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The Post Carbon Society: Is it feasible?

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Moderated by Ann Dale

Participants

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Dr. Richard Gilbert, consultant to the Organization for Economic Cooperation and Development (OECD)

Elizabeth May, Executive Director of the Sierra Club of Canada

Dr. John B. Robinson, Professor, Sustainable Development Research Initiative (SDRI), UBC

Ralph Torrie, consultant in the field of energy and environment for 30 years

Dialogue

Ann Dale

Welcome, colleagues to the first in our series of real-time e-Dialogues on The Post Carbon Society. First, I wonder if each of you could briefly introduce yourselves to our e-audience, and I would like to take this opportunity to congratulate Elizabeth May on her Order of Canada award. What an honour, Elizabeth, and very well deserved!

Dr. John Robinson

My name is John Robinson. I am a Professor in the Institute of Environment, Resources and Sustainability at the University of British Columbia. I have been working for about 30 years on alternative and sustainable energy systems, and for about 15 years on how those issues connect to climate change. My main interests at present have to do with market transformation towards more sustainable energy demand and supply practices; the linkages among climate change mitigation, adaptation and sustainability; the technical, behavioral and policy dimensions of energy efficiency and renewable energy; and participatory tools and processes for community engagement.

Congratulations, Elizabeth.

Jeff Ardron

Hi All,

I am Jeff Ardron, and presently work in Germany for the Federal Agency for Nature Conservation. I am a scientific advisor on marine protected areas. I also do work for a German environmental non-governmental org., NABU, which is part of BirdLife International.

However, having said that, I think Ann Dale approached me to participate in this e-dialogue not because of my work. Instead, I think it stems back to a conversation we had over a year ago about how everything in our modern civilization has been “touched” by hydrocarbons, usually oil. And how it would be a shock when we start to run out of that gooey oh-so-useful stuff.

I look forward to the discussion, though I must warn you that I am torn on this, with my head being not too optimistic... but my heart holding out hope nonetheless.

PS: Congrats also, Elizabeth. You have been a great benefit to environmentalism in Canada. I imagine Sierra Club is pretty happy too --what with both you and Vicky Husband (and are there others I don't know about?) being recipients.

Ann Dale

Jeff, you forgot to mention that you are a Royal Roads University graduate? Welcome, and it is good to reconnect.

Dr. Richard Gilbert

Hi, I'm Richard Gilbert, in Toronto, congratulating Elizabeth too, and thinking that I'm part of this because of my interest in transport issues.

Louise Comeau

Hi everyone! Louise Comeau here. I've been working on climate change since 1991 and among this group I am one of the newest members!

I feel like we're at the cusp of a new energy future, but it won't be post-carbon.

Elizabeth May

Hi all, This is the much congratulated (and a bit over-awed!) Elizabeth May. I am the Executive Director of the Sierra Club of Canada. I started working on climate in 1986 when I was a policy advisor to the federal Minister of Environment. Since 1989 I have been with SCC. My concern which tends to border on panic is that we have made such a pathetically small amount of progress in addressing the threat of climate change. Thanks to Anne for creating this e-dialogue

Ralph Torrie

Hello everyone, Ralph Torrie here.

Ann Dale

Welcome, Ralph, any comments on whether or not a post carbon society is feasible?

Dr. Richard Gilbert

We're not going to "run out of oil", but production will soon not keep up with potential demand and prices will rise steeply. We are quite unprepared for this and preparing for it should be among the highest of national priorities.

Jeff Ardron

Yes, I agree. Furthermore, the "easy" stuff is pretty much disappearing. So, we will be left with trying to get at the harder to reach reserves of hydrocarbons, each with their associated economic, social, and environmental costs...

Ann Dale

Our first question "is a post carbon society even feasible?" Louise, you say we are at the cusp of a new energy future, but it won't be post-carbon. Can you explain this a little more? And Richard says we need to be prepared for supply and demand not keeping up with corresponding price increases.

Dr. Richard Gilbert

The new transport future is already beginning. It's electric, eventually with battery and grid-connected vehicles powered by renewable sources of electricity. Fuel cells are inherently too inefficient to play a prominent role.

Jeff Ardron

Is a post [hydro]carbon society feasible? Yes, not only is it feasible, it is inevitable.

The question as I see it is: Is our civilization feasible?

Because our society as relied so heavily on this wonderful portable energy for its success, without having to look elsewhere, its reliance has become pervasive. As such, no, our present civilization is not feasible.

There are a lot of compelling technical and economic and environmental reasons for this, and really I think it would be easier to try to imagine the opposite: A world with diminished availability of hydrocarbons looking like the one we know today... It seems pretty unlikely.

Louise Comeau

I think we will soon - next 10-15 years go through a revolution in the way we look at fossil fuels: people will look back and ask how we could have been so stupid to have burned it. We will use fossil fuels but the combustion aspect will be revolutioned: capture if combusted, or not combusted at all. We will also turn to the other carbon system based on biomass and harvest the knowledge of biomimicry.

Dr. John Robinson

Richard, I agree that we are running into problems with the availability of conventional crude oil. Unfortunately that is not the case with coal, nor with the supply of (as opposed to the ready availability of) heavy oil and tar sands. And depending on what you think of the 'deep gas' issue (is there lots of it or not?) and ocean methane, there may not be major resource constraints on natural gas either. What I think we are witnessing is a peak in the deliverability of conventional crude oil, but I think it is far from clear what the price effects will be over the next decade. In fact, I worry more that the price will continue to be too low, than that it will be too high. High is good, though I agree some intelligent planning would be nice,.

Dr. Richard Gilbert

I have to assume something like our society is feasible without a lot of oil. The alternative is throw myself under a grid-connected subway train. The key issue is how large a population can be supported with the diminished agricultural output that will be available when oil and natural gas become very expensive.

Dr. John Robinson

I agree with Louise. To me the most likely and hopefully most desirable shift is from combusting carbon in the form of fossil fuels to transforming carbon (and other materials), and using them, in elegant and efficient ways, based on the knowledge gained in that 5 million year old R,D&D plant: the planet earth.

Jeff Ardron

Yes! I too am concerned. This issue seems to not get enough attention: the reliance of our food production on hydrocarbons.

The green revolution, which increased productivity 2.5 times, did so with a 50 fold increase in energy inputs. Of these (just looking at the framing aspect here) about a third are used to make fertilizer... Yep, fertilizer comes from hydrocarbons (natural gas, actually).

Here is a really gloomy web page if you want to read more...

http://www.fromthewilderness.com/free/ww3/100303_eating_oil.html

Ralph Torrie

There is so much momentum, still building, behind the use of fossil fuels, that it is difficult to see a smooth transition to a sustainable level of GHG emissions that would occur on a time scale that will keep us from entering the next zone of climate changes. It will be less smooth, there will be large events in the climate system that will be generally negative for humanity. This will create the motivation that we all have been trying to kindle, but it is not clear that will happen before the human term in the equation will have sufficient leverage to calm the system. Cheery, eh?

Ann Dale

Perhaps I am overly optimistic, however, I believe in our ability to innovate if we have the political will and institutional systems in place that either stay out of the way of this

innovation, or facilitate it. I think we all agree that there it is unsustainable to have so little diversity in our energy system. So, how do we get from our current dominant reliance on fossil fuels to a more diversified system?

Dr. Richard Gilbert

My server gets slow at this time as the TSX winds up for the day. We will use more coal, and that will be a problem, but its hard to do most of the things with coal that we do with oil and natural gas. I don't think we will ever pull much out of the oil sands in any given year, and I don't see other carbon sources becoming available (e.g., methane hydrates), but who knows.

Jeff Ardron

Here's some quotes about the oil sands...

<http://www.lifeaftertheoilcrash.net/SecondPage.html>

...even with massive improvements in extraction technology, the oil sands in Canada are projected to only produce a paltry 2.2 million barrels per day by 2015..

More optimistic reports anticipate 4 million barrels per day of oil coming from the oil sands by 2020. Even if the optimists are correct, 4 million barrels per day isn't that much oil when you consider the following:

1. We currently need 83.5 million barrels per day.
 2. We are projected to need 120 million barrels per day by 2020.
 3. We will be losing over 1 million barrels per day of production per year, every year, once we hit the backside of the global oil production curve.
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Dr. John Robinson

I think Ralph's comment points to the fundamental issue about fossil fuels: the problem is not that they are physically scarce or that we are running out, but that the consequences of continuing to burn them are so unpleasant. I am an optimist on this point. I believe that the global scenarios that show us in the year 2100 with lower emissions than today are indeed possible. The problem is that they do not appear very likely at the present. However, since I don't much believe in prediction, I remain convinced that they are achievable.

Elizabeth May

I have to be an "operational optimist" to use Maurice Strong's terminology. As we have no choice but to rapidly reduce fossil fuels and GHG emissions, I must operate on the basis that we WILL do so. So the question is not whether a low carbon future is possible. The question is: is any future possible without such an energy revolution?

Ann Dale

Has there been anything written about the economics of all this? For example, I read that the drilling of oil in the Arctic Reserve was not only ecologically and socially perverse but economically as well? (to quote Jim MacNeill, who has always talked about economically preserve and ecologically destructive incentives).

Jeff Ardron

Uh... I meant to include this one too... which gets at what I alluded to earlier: this stuff doesn't come cheap in dollars, socially, or environmentally.

<http://www.feasta.org/documents/wells/contents.html?one/panel1.html>

In the 2003 book *The Party's Over* ...points out that the waste water pond of one of the processors, Syncrude, is 4.5 miles in diameter and twenty feet deep. He calculates that it would take 350 similar plants to meet the world's oil needs, and, together, their waste water pond would be half the size of Lake Ontario.

Louise Comeau

On the question of how to get to there - and there being 60--80 percent reductions in GHGs from 1990 levels - we need to focus on sustainable economy and sustainable communities. There has to be a strong and strengthening price signal for carbon and real financial incentives for efficiency and productivity. My question to you all: are price signals and incentives enough to ensure a diversified energy system, and importantly one that is distributed and diversified?

On reserves and whether we are peaking:

Ann Dale

John, the consequences, is there any recent IPCC (Intergovernmental Panel on Climate Change) work you may want to refer to, what are the current scenarios?

Dr. Richard Gilbert

If John and Ralph are right, and the main issue is managing the impacts of carbon fuel use, then we are in very deep trouble. I believe the main issue is managing the transition to very high fuel prices, which to a degree will look after the impacts issue. It's the prospect of these high prices that keeps me going.

Ann Dale

Ralph, a question, in our research building the website, most people seem to assume that when oil reserves near their limits that it will be gradual, but why wouldn't it be equally likely that it could be sudden?

Ralph Torrie

I suppose the decline in oil production could be relatively sudden, or at least the tension between demand and supply could escalate rapidly, especially as India and China start their engines, but I don't think the physical supply constraint will be the critical path. With enhanced recovery techniques, the tar sands, the deep gas etc. not to mention the things that become economic to do with coal when oil goes up over \$60 and stays there, I don't think physical shortages will be the pinch. I agree with John on that.

Dr. John Robinson

I have to say that, having lived through the limits to growth and oil peak arguments of the 1970s (based on exactly the same Hubbert curves) I am worried about the tendency to use fossil scarcity as the main rationale for the shift to sustainable energy systems. It is not only an unreliable argument, I think, it is not the key point. We want to get off fossils whether or not they are physically scarce. Insofar as we suffer from delivery problems, the net effect, to increase prices, will in the long run be a very good thing. The key is to mitigate the impacts for those most hard hit by such price increases.

Louise Comeau

didn't finish my thought!

On the question of are we running out: agree with John and Elizabeth that it is the wrong question: scarcity will be set by atmospheric capacity, not supply of fossil fuels.

Jeff Ardron

I hope that market signals will work, but I am worried. First of all it a "Non-elastic" commodity, whereby small changes in supply can lead to wild and unpredictable changes in costs and even demands. the 70's oil "crisis" demonstrated that with just a temporary 5% reduction...

Here is someone else's opinion:

<http://www.lifeaftertheoilcrash.net/SecondPage.html>

...as of April 2005, a barrel of oil costs about \$55. The amount of energy contained in that barrel of oil would cost between \$100-\$250* dollars to derive from alternative sources of energy. Thus, the market won't signal energy companies to begin aggressively pursuing alternative sources of energy until oil reaches the \$100-\$250 mark.

Ralph Torrie

Richard, how do you define "very high prices"?

Dr. Richard Gilbert

Ralph, in work I'm doing for the City of Hamilton on the impacts of "very high prices", I've chosen about four times present levels (i.e., \$4/L for transport fuels and \$2/m³ for natural gas) as indicative levels. They are well above the upper limit of 'business as usual' which seems to be about 2.5 times present levels.

We could debate the production/scarcity issue, probably unproductively. I would now only make the point that whatever its validity (and I am reasonably convinced of it) as a basis for impelling action it beats out climate change.

Ann Dale

Does this argue for a carbon tax?

Louise Comeau

Price signals in the \$150-\$250 range: absolutely and the process starts and builds to that level: say within 10 years? Carbon tax: yes! But I also believe that carbon taxes may work best at the consumer level and that we will also need emissions trading through real cap and trade for industry and strong standards for a broad range of appliances and equipment. Even at this level there will be a need for R&D investments and other government involvement.

Ann Dale

Key question, Louise, but I recall an earlier e-Dialogue we had on climate change in which Danny Harvie (UofT) climate change expert and an economist stated that simply retrofitting existing buildings with no new technology could reduce GHG emissions by 30% and if you included new technology, 60%. It seems we miss the many small steps that could be taken at the expense of the big fix. And yet, this would entail political will to devote as many resources to maintenance as to production? We seem to be so 'locked into unsustainable pathways?

Dr. John Robinson

I want to pose a small thought experiment. In 1980, everyone, including the federal government, the provinces and the whole oil industry, not to mention the advocates of change, believed that the price of oil was going to approach \$100/barrel (in 1980 dollars!) by about 1995. In fact it tanked shortly thereafter, and we had a glut of cheap oil. My thought experiment is to ask: what if everyone had been right, and we had oil at well over \$100/barrel now. I think it is pretty clear that energy efficiency and renewables would have been exploited to a vastly greater degree than they have been. In fact, I think we would have been well on our way to a post-fossil age.

Ralph Torrie

Perhaps John but it seems to me that even then a great deal more spending went to synthetic fuel from coal and finding more petroleum (whatever it took and whatever ecosystem had to be destroyed to get it) than was directed to efficiency and renewables. I believe there is a much greater appreciation of the economic and other benefits of the efficiency side of the equation now, but it still not pursued with the vigour one might expect, especially given the role that improved energy productivity has played in the last 25 years, in rich and poor countries. Energy productivity has contributed more to the energy security of the OECD nations since 1973 than all of the new sources of all fuels and electricity added together. And still we turn away from it.

Ann Dale

The ultimate limit will be biospheric not human, what about both biospheric and human at nearly the same time?

Dr. John Robinson

I agree with Ann. The most interesting questions are about why we make the decisions we do make; what are the institutional lock-in effects; what conditions are likely to give rise to changes in behaviour and policy; etc. In other words, I think the key issues are institutional, social and political, not technical or even economic.

Jeff Ardron

Uh oh, falling behind in the dialogue here...

I am not so optimistic about either the supply of energy or our ability to change. I guess I am a bit like Jared Diamond on this one (collapse of civilizations).

But I do agree that the issue is mounting a sense of urgency. Yes, I truly think the situation is urgent, but that factual knowledge alone is not enough. There has to be a real visceral link.

Dr. John Robinson

Without wanting to single out Diamond too much, surely the problem with his arguments is that they are almost entirely materialistic and deterministic nature. He seems to ignore the factors I mentioned in my last post. One could construct an alternative history to his, with very different conclusions.

Jeff Ardron

This from a recent issue of Wired Magazine. I don't agree with it, BTW, but it belies how market thinking and happy consumerism can coexist in some people's heads:

http://www.wired.com/wired/archive/13.12/gas.html?tw=wn_tophead_5
Dec 2005

So what's a price-shocked, carbon-afflicted highway jockey to do? Keep driving. In fact, drive more. The longer gas stays expensive, the higher the chance we'll see alternatives. Put that pedal to the metal. And smile when you see a big black \$3 or \$4 out in front at the gas pump. Those innovators need all the encouragement they can get. Shale oil, uranium, sunlight - there's enough energy out there for a dozen planets. Where we'll all park is another matter.

Ann Dale

Jeff, what about Lovins new book on Winning the Oil End Game, in which he argues that the root causes--most of all, inefficient light trucks and cars--also threaten the competitiveness of U.S. auto making and other key industrial sectors. He suggests four integrated steps: double the efficiency of using oil; apply creative business models and public policies; provide another one-fourth of U.S. oil needs by a major domestic biofuels industry and use well established, highly profitable efficiency techniques to save half the projected 2025 use of natural gas?

Louise Comeau

How do we garner public support for a pricing strategy? That is where we focus on climate change: the risks, the impacts, the need to adapt. On the positive side; we need to engage citizens supporting sustainable communities for the clean air, water and land benefits as well as the quality of life. I am sensing a psychological shift stemming from concerns about extreme events and reliability of electricity that is an opening on personal energy security and energy self sufficiency: key to the distributed energy system.

Dr. John Robinson

Ralph, I agree that there is better awareness of the demand-side issues now (though we are still conceptually behind the high-water mark of thinking of the early 1980s) and that makes me more optimistic about the effect of significant price increases. Don't forget we didn't actually get \$100/barrel oil prices. But maybe we now will. That will trigger a major reformation, not just of energy systems but also of economies more generally. Out of that creative destruction, there is at least the chance of transforming to a more sustainable world. Certainly a high-energy-price world is much more likely to be sustainable than a low-energy-price world.

Ann Dale

Ralph, energy security, is it true that it is easier to trade energy north/south than east/west in this country and what does that mean for Canadians?

Louise Comeau

Richard: do you think our energy self sufficient consumer would extend beyond the home (solar thermal for water, solar PV for electricity, geothermal, etc.) to the vehicle: plugging their electric cars into the grid?

Consumers as energy entrepreneurs making money from the energy they generate from their building and transportation assets.

Ann Dale

Louise, can you explain in more detail what you mean by a distributed energy system?

Elizabeth May

While waiting for Louise to explain, let me weigh in to say that a distributed energy system more closely mirrors the kind of society we would most want: a society where power is shared, not centralized. By this I include political power, as well as electrical energy. We need more equitable frameworks for sustainable communities. A broad portfolio of energy options used at appropriate scale throughout society will look and feel very different from the mega-project, monopolistic (dare I add patriarchal) model of society since the Industrial Revolution.

Louise Comeau

My favourite topic. A more resilient and potentially energy system will include a broader range of supply options and will balance centralized, large scale with decentralized, smaller scale.

I've mentioned some options on the residential front, but solar walls, solar shingles, cogeneration and district energy systems also will link buildings as part of an integrated energy system.

Eco-industrial parks will be designed to capture waste heat and materials from one operation and feed it into the next. Eco-efficient industrial processes tied through distributed infrastructure: whole new way of thinking about industrial parks.

Dr. John Robinson

Louise, I completely agree with your list. However, virtually all of these technologies have been suggested for the past 30 years. In that sense we are in Nov 1974 every five years. And the real price of energy is about the same now as then. So how do we begin to make them happen?

Dr. Richard Gilbert

Louise, all these things are possible now, and most of them are featured in the Hamilton work. That proposes: (i) overall 2/3rds reduction in energy use for transport and buildings, much for oil and gas, less for electricity; (ii) all electricity produced in Hamilton; (iii) half of other energy used produced in Hamilton.

Dr. John Robinson

here is a wild stab at a proposed strategy:

1. ride the coat-tails of the peak oil argument ("see the price increases are driven by the market not by policy") as far as it will go.
 2. Craft the innovation argument for the policy world, along the lines of Lovins arguments.
 3. develop an argument based on personal security and insulation from price shocks for the average citizen ("the more you improve efficiency and use alternative sources of supply, the more you are insulated against oil price increases")
 4. focus a lot of attention at the urban scale, where cities are grappling with sustainability in a more focused way.
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Jeff Ardron

Back to that sense of urgency...

Just on the news today: Kuwait's largest oil field is peaking... I mention this because many people don't realize how quickly things are changing.

<http://www.kuwaittimes.net/localnews.asp?dismode=article&artid=37595069>

Wednesday, November 23, 2005 17:11:55

Kuwait's biggest field starts to run out of oil

By Peter J. Cooper

KUWAIT: It was an incredible revelation last week that the second largest oil field in the world is exhausted and past its peak output. Yet that is what the Kuwait Oil Company revealed about its Burgan field. The peak output of the Burgan oil field will now be around 1.7 million barrels per day, and not the two million barrels per day forecast for the rest of the field's 30 to 40 years of life, Chairman Farouk Al-Zanki told Bloomberg.

He said that engineers had tried to maintain 1.9 million barrels per day but that 1.7 million is the optimum rate. Kuwait will now spend some \$3 million a year for the next year to boost output and exports from other fields.

However, it is surely a landmark moment when the world's second largest oil field begins to run dry. For Burgan has been pumping oil for almost 60 years and accounts for more than half of Kuwait's proven oil reserves. This is also not what forecasters are currently assuming.

Last week the International Energy Agency's report said output from the Greater Burgan area will be 1.64 million barrels a day in 2020 and 1.53 million barrels per day in 2030. Is this now a realistic scenario?

Dr. Richard Gilbert

Louise: You're on the right track. I'm staying away from industrial uses in the Hamilton work because they are too complex (and not greatly significant). Distributed electricity production is the key. Hamilton already has some of it. The City Hall was one of the few buildings in north-east North America that had an electricity supply at 5 p.m. on August 14, 2003 (from a neighbouring trigen plant).

Jeff Ardron

The oil industry is heavily invested in the "alternatives" as well, such as solar and wind. Chevron's <http://www.willyoujoinus.com/> site is probably a good business idea because it could raise the perceived value of oil and help boost the alternative investments.

Ann Dale

John, and others, can you think about transition strategies that would cushion those who earn their living from the oil industry?

Dr. John Robinson

Ann, this is the same question being asked out here with regard to resource-dependent towns on the coast who are seeing their livelihood (logging, mills, fisheries) disappear. It speaks to Elizabeth's point about power and political distribution issues. Right now we have political economies that are good at reproducing unsustainable production systems.

Dr. Richard Gilbert

Ann, the oil workers will be fine. Things are not going to change that quickly, and they'll have good nest eggs. I'm much more worried about the rest of us who will not be able to afford what they are producing.

Ralph Torrie

Whoops, I have been falling behind, while formulating a response to the question of how to garner public support for a pricing strategy.

The historical experience is that high energy prices, and more specifically rapidly increasing energy prices, play an enabling role in the improvement of energy efficiency but not a sufficient one. After the first price shocks of the 1970's, when you stripped away the structural change (that was already underway before the price shocks) the only significant technological efficiency improvements that took place were in home heating and personal vehicles, where there were effective government programs. Everywhere else the higher prices were passed on, from manufacturing to building rents to commercial transportation. Energy is a small contribution to the cost of doing just about anything (except for primary processing); its less than two percent of value added for most manufacturing. We apply Lovins argument about considering the end use service when analyzing the technological and thermodynamics of energy demand, but we don't seem to apply so well to the decision making process that leads to the demand for fuel and electricity.

I think it is also a hard sell for environmentalists to argue that what is good for the environment is good for the economy and then turn around and propose new taxes as a way of addressing the "environmental problem". I know it can be revenue neutral (but it wont be) and that a rationale can be concocted, but it will be a very difficult political sell. A carbon tax on a single mother who lives in Mississauga and works in North York will create an incremental increase in human misery, but it wont save a Joule.

Ann Dale

What about fundamental redesign of current transport modes, demand side incentives, strategy-based business and government leadership supported by progressive and transformative government policies, with a social safety net to cushion those whose livelihood is dependent upon the oil industry, while at the same time conserving existing oil stocks for essential societal uses? And etherialization of the economy (Newman, e-Dialogue) trying to disconnect as much as possible using tonnes of physical resources, or what John has referred to as dematerialization?

Louise Comeau

I am seeing consensus emerging on the need for change, that price signals are key and that we see a brighter future ahead if we can transition to a new energy system. What would you say are your priorities for moving forward?

Let me start on the fair transition question: I see no reason why existing energy workers could not be tomorrow's energy workers. Many of the same skills will be needed. Workers have moved to where the jobs are for a long time and there is no reason why Alberta can't be a substantial player in the future.

Jeff Ardron

More on the suffering oil industry :), Alberta is going to boom, no doubt in my mind:

<http://www.energybulletin.net/1894.html>

According to the Athabasca Regional Issues Working Group, an organization representing energy companies, some 28 billion Canadian dollars, or \$21 billion, in oil-sands investments are planned over the next decade.

By next year, the sands are expected to account for half of Canada's crude oil output and about 10 percent of overall oil production in North America. Statisticians at the U.S. Department of Energy last year included oil sands in their estimates of Canada's oil reserves, raising them more than thirty fold at a stroke, to 180 billion barrels from 4.9 billion.

That vaulted Canada to second in the world rankings, behind Saudi Arabia.

Dr. Richard Gilbert

Ralph, this is the first time I've known you to simplify things unreasonably. Energy is a small part of the total cost of most things, but it's often a large part of the marginal cost. This can often change behaviour more powerfully and influences on sunk costs, etc. etc.

Ann Dale

Jeff, give me your priority sectors for change and some solutions?

Dr. Richard Gilbert

But there's a big debate in the industry as to whether oil sands should be counted in this way although not a very interesting debate).

Dr. John Robinson

A quick comment on Ralph's argument re prices: it is not just the direct (retail) effects that matter. \$100-150/barrel oil would change a lot of things I think. And misery and lack of efficiency are not the only possibilities.

Which leads me to my response to Ann and Louise. All that you propose makes a lot of sense to me, but it seems to be still focused on the what, not the how. How do we get those results you describe to happen? I do think we need a socio-political strategy. A big part of my own would be somewhat along the lines that Louise (I think) suggested earlier: creating emergent processes of community engagement in which preferences can be expressed and strategies articulated at the level of engagement closest to the level of behaviour.

Ann Dale

Richard, can you explain this further, I simply don't understand, especially when 85% of the world's energy is fossil fuels?

Dr. Richard Gilbert

Ann, I mean nothing more complex than people complain loudly about gasoline prices, even though they are typically a small part of the overall cost of operating a car (about 12-16%). They do this because gasoline costs are a large part of the marginal cost, i.e., the cost of driving the next ten km.

Jeff Ardron

I am turning out to be perhaps the pessimist in the crowd, which doesn't really please me... but so it goes.

Louise, I am not sure price signals alone will do the trick. Economics generally is not as rational as hindsight would have it. I have quoted a web site below that boldly names the flaws in standard economic approaches, but for me, it is about number 4: recognizing that we are animals running on instincts and that these instincts are not serving us well in our current situation. In fact, they seem to be part of the problem.

<http://www.dieoff.org/page241.htm>

FIVE FUNDAMENTAL ERRORS

#1. A fundamentally incorrect "method": the economist uses "correlation" and "post hoc, ergo propter hoc" (after-the-fact) reasoning, rather than the "scientific method" and biological theories of behavior:

2. A fundamentally inverted world view: the economist sees the environment as a subsystem of the economy, rather than the other way around. In other words, economists are trained to believe that natural resources come from "markets" rather than the "environment".

#3. A fundamentally incorrect view of "money": the economist sees "money" as nothing more than a medium of exchange, rather than as social power -- or "political power":

#4. A fundamentally incorrect view of his *raison d'être*: the economist sees "Homo economicus" as a "Bayesian utility maximizer", rather than "Homo sapiens" as a "primate":

5. A fundamentally incorrect view of economic *élan vital*: the economist sees economic activity as a function of infinite "money creation", rather than a function of finite "energy stocks" and finite "energy flows".

Elizabeth May

While we are talking about workers, let's look at the unsustainable and hellish lifestyle of the oil sands workers. We are NOT talking about a resource dependent community. We are talking about a region straining at the seams from too much development, no decent housing and thousands and thousands of highly paid men living in camps spending their money of drugs and prostitutes (sorry, that's what the doctors in Fort McMurray tell me...high risk behaviour, AIDS, injuries from fights and no family around for when they are sick. They get on planes, no matter how ill, and fly home to Newfoundland). Fort McMurray is, after all, the second biggest city in the Maritimes. Neighbours of mine from Cape Breton work there. I wouldn't want their life (for all the money) for anything. It is the opposite of a healthy community. Even the Mayor is saying , slow down development to a pace we can live with. Let's talk about societal transformation, a just transition strategy for workers and decent jobs in clean energy. It is not a pipe dream (pun intended).

Jeff Ardron

Nicely said.

Dr. John Robinson

In fact, Elizabeth, the conditions you describe are quite typical of many resource-dependent communities over the past several thousand years, with the exception of flying home. That said, I completely agree with your last sentence.

Ralph Torrie

Here in Ontario, the demand for electricity grew all through the 1980's when the price was going up, stabilized in the 1990's when the price was flat or declining in real terms, and yes it appears to be going down now as prices go up. So you can pick the period you wish to support the argument you want to make about price impacts, but I think if you look at the complexity of the decisions that determine the level and pattern of energy demand, including investment decisions, you have a hard time demonstrating energy price itself as a primary factor (with some exceptions that are important here in Canada). Investment and infrastructure decisions are key to defining the range of what level of price response is even possible, but those decisions themselves are not usually all that sensitive to energy price

Louise Comeau

Jeff: I don't think it is pessimistic to support a systems based approach. Indeed I am arguing for just that: price mechanisms as one tool in the overall toolbox of regulation, standards, consumer engagement

Ann Dale

The focus on community engagement strategies is key to sustainable community development and ultimately, I believe more sustainable lifestyle choices, of which energy security is key. The Energy Dialogue Group (EDG), however, notes that the challenges ahead are big and the choices are not easy, and they refer to "too much of what passes for debate is either a dialogue of the deaf (on all sides) or a dialogue based on at best partial information, at worst, misinformation"?

Dr. John Robinson

Ann, The problem I have with the EDG group is that it posits what seems to me to be an unrealistic distinction. Just where is this dialogue of the hearing that is based on complete information, that they are implicitly calling for? I would like to see it. Until then, I think we have to accept that all views are in some sense partial.

Jeff Ardron

"Energy security" is also probably a pipe dream, much as I wish it were not. Some may attempt to achieve this thru military might, while others may rely on their currencies, but in the end, someone pays and someone doesn't... At least for awhile.

Doom and gloom... Ok I'll snap out of it. Tech solutions: I actually think that depolymerisation is pretty cool and might help us more than it is given credit re recycling our energy:

http://en.wikipedia.org/wiki/Thermal_depolymerization

Thermal depolymerization (TDP) is a process for the reduction of complex organic materials (usually waste products of various sorts, often known as biomass) into light crude oil. It mimics the natural geological processes thought to be involved in the production of fossil fuels. Under pressure and heat, long chain polymers of hydrogen, oxygen, and carbon decompose into short-chain petroleum hydrocarbons with a maximum length of around 18 carbons.

Working with turkey offal as the feedstock, the process proved to have yield efficiencies of approximately 85%; in other words, the energy required to process materials could be supplied by using 15% of the petroleum output. Alternatively, one could consider the energy efficiency of the process to be 560% (85 units of energy produced for 15 units of energy consumed). The company claims that 15 to 20% of feedstock energy is used to provide energy for the plant. The remaining energy is available in the converted product. Higher efficiencies may be possible with drier and more carbon-rich feed stocks, such as waste plastic.

Dr. Richard Gilbert

Newsflash: A peak oil caucus has just been formed in the U.S. House of Representatives. The most hopeful thing I've heard for days.

Ann Dale

Now that is interesting, a major step when we no longer deny there is a problem?

Jeff Ardron

Very cool. Well, it's not over 'till it's over...

Ann Dale

I think that social capital has an important role to play here and industry-community partnerships are key, however, that is beyond the scope of this particular discussion. With respect to where the dialogue of the hearing is happening, I think that what EDG is saying that it does not happen in more traditional forums. Given your interdisciplinary

experience, I think that we need more integrated approaches to our search for solutions and knowledge?

Dr. John Robinson

Building off Jeff's comment, I would like to propose a somewhat paradoxical position. The real problem is not that we are running out of oil, or that technology will not solve our problems. The real problem is that technology may in fact do so, and that, in so doing, it will allow us to continue and perpetuate the deeply socially, culturally and environmentally unsustainable world that we currently occupy. My favorite New Yorker cartoon shows a man with a long beard in sackcloth and carrying a sign. But the sign doesn't say "the world is coming to an end". It says "Its just going to continue and continue".

Ralph Torrie

I agree that the community engagement issue is critical. As the climate system and other regional and global ecosystems begin to exhibit a wider range of behaviour, responses that fall outside the range during which human civilization has itself developed, it will be our social and political systems that will be most vulnerable. Creating models for sustaining human solidarity in the face of destabilization of the underlying environmental matrix that supports health, well being and human community will be, I think, the central challenge of this century. It will be so important for these global issues to be understood at the local level, and for citizens at the local level to have formulated and demonstrated models for sustainable community development and culture (including technology) that can inform democratic processes that will be under pressure to abandon rights and freedoms in the service of "fighting back" against Nature.

Jeff Ardron

Hi Ann,

Have there been any questions from the audience?

Ann Dale

Thank you for such a rich and informative discussion. We appear to agree on the critical need for more diverse energy systems, more distributed energy systems, supported by higher energy prices to induce behavioural changes, emphasis on community engagement strategies, and much more beyond my tired brain to summarize quickly, and hopefully we will not just continue with more of the same old, same old.

We had no questions from the e-audience, other than a comment on addressing consumption and not focusing exclusively on technological change and innovation, I am hoping they were too enthralled with the dialogue, first time with no questions.

We will be posting this discussion on the our website on Monday, invite people to reflect and suggest future subjects and experts for other e-Dialogues, may we have your wrap-up comments, and une mille fois merci.

Louise Comeau

Thanks for the exchange everyone. Social systems, as we saw in New Orleans, are more fragile then we imagine. Supporting development of "community" in all its various forms is my take home message from today.

Jeff Ardron

Thanks Ann and Panel.

In order for nations to mobilize and re-toll in the face of hydrocarbon scarcity, I would suggest that there needs to be a perceived enemy or threat. The mind wanders back to WWII... which while being bad for the environment, not to mention people, did not too bad with technology...

The new threat is...

Surprise, ourselves. Or to put it more clearly, our bad habits. Like a smoker told by her doctor that she will die soon if she continues, maybe that will finally be enough to get her to quit..?

We are clever and extremely well organized critters... It would be a shame if we could not figure it out.

Elizabeth May

Well, I found this fascinating! A bit exhausting in the race to catch up with real-time postings, but a lot less carbon expended than a face to face meeting!!

One thing is clear: there is no shortage of good ideas! There is no shortage of intellectual energy and creative, problem solvers in the academic/environmental future visioning, world-saving crowd..

Now the \$60,000 question: how do we move governments to change? Stay

tuned for COP11....

Best to all,

Elizabeth

Dr. John Robinson

I like Ralph's last comment very much. A few summary comments:

1. achieving a sustainable energy system requires achieving a sustainable society more generally.
2. The latter is achievable but we are not now heading that way.
3. Getting there will require higher prices, but this will not be enough. We need fundamental reformulation of social, political and economic systems.
4. To be consistent with sustainability principles, we must pay strong attention to the impacts of transition on the most vulnerable among us.
5. We can fairly easily articulate the content of a more sustainable system (the what); it is harder to determine how to make it happen.
6. We require an explicit political and social strategy for change.
7. A key component of that strategy must involve engaging citizens in articulating and exploring their preferences and values.

Dr. Richard Gilbert

My take-home message is that there needs to be more education on oil and natural gas basics, and on the extraordinary changes that have occurred over the last 50-100 years. There's more difference between my life as a child and the lives of my grandchildren than between them and children in China today.