year on year. This also applies to the power sector. Harmonizing provincial sales taxes is a challenge let alone harmonizing taxes on electricity based on carbon content given the acute differences in carbon-intensity of electricity between provinces. In any event a national carbon trading mechanism would be needed.

The taxes and rebates on vehicles announced in the recent federal budget are only a start; they send a signal. It is important that consumers understand that the cost of carbon will increase in the years ahead.

Subsidies to improve end-use efficiency of individual consumers and householders—the favoured approach in the seventies—should be avoided. They may have already created a ‘moral hazard’ for policy makers; the public seems to be waiting for more handouts. These programs are rife with free-riders and bounce-back effects, making *net* savings doubtful and virtually impossible to measure; for example, what are the carbon emissions reductions if the savings from home insulation are spent on a holiday in Florida or Cuba?

**Figure 3** illustrates the periodic projections of OECD-wide CO<sub>2</sub> emissions by the IEA together with the actual reductions as oil prices doubled six times, appliance efficiencies improved, CAFE standards took effect in the U.S., nuclear replaced oil (especially in Japan and France), North Sea gas replaced coal in the UK and over 300 million tonnes of dirty coal production closed in a reunified Germany while through two major recessions heavy industries closed down or moved to the developing countries. Over fifteen years we threw a lot of carbon freight overboard.

According to recent opinion polls, more than 75% of Canadians believe climate change constitutes a serious threat to mankind. Yet, 80% would not pay an extra 25 cents/litre for gasoline to combat it. Implicitly we are saying that other Canadians must either reduce their emissions or pay us to reduce ours.

Consumers everywhere have been lulled into believing that easy solutions are just around the corner. Politicians selectively embrace politically safe renewables and energy efficiency. They love to wave Compact Fluorescent Lights and jump at the

chance to open wind power projects and ethanol plants while disingenuously using large numbers of small units to create the impression of major progress in reducing greenhouse gas emissions—“enough capacity to power 10,000 homes” or “millions of litres of ethanol per year”<sup>6</sup>. Not only does this conceal the very small net impact on the carbon-based fuels these renewables are supposed to replace, it sends a dangerously misleading signal that current energy consuming behaviour is OK because a solution is at hand.

The preferred, politically-correct fuels also include natural gas with its lower carbon content, as long as its price remains below about \$5/GJ. But natural gas supply has been jolted by the failure of deliverability in North America, the rapid decline of the UK North Sea fields and the aggressive and ham-fisted ‘resource diplomacy’ by Russia. And that brings us back to Saint John as it prepares to be part of a future of increasing gas trade.

Climate change is a serious issue; it requires serious policies based on a clear understanding of where policies would be most effective. This means science or fact-based policies. Governments need to be honest with consumers: our energy needs are going to have to cost more; that they will increase every year and that consumers ultimately are going to have to pay the cost.

Markets work. The energy industry is based on gigantic, fixed capital assets that take years to plan, build and be approved, and they are in place for decades. Companies therefore have a duty to shareholders and to the community in which they operate to anticipate a world where managing carbon is part of business and good business. They are doing it already to gain their license to operate.

But we live in a world whose energy requirements are expanding and Canada is a growing energy supplier, a supplier of very carbon-intensive oil in particular that is contributing to our economic growth. How governments reconcile these realities will be a challenge. Because of our geography and our policy mistakes of the past, governments are constrained; they should give the market a chance and help it where needed because the old approach of subsidies, command-and-control and picking winners will not work in our complex confederation of extremely diverse carbon dependency.

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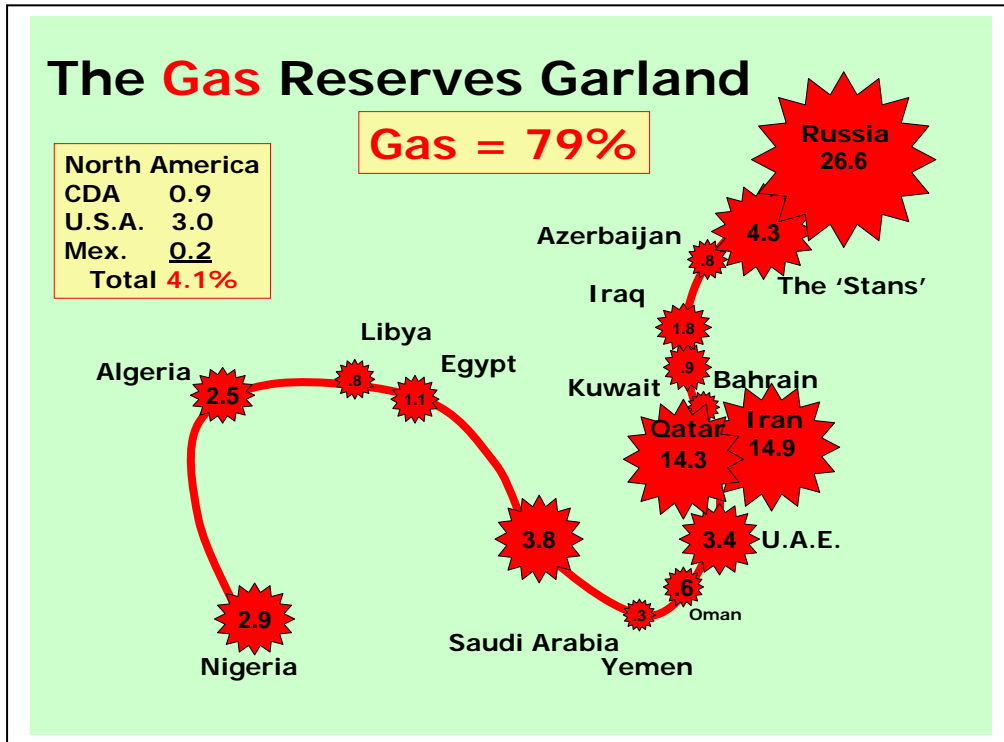
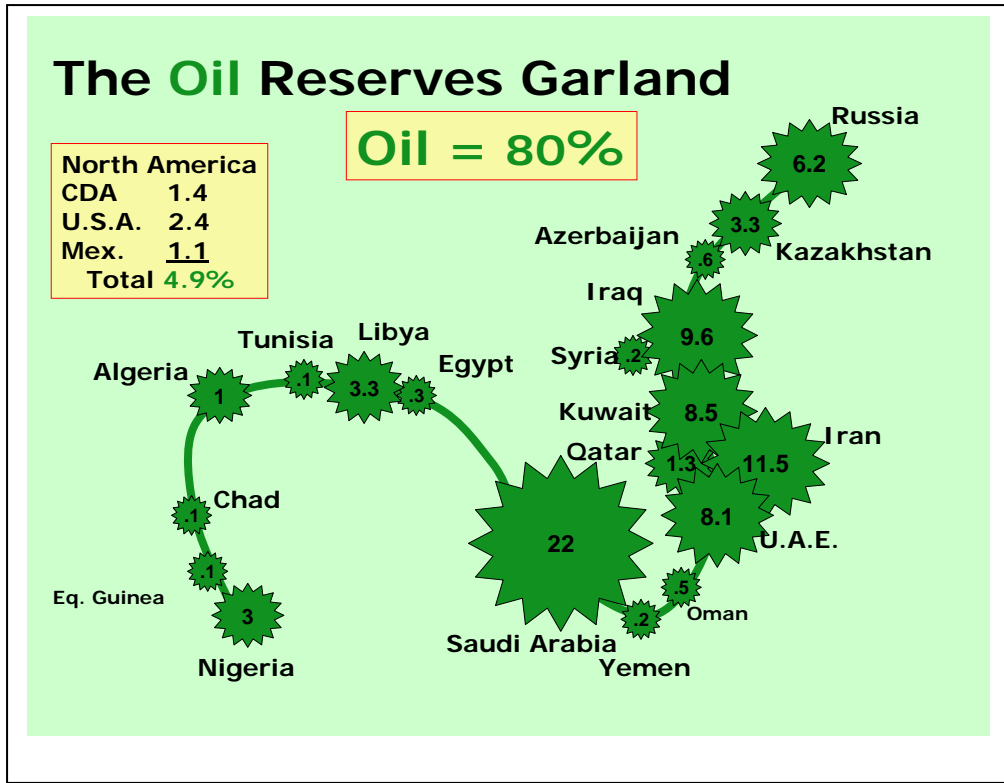
<sup>6</sup> A) If all the lights in all Canadian households were *turned off*, let alone replaced by CFLs, Canada’s GHG emissions would be reduced by 0.5%.

B) Wind power projects are usually described in Megawatts and not in terms of load factors, availabilities and electricity generated. An excellent wind plant will generate power 35 to 40% of the time. The average wind power unit in Europe operates less than 20% of the time; obviously, only when the wind is blowing—not necessarily when the power is needed.

C) Canada’s largest ethanol plant, Suncor’s St Clair plant, will produce 200 million litres of ethanol per year. This equates to about 3,450 b/d or ~2,100 b/d of gasoline in energy equivalent terms. Canada’s gasoline consumption in 2005 was 630,000 b/d; it increased on average 8,000 b/d per year between 2000 and 2005 ([http://www.cppi.ca/Gasoline\\_Sales\\_Data\\_by\\_Province.html](http://www.cppi.ca/Gasoline_Sales_Data_by_Province.html)). Four comparable plants built per year would offset the increase in gross gasoline demand but this does not take into account the fuels and other oil feedstocks used to produce, transport and fertilize the corn. We would soon face a limit in corn supply; the St Clair plant uses 10% of Ontario’s corn production.



**Figure 1:** The Oil and Gas Reserves Garland—a ‘True Inconvenience’?



**Figure 2:** Canada's carbon emissions from fossil fuels, 1900 to 2004; the only years (1929 – 1933, 1980 – 1986) Canada's emissions reduced year-on-year at a rate comparable to what would have been needed to meet the Kyoto commitment from 2000 to 2012 (red line). Source of data, Oak Ridge National Laboratory, U.S. Dept of Energy. Emissions post-1993 are understated.

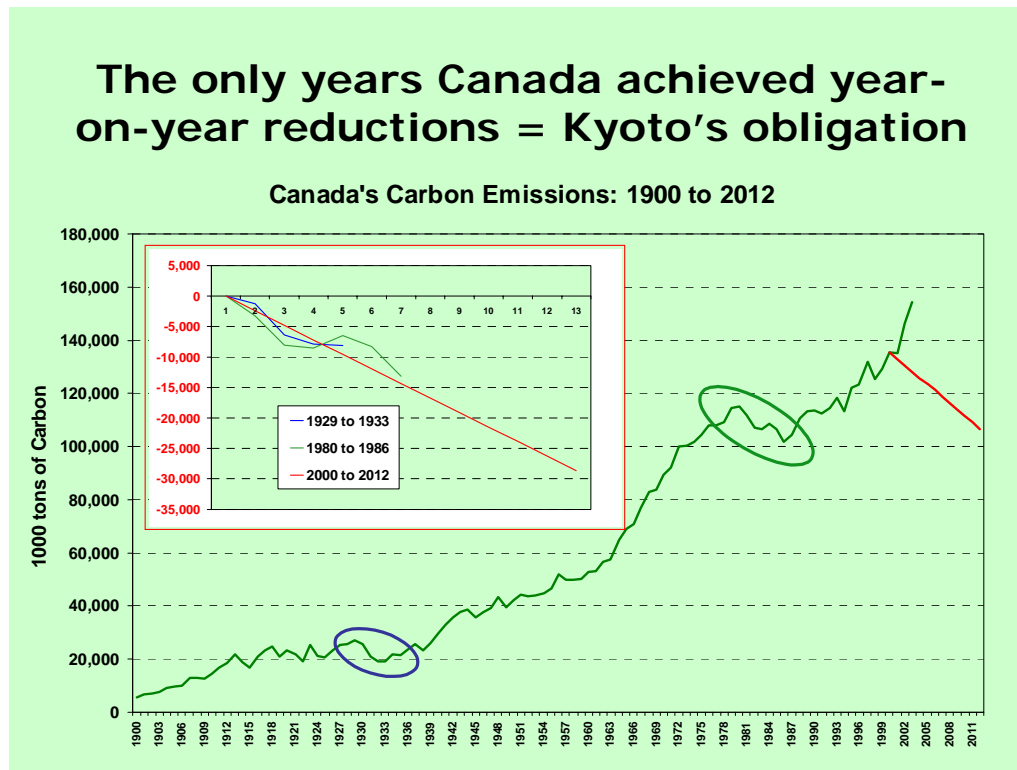


Figure 3:

