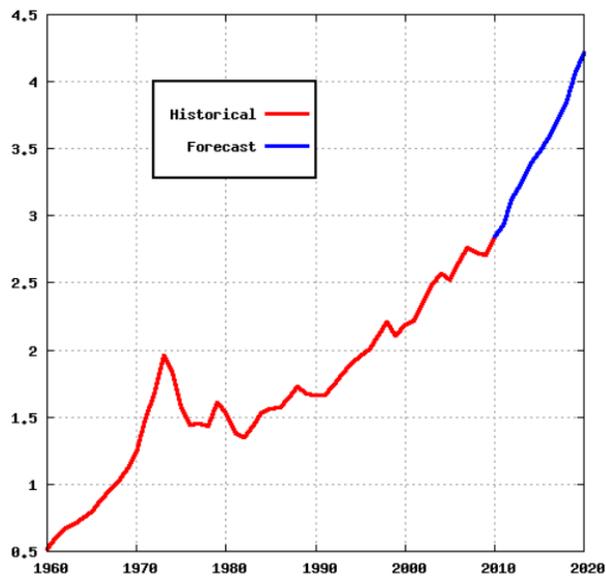


# NEB Energy Futures 2013

## A revolution is underway

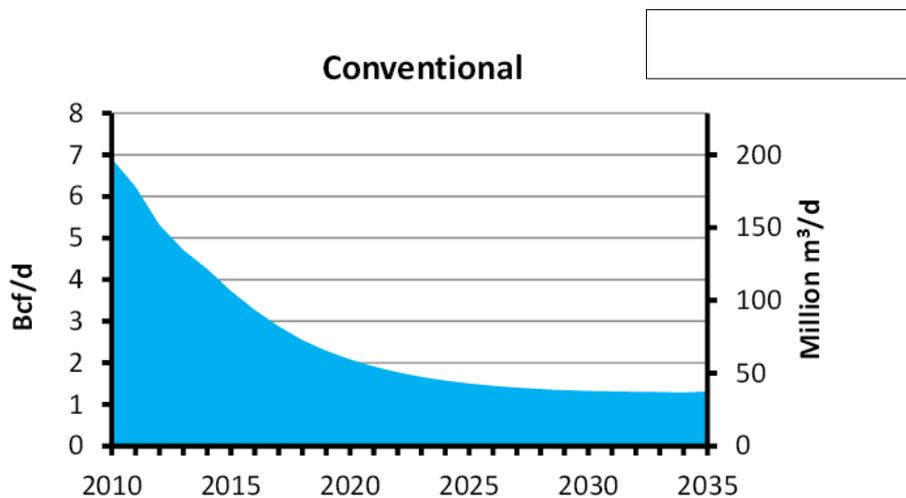
The data in the National Energy Board report shows that Canada is in the midst of a revolution that will have major effects on the economy, on the environment, and on the public and private organizations that are engaged in energy-related activities.

The report observes that the production of oil from conventional sources peaked in 1973 and has fallen drastically since then, being replaced by non-conventional sources:



*From wikipedia - Peak Oil article - data for Canada*

Prior to the 1980's natural gas was produced primarily as a by-product of the conventional oil production. That too has declined radically:



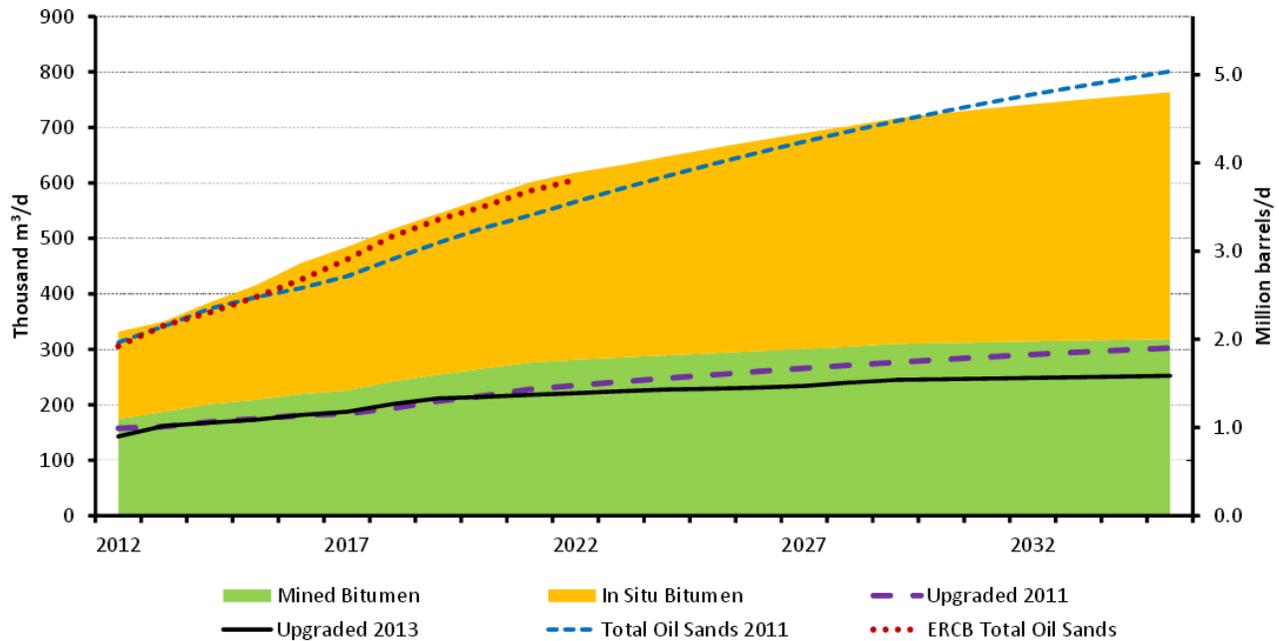
*Conventional natural gas production - NEB Energy Futures 2013*

Canada therefore needs a revolutionary response to meet our future energy needs. In fact the whole world faces the same question: "Can we, and should we, continue to rely primarily on fossil fuels?" That question has been examined in great detail by the International Panel on Climate Change, made up of a large number of scientists from around the world, and their conclusion was clear and unequivocal - we must stop producing so much greenhouse gases.

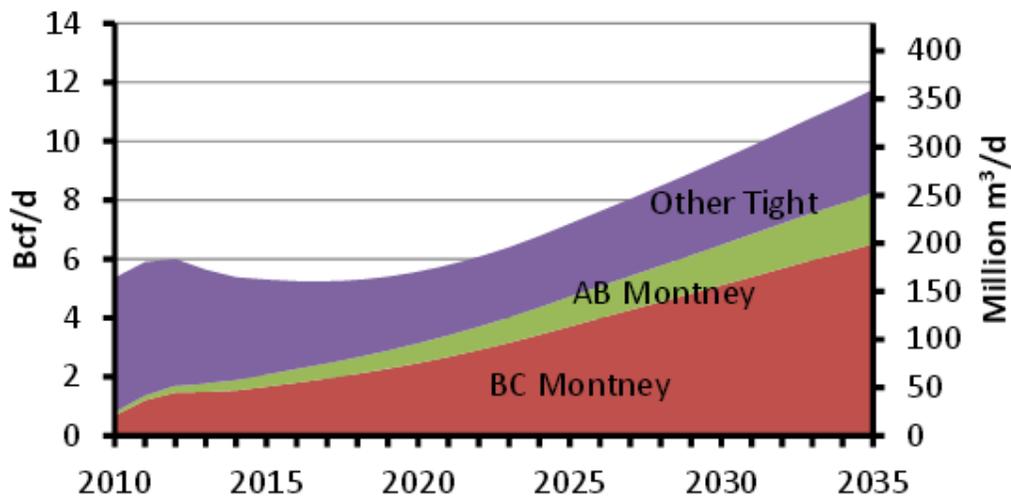
The current Canadian government has not accepted that recommendation. Although the NEB claims to be independent it is following the government's rationale that Canada should adopt two revolutionary changes that would enable it to continue to rely on fossil fuels - switch to the use of the bitumen in the tar sands and switch to natural gas that is released from the rock containing it by fracking.

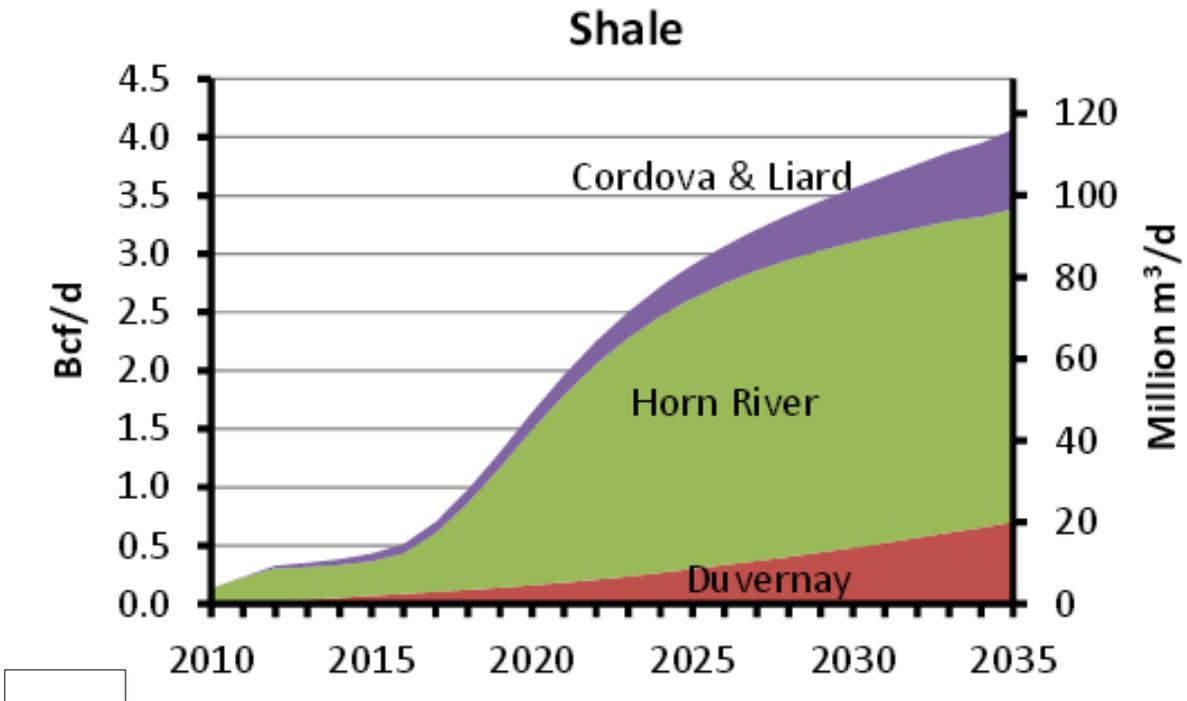
The NEB Futures report shows what the government intends:

### Oil sands production – Reference Case



### Tight





*All three illustrations are from the NEB Energy Futures, 2013*

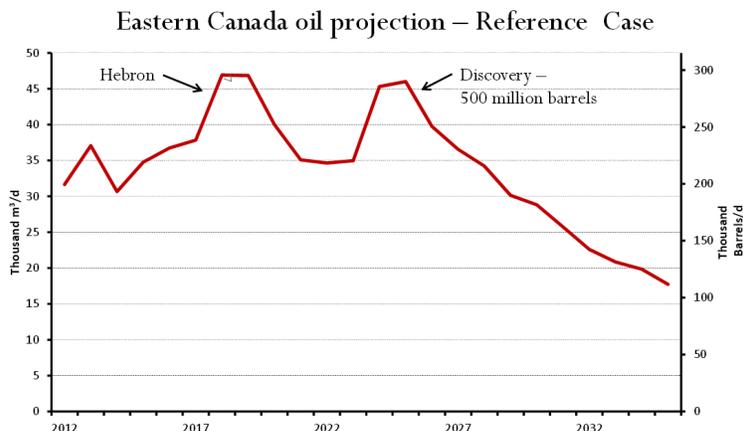
Although nearly all Canadian provincial and city governments advocate GHG reductions to 80% below the 1990 level the federal government is advocating that we should greatly increase our production of fossil fuels, and hence our emissions of GHG's, primarily to expand exports. The Futures report puts the increase at 60% over the current level of production, implying that the increase over the 1990 value is much larger still. The graphs for tight gas and shale gas show that the long term intent for increasing the production from those two (dominant) sources will be even faster.

It is proposed that some of the emissions can be reduced by sequestering the carbon dioxide. However, it is not feasible to capture the CO<sub>2</sub> coming from buildings, or from cars, or from most factories, and it is not economically viable to capture the CO<sub>2</sub> from most other sources. It has not yet been demonstrated that it is really practical to capture the CO<sub>2</sub> from any applications at all, but at best it would provide only a very minor amount of relief.

The government's statements on this issue are ambiguous. In arguing its case for building the Keystone pipeline the government claims that it will impose regulations that will control the GHG emissions. However, the federal government's regulator for the oil and gas industry is the National Energy Board and the Energy Futures 2013 report clearly shows that the NEB has no current intention of implementing regulations that would reduce the GHG emissions. The rationale for this policy is presumably to capture a larger part of the US market for oil, but the US is now following a self-sufficiency policy and is reluctant to even provide the pipeline capacity (and probably the distillates that Canada would need to dilute the tar sands).

**The NEB is assuming that revolutionary changes will be made:**

The report notes that 98% of Canada's oil reserves are in the form of bitumen in the tar sands. As the production of conventional oil dies out it will temporarily be boosted by a small amount of oil from offshore sources but that too will soon be exhausted (see graph below):



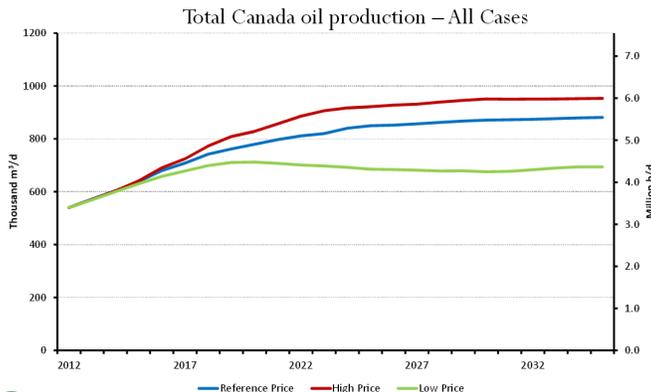
*From NEB Energy Futures, 2013*

That leaves the tar sands representing Canada's future for liquid fossil fuels. In fact it means that Canada will stop producing crude oil altogether. Instead we will import condensates that can be used to dilute the semi-processed tar sand fluids to make them suitable for transmitting by pipeline to the Gulf coast of Texas where they will be processed to produce a wide range of petroleum products - gasoline, diesel fuel, distillates, etc. In future, Canadian refineries will all have to import their crude oil, and will have to compete with the products coming from the American refineries.

In short, Canada will be out of the oil business. We may be shipping a low grade product to the US refineries but since we will effectively have only one customer, and that customer has other sources that will compete for the supply business, the prospects are that the Canadian share of the overall income will be very small.

This is a revolutionary change.

The NEB report equates the tar sands product to crude oil and treats the changes as evolutionary ones, not revolutionary. It glibly presents the "apples and oranges" situation as if only "apples" need to be considered and inappropriately applies various trend analysis tools to discuss what is happening:



*From NEB Energy Futures, 2013*

In the above example the NEB talks about "oil production" even though Canada would not actually be producing any significant amounts of oil in the latter part of the time period that is covered. I would suggest that this is a serious misrepresentation of the facts. Canada needs to chart a new course and to do that it needs to use precise, candid language to explain the situation.

A similar problem arises from the second revolutionary change - the switch from natural gas coming from conventional oil wells to natural gas that is produced by the fracking process as applied to tight gas and shale gas. In that case the end product is the same as before but the shattered rock releases natural gas, some of which is recovered but much of which will eventually escape to the atmosphere. Some gas is released during the commissioning stage, some during the production stage, and some (perhaps the greatest part) will seep to the surface after the well production has ceased. In future some efforts will doubtlessly be made to flare off the methane during the commissioning stage but there is no way to prevent the other forms of leakage. Methane is a particularly potent greenhouse gas (the oil industry often reports that it is 21 times more potent than CO<sub>2</sub>, but that number grossly underestimates the value that should be used if you are considering the near term consequences over the coming two decades or so).

This is consequently also a revolutionary change.

The prices of oil and natural gas are determined by the current rate of production as compared to the current demand. The introduction of oil derived from the tar sands and of natural gas from fracking processes has substantially increased the supply so the prices of oil and gas have declined even though the production costs are significantly higher. Both tar sands and shale gas operations are currently being shut down because of this lack of profitability. The NEB is promoting the idea that the future is bright for such operations - the time will come when consumers will be paying much higher prices and the production rates will balloon so such operations will reap the huge profit margins that the oil industry expects.

***Will this actually happen? The NEB is painting a future that is rosy for the oil industry but that will cost consumers dearly, that could seriously damage Canada's economy, and that will certainly damage the prospects for our future environment.***

The NEB Futures report gives short shrift to the alternatives that might be cheaper and that could meet the energy demands without damaging the environment. They predict that nuclear and wind energy applications will shrink, that solar and deep geothermal contributions will be minuscule, and they ignore the air-source potential altogether.

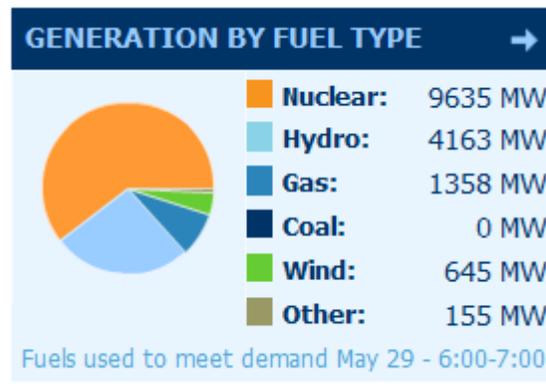
At the 2011 NEB Energy Conference I asked why they were ignoring energy extracted from the air. We currently use the air as a "bottomless pit" to get rid of the waste energy from all of our energy applications. It is just as easy to extract energy from the air, and the heat from the air can readily be transferred into the ground for storage and recovered in the opposite season for applications like heating and cooling homes. Such applications are well established in many practical examples but Canadian government publications deliberately ignore them. As a source of energy the air has effectively an unlimited capacity, it is free and universally available, the storage and recovery costs are minimal, and it does not produce any greenhouse gases. I followed up my question with extensive written descriptions of working systems that showed how we could completely eliminate the use of natural gas in particular, and save many billions of dollars in the process. Since Canada has nearly run out of conventional natural gas this is clearly an appropriate time to consider this alternative, but once again the NEB has ignored it. It is very difficult to avoid the conclusion that the NEB is totally biased

in favour of the oil and gas industry, even if that choice destroys the Canadian economy and the world's environment.

For the record, a [compilation of slides](#) from papers on air-source systems presented at the University of Toronto, Simon Fraser University and at Hydro Ottawa is available in the May Issue of <http://sustainability-journal.ca>. Since 2011 the system has evolved so that it now includes the capability of storing large amounts of electricity (in the form of exergy). That provides a solution to the supply and demand fluctuations of our power grids and a means of storing power from intermittent sources like wind turbines.

### NEB predictions

The NEB trend lines for natural gas produced by fracking are pure fiction. Fracking technology is not yet being used on a significant scale in Canada. It is being used in the US but they have a very different set of problems. In particular, they use coal to generate electricity but in Canada only Alberta uses coal on a large scale. For them gas produced by fracking is the lesser of two evils but in Canada most provinces use hydro power except for Ontario, which primarily uses nuclear power.



*Ontario data for 29 May, 2013, from IESO*

The NEB is simply assuming that when fracking is adopted in Canada in the future it will automatically become the energy source of choice. Canadians are being cheated by the government-oil-industry consortium that turns a blind eye to competing technologies in favour of the use of fossil fuels. We would save many tens of billions of dollars if we take this opportunity to switch to air-source and similar energy sources, which can completely replace the present uses of natural gas. In the process we would completely eliminate the GHG emissions and we would have an energy supply source that can serve the country for many centuries to come.

The tar sands proposals were originally based on the premise that the US would be a permanent market for Canadian sources of energy. Now the US expects to be energy independent in the near future so that original premise is no longer valid. What we are left with is the shell of a program that is highly questionable from the point of view of Canadian citizens. It should at the very least be subject to a proper re-examination. A much smaller program that includes a refinery that can handle the tar sands and that is designed to fill a stop-gap role until we can switch to cleaner transportation fuels would appear to be in order. The NEB report was supposed to have examined Canadian futures but it has failed to consider even the most rudimentary issues and opportunities before us.

## **NEB objectives**

The report lists three NEB objectives:

- \* to provide unbiased, expert analysis on energy supply, demand and on economic consequences
- \* to provide a stimulus for discussion
- \* to inform decision makers on key risks and uncertainties.

The NEB Futures 2013 report has utterly failed in the first and last objectives. Hopefully the May 30 meeting will be attended by people who will call attention to what the NEB has failed to do, and that urgently needs to be done in Canada.

Review by Ron Tolmie, Editor, Sustainability-Journal.ca  
29 May, 2013