What went wrong with Ontario's energy policy?

Comparing spin & reality

Compiled for CENTRAL BRUCE-GREY WIND CONCERNS ONTARIO

By Keith Stelling, MA, (McMaster) MNIMH, Dip. Phyt., MCPP (England)

10 April, 2010

http://windconcernsontario.wordpress.com/
windconcerns@gmail.com

Table of Contents

Executive Summary

By referring to the economic experience of those European countries that have vigorously promoted wind energy over the last two decades, this report demonstrates that the decisions of the Ontario government did not take into consideration the reality of introducing large scale industrial wind energy onto the grid. In fact, the government's enthusiasm to embrace what it claimed to be cheap, "clean", environmentally benign electricity at the same time as diminishing CO_2 emissions appears to have ignored all the realistic information that was available, leaving an energy policy based on little more than a leap of faith. Wind energy is neither cheap nor environmentally benign, as this report will demonstrate.

This compilation of recently published information demonstrates that Ontario's energy policy is seriously flawed. It is based upon assumptions that never have and never will be substantiated in practice. Using European reports, it shows that industrial wind turbine and solar panel complexes do not lower CO_2 emissions when added in any quantity to the grid. In some instances, in fact, it may even increase CO_2 emissions because of the fossil fuel back-up required to compensate for the inconsistencies of these renewables.

Claims by the government that costs associated with the Green Energy Act are insignificant are shown to be incorrect. "Green" job creation statistics from other countries indicate that government estimates are wildly exaggerated and that subsidizing renewables has a negative effect on the economy. Shifting the cost of renewables subsidies to consumers despite handsome profits for developers (predominantly multinationals) is unacceptable to taxpayers and detrimental to the economy. This report calls for an immediate public review of the government's energy policy; a judicial enquiry into the inconsistencies,

inaccurate assumptions, and long-term detrimental effect on the environment by the Green Energy Act; and an investigation of the cost/benefit implications of the government's energy policy by the Auditor General.

Introduction

Ontario's energy policy is raising serious concerns from a broad range of critics. They are questioning its economic and environmental feasibility, cost effectiveness and ability to ensure both energy security and grid stability. Government predictions of thousands of new "green" jobs have been met with skepticism. The censure comes from economists, electricity generation experts, bankers, municipal councillors, prominent academics, opposition MPPs, medical professionals, citizens' groups and electricity consumers. Unless policies and practices change soon, the damage will be impossible to remedy.

Background

The Ontario Ministry of Energy and Infrastructure introduced its Green Energy Act in 2009. According to the Minister, the act was designed to eliminate "social roadblocks" (public consultation and objection) over the siting of renewable energy infrastructure projects—in particular industrial wind turbine developments. The act promoted "fast tracking" (rubber stamping) of environmental approvals for all electricity infrastructure projects, removed the long-established local planning process and left rural residents without effective noise complaint protocols and municipalities with no voice in their own community development. It also dismantled much of Ontario's environmental

protection legislation through a multitude of amendments to various other acts. And yet, the Act was given both first and second reading before going to committee, highly unusual for a piece of legislation that amended so many other statutes. Within an abnormally short space of time it had been given second and third reading and passed into law by the Government majority without proper scrutiny and without meaningful public input or transparent public debate.

The Green Energy Act was originally proposed by the Ontario Green Energy Act Alliance,[1] a coalition of the Ontario Sustainable Energy Association, together with other trade associations, developers, manufacturers, and environmental groups including the David Suzuki Foundation, Environmental Defence Canada, Pembina Institute and World Wildlife Fund Canada. Their proposal eventually formed the basis of the Green Energy Act. [2]

However, Tom Adams, former head of Energy Probe, has pointed out problems of accountability in the Green Energy Act. He notes the disturbing conflicts of interest in government funding of NGO's whereby taxpayer dollars were used to create a support base for the government's agenda—a new phenomenon that was never recognized or addressed.[3]

---

[1] "Proposal for a Green Energy Act for Ontario Proposal for an Act Granting Priority to Renewable Energy Sources to Manage Global Climate Change, Protect the Environment and Streamline Project Approvals *prepared by* the Ontario Green Energy Act Alliance January 10, 2009". http://www.greenenergyact.ca/Storage/24/1605_1477_GEA-Proposal_with_hyperlinks.pdf

[2] In January 2009, Kent Hawkins BSc. (E.E.) wrote a critique of the Green Energy Act Proposal, pointing out to the government the flawed thinking behind it: "Green Energy Act Proposal is Flawed; A critique of the Ontario Green Energy Act Alliance's proposed legislation". http://windconcernsontario.files.wordpress.com/2009/01/green_energy_act_is_flawed_wco.pdf

[3] During a panel discussion at the York University Osgoode Hall Law School Professional Development conference on June 15, 2009, Tom Adams noted:

"The Green Energy Act is a fundamental retrenchment of our basic civil rights and freedoms and also a perverse new electricity tax, the revenues of which will be paid to a

Terrence Corcoran, [4] writing in the *Financial Post* (March 6, 2009) has also questioned the intimacy between the green Energy Act Alliance and the Government.

---

group of private developers of renewable energy projects and also secretive new government departments shielded from accountability to mechanisms that normally apply when government spending is involved."

"The G.E.A. shuts down local democracy with respect to renewable energy and energy conservation decision making. It provides for whole classes of customers to be exempted from increased costs of green energy if they are on the right side of the Minister".

"The G.E.A. creates a secretive new government agency whose job it is to promote business interests but is shielded from citizen and legislative oversight and accountability. The G.E.A. destroys the foundation for effective utility regulation by taking away the independence of the Ontario Energy Board and weakening the right of citizens who might be seeking the protection of the Environmental Review Tribunal."

"Under the G.E.A., cabinet will be able to set levels for special taxes on energy to be paid by energy consumers. The tax revenue from that will not be subject to the normal scrutiny that other tax revenue is subject to".

Adams also raised the question of conflict of interest in which taxpayer dollars are used to create a support base for the government's agenda, noting that the **Ontario Sustainable Energy Association** receives funding from four government sources: the Ministry of Energy and Infrastructure, the Ministry of Agriculture, Food, and Rural Affairs, the Trillium Fund and the Community Power Fund—which was set up in 2007 with a $3 million endowment from the Ontario Government which it used to support the Green Energy Act. Adams points out also that the **Pembina Institute** receives funding from the Ontario Ministry of Energy and Infrastructure, Ontario Power Authority and at the same time from prominent wind power producers from Ontario. Adams' remarks are available on You Tube: www.youtube.com/watch?v=KT62LNcbJBI

[4] According to Corcoran, "among the backers of the alliance is the Pembina Institute. The institute's former climate campaigner, Robert Hornung, is now head of the Canadian Wind Energy Association, which in turn gives money to Pembina. Pembina writes glowing reports on renewables. Pembina also receives money from the Ontario Power Authority, the Ontario Energy Board and the Ontario Ministry of Natural Resources".

"Another alliance backer is Environmental Defence, the radical Ottawa-based activist group headed by Rick Smith. Last year, Environmental Defence received $500,000 in funding from the government of Ontario. It would appear that one source of that money was the Friends of the Greenbelt Foundation, which is largely funded by Dalton McGuinty's Liberal government. Rick Smith recently resigned from the Greenbelt Foundation, where he was a director".

"Another Green Act Alliance backer is the Ontario Clean Air Alliance. It gets money from local community groups, such as the York Region Environmental Alliance, which is largely funded by the agenda-driven Ontario Trillium Foundation, which spends Ontario lottery cash. The Clean Air Alliance also counts the Energy Action Council of Toronto as a member. Its major backers include the Ontario Energy Ministry and the Ontario lottery operation. In summary, the Ontario government pays millions of dollars to environmental

The Government has made it a priority to add large quantities of commercial wind and solar energy to the grid. It has devised a system of rich enticements to industry that include generous feed-in tariffs and tax incentives to encourage *otherwise commercially unviable* renewable energy projects in the province. The companies that have obtained and are seeking contracts to supply wind power are dominated by multinational oil, gas, and energy suppliers. Many of them are foreign owned.

Financial experts contend that the government is promoting an economically unviable industry at the expense of electricity consumers. They say that government promotion of commercial wind and solar energy is exceedingly expensive and that much cheaper methods of avoiding CO_2 emissions are available. Scientists point out that the CO_2 emission savings claimed for wind turbines have been exaggerated. Biologists and engineers cast doubt on their much publicized "benign" environmental foot-print.

Taxpayers and electricity consumers resent being forced to purchase the so-called "green" electricity at many times the market value from publicly subsidized for-profit corporations. The renewable energy must be bought by Ontario even during periods when it is not needed on the grid— displacing already available much more cheaply priced electricity. Worse, because of the variable nature of wind, the IESO (Independent Electricity System Operator) must reserve space on the grid (and on transmission corridors) for wind to appear when it will, not

---

activists and corporate interests to lobby the Ontario government and agitate for the Green Energy Act, which act serves the interests of the agitators".

when needed. This forces base load nuclear generators, whose output cannot be quickly varied up and down, to be reduced in output. If the wind does not appear, then gas has to fill the gap, increasing CO_2.

The cost of new transmission lines required to bring the wind energy to the cities ($5 billion by the Government's own estimate) will not be paid out of the handsome profits made by these corporations. Instead it will be transferred directly to hydro consumers and taxpayers. Consumers will also be billed for the increasing amounts of back-up energy (largely natural gas supplied by some of the same firms) that will be needed to stabilize the grid in order to counteract the intermittent and unpredictable wind and solar power as penetration of "renewable" energy into the grid increases.

An additional contentious issue is the failure of the provincial government to make adequate regulations for siting wind turbines well away from human dwellings and significant natural habitats. Biologists have warned of catastrophic natural habitat degradation and abandonment as well as decimation of migratory avian species, many of them already at risk. Reports of adverse human health effects attributed to wind turbines and concerns about public safety are increasing each day from across Ontario and around the world. As a result, public anger is growing. The provincial government has so far ignored demands from citizens and many municipalities for a moratorium on building more wind energy complexes until unbiased epidemiological health studies have been completed.

The Government has been amply warned by its own electricity experts in OPA (Ontario Power Authority) and by presentations to OPA stakeholder groups from energy professionals of the impracticability of adding increasingly greater amounts of renewable energy to the grid. However the Minister of Energy has

ignored their advice and assumed the direction of the OPA, imposing his own will in the form of ministerial directives.

Many people in Ontario now believe that the Ontario government's energy policy embodied in the Green Energy Act 2009 is working against the interests of the province, its economy and the well being of its citizens.

About this report

This summary assembles some of the most pertinent, recently published scientific knowledge on wind turbines. It describes the process by which citizens believe their interests have been made subservient to the profits of multinational energy corporations—companies that lease, through secret agreements, vast tracts of Ontario farmland with options to buy the property. It calls for an urgent review of the Ontario Government's energy policy by the provincial Auditor General and an immediate change of government policy before more harm is done.

I. Feasibility: Where are the CO_2 emission savings?

The spin:

"There are a number of unique advantages to wind power: Electricity generation from wind farms reduces the emission of carbon dioxide by 99 per cent over coal-fired electricity plants and by 98 percent over natural gas".

"Wind and solar projects will displace 40 megatonnes of carbon dioxide compared to what would be emitted by equivalent gas-fired generation. That's equivalent to removing every single car off Ontario roads for one year".

—Ontario Ministry of Energy and Infrastructure web site

The argument for installing wind turbines as part of the Ontario power generation mix rested on the premise that they would provide a "clean" alternative to coal-fired electricity production.

The ministry statement implies that wind-produced electricity can be substituted for coal plants. Unfortunately, this theory has not been borne out by the actual experience of using wind energy in Europe.

The reality:

When added to the grid in any substantial quantity, the intermittent and unpredictable fluctuations of wind power mean that it cannot be relied on for either base load or peaking generation. The only way it can be used is if it is backed up or "shadowed" by conventional power generation.

Two black-outs that plunged most of Europe into darkness have been attributed to unexpected fluctuations in Germany's wind fleet output. These events taught the German electricity distributor that back-up coverage of wind had to be available for 90% of output. (More recently, some experts have indicated that wind must be backed up 100%).

"This means that, as more wind energy is added to the grid, more conventional electricity generation has to be devoted to backing it up. Because nuclear cannot be easily ramped up and down and is therefore useless for this purpose and since

hydro is already committed for stabilizing the grid during peak periods, this task mostly falls to fossil fuel powered generation: either coal or gas. Usually new fossil-fuelled plants have to be built specifically for this purpose. But when they are run in back-up mode, they are much less efficient, more expensive to fuel, and more costly to maintain".[5]

In his report, *Cost and Quantity of Greenhouse Gas Emissions Avoided by Wind Generation*, (February 2009)[6] Peter Lang explains:

> "A small drop in wind speed causes a large drop in the power output. Energy storage is completely uneconomic for the amounts of energy required. So we must use back-up generation. Constantly, instantly available back-up must be provided by reliable energy sources (to provide power whenever the wind speed drops)."[7]

---

[5] "Back-up generation is mostly provided by gas turbines . . . . The reasons why gas provides the back-up rather than one of the other energy sources are:

- "Hydro energy has high value for providing peak power and for providing rapid and controllable responses to changes in electricity demand across the network. So our . . . hydro resource is used to generate this high value power. . .
- "Gas turbines can follow load changes fairly well but not as rapidly as the wind power changes. Gas turbines power up and down like a turbo-prop aircraft engine, but with slower response. Next to hydro, gas turbines are best able to follow the load changes created by wind power.
- "There are two classes of gas turbine: Open Cycle Gas Turbine (OCGT) and Combined Cycle Gas Turbine (CCGT). OCGT has lower capital cost, higher operating costs, uses more gas and produces more greenhouse emissions than CCGT per MWh of electricity generated. OCGT follows load changes better than CCGT. CCGT has higher capital cost and needs to run at higher power and run for longer to be economic. CCGT is more efficient so it uses less gas and produces less greenhouse emissions. CCGT produces electricity at less cost than OCGT for capacity factors above about 15%. . .
- "If wind generation is available the power produced is highly variable and unscheduled so it needs to be backed up by OCGT. Although OCGT is called up to back up for wind, the energy produced by wind actually displaces CCGT generation mostly".
- "Because wind energy is variable, unreliable and cannot be called up on demand, especially at the time of peak demand, wind power has low value". – Peter Lang (see below).

[6] Peter Lang. "Cost and Quantity of Greenhouse Gas Emissions Avoided by Wind Generation". http://www.windaction.org/documents/20052

[7] Lang, *ibid*.

After carrying out a number of cost and efficiency calculations, Lang concludes:

> *"1. Wind power does not avoid significant amounts of greenhouse gas emissions.*
> 2. Wind power is a very high cost way to avoid greenhouse gas emissions.
> *3. Wind power, even with high capacity penetration, can not make a significant contribution to reducing greenhouse gas emissions".*

His conclusion is consistent with other earlier studies including the 2003 paper presented by Tallinn Technical University of Estonia at the International Energy Workshop at Laxenburg, Austria which was based on actual operating records from Denmark. It concluded:

> *"Participation of thermal power plants in the compensation of fluctuating production of windmills eliminates the major part of the expected positive effect of wind energy".*

> *"In some cases the environmental gain from the wind energy use was lost almost totally".*[8]

In 2004, the Irish Electricity Supply Board (ESB) National Grid published its study of installed wind power in Ireland: *Impact of Wind Power Generation in Ireland on the Operation of Conventional Plant and the Economic Implications:*

[8] *Estimation of real emissions reduction caused by wind generators*. O. Liik, R. Oidram, M. Keel Tallinn Technical University, 5 Ehitajate tee, Tallinn 19086, Estonia. http://www.etsap.org/worksh_6_2003/2003P_liik.pdf

"The evidence shows that as the level of wind capacity increases, the CO_2 emissions actually increase as a direct result of having to cope with the variation of wind-power output". [9]

The October 2009 report of the Rhine-Westphalia Institute for Economic Research (one of Germany's leading economic research institutions),[10] analyzed the German renewable energy technology promotion experience. The report concluded:

"Although Germany's promotion of renewable energy is commonly portrayed in the media as setting 'a shining example', we would instead regard the country's experience as a cautionary tale of massively expensive environmental and energy policy that is devoid of economic and environmental benefits".

"Wind turbines and solar panels have produced no environmental benefit in Germany in terms of lowering of CO_2 emissions that would not have been produced by other plans already in effect".[11]

The Ontario Government was informed of questionable CO_2 savings in 2007

[9] Both of these studies were brought to the attention of the Ontario Minister of Energy and the Premier in 2007.

[10] The Institute, a non-profit, independent and non-commercial organization based in Essen combines the expertise of researchers from all four participating universities: Ruhr University Bochum, University of Dortmund and University of Duisburg-Essen as well as the newly established Ruhr Graduate School of Economics.

[11] Rheinisch-Westfälisches Institut für Wirtschaftsforschung: "*Economic impacts from the promotion of renewable energies: The German experience*", (October 2009). http://www.instituteforenergyresearch.org/germany/Germany_Study_-_FINAL.pdf

"This alternative would result in higher greenhouse gas emissions".

--OPA

The Ontario Government was well informed of the questionable CO_2 emission savings of renewables. The Ontario Power Authority (OPA) published its *Integrated Power System Plan*, in October, 2007. It analyzed a "high wind power" scenario for the province, and concluded: "Since wind generation has an effective capacity of 20% compared to 73% for hydroelectric generation, additional generation capacity with better load-following characteristics would need to be installed".

"This needed capacity will likely have to be obtained by installing additional gas-fired generation. Thus, in addition to incurring further capital costs for the gas generation installation, higher gas usage would be expected to make up for the reduced amount of renewable energy from wind compared to that from hydroelectric generation or this alternative. Therefore, this alternative would result in higher greenhouse gas emissions. Wind and solar power will never be more than a niche supplier of power in Ontario."

The OPA report indicated that it was more cost effective to develop hydro generation north of Sudbury rather than developing additional wind generation in southern or northern Ontario.

However, not only was the report from the government's own experienced power generating experts ignored, but by October 2009, the Energy Minister had stepped in to silence his advisors. "In a letter to the OPA, Mr. Smitherman personally seized control of the agency. 'I write pursuant to my authority as the

Minister of Energy and Infrastructure, in order to exercise the statutory powers of ministerial direction which I have in respect of the Ontario Power Authority. . . I direct you to develop a feed-in tariff (FIT) program'. . . And 'I direct the OPA' to engage in a range of other command-and-control initiatives to boost green energy in communities, municipalities and on Aboriginal lands".[12]

Other experts were also ignored

Other experts who had previously advised the government on electricity generation and marketing had also issued warnings against the implementation of the government's green energy policy.

> Ronald J. Daniels, President of Johns Hopkins University, and former chair of the Ontario Government's Electricity Market Design Committee warned the government that a previous task force had recommended moving "away from a command-and-control, politically managed electricity system, to a system governed more by normal competitive principles."

> "The Green Energy Act . . . will further centralize and politicize most important aspects of the provincial electricity sector. At the same time, the act . . . will compromise the role of the independent regulators (the Ontario Energy Board and the Independent Electricity System Operator) in ensuring the sector's efficient operation. *The idea wind power is likely to have a significant impact on Ontario's carbon emissions is fallacious*".[13]

[12] "Ontario's iron-fisted energy model" Terence Corcoran, *Financial Post*, October 01, 2009.

[13] *Globe and Mail*, April 29, 2009.

Michael Trebilcock, Professor of Law and Economics, University of Toronto Faculty of Law, and a Research Fellow at the C.D. Howe Institute had been Research Director of the Ontario Government's Electricity Market in 1998. On April 8, 2009 he warned the legislative committee on Bill 150 that "there is no evidence that industrial wind power is likely to have a significant impact on carbon emissions" and that in Germany and Denmark, CO_2 emissions have been constant".

A recent technical paper by Arthur Campbell published in April 2009 by the Massachusetts Institute of Technology, points out:

> "This increase in variability results in a substitution away from base load generating technologies towards peaking and intermediate technologies. If peaking and intermediate technologies are more carbon intensive than non-renewable "base load" technologies, this substitution can more than offset the emission benefits derived from the output of the renewable technology".[14]

However, the gas that is needed to back up the wind turbines causes more health problems than the coal which it is supposedly replacing. In the words of the Suzuki Foundation web site:

> *"Possibly more troubling are the emissions of fine particulates from gas-fired power plants. Though particulate emissions are about one-tenth what they are for coal power, the U.S. Environmental Protection Agency*

[14] *Government Support for Intermittent Renewable Generation Technologies*. Arthur Campbell. Massachusetts Institute of Technology, April 6, 2009. http://econ-www.mit.edu/files/3563

estimates that 77% of particulates from natural gas plant are dangerously small. These fine particulates have the greatest impact on human health because they bypass our bodies' natural respiratory filters and end up deep in the lungs. In fact, many studies have found no safe limit for exposure to these substances". [15]

II. Cost/benefit accounting: Who pays? Who benefits? Who knows?

The spin:

Dalton McGuinty is on record as saying vaguely that electricity bills will rise only "minimally" with new green technologies. George Smitherman forecast a rise of "about 1%" annually.

The mandate of Ontario Power Generation (OPG) requires the crown corporation for electricity generation to "operate its existing nuclear, hydroelectric, and fossil generating assets as efficiently and *cost-effectively* as possible".[16] However, there is no evidence that the Ontario government has acted prudently in embracing large quantities of heavily subsidized renewable energy. Where are the preliminary studies to determine efficiency, the real cost, or the actual *benefit* of this policy for Ontario?

---

[15] Suzuki Foundation web site:
http://www.davidsuzuki.org/Climate_Change/Energy/Fossilfuels/naturalgas.asp

[16] Memorandum of Agreement BETWEEN Her Majesty the Crown In Right of Ontario (the "Shareholder") And Ontario Power Generation ("OPG") Dated: the 17th day of August, 2005 signed by: the Minister of Energy, Dwight Duncan.
http://www.opg.com/pdf/memorandum.pdf

The reality:

> *"The GEA [Green Energy Act] abandons the concept of economically prudent service to customers. Instead the act seeks to promote the interests of particular, politically determined electricity producers. Where once, lowest cost was a key objective, the government is now about to buy vast renewable output at 2 to 13 times current commodity rates. Where once the Ontario Energy Board operated at some arm's length from government, now the OEB is under close government direction. Taxes to pay some of the direct costs of Ontario government departmental programs will be raised by way of electricity levies without parliamentary approval".*
>
> *—Tom Adams, former Director of Energy Probe*[17]

The experience of European countries should have served as a caution for the Ontario government.

UNITED KINGDOM: *National grid warns of need to curtail wind*

- *The U.K. National Grid has warned of the need to curtail uneconomical wind production because 'conventional power is more economical'.*[18]

---

[17] In an address to the Professional Engineers of Ontario at McMaster University in 2009: "Transforming Ontario's Electricity Paradigm: Lessons Arising from Wind Power Integration". http://tomadamsenergy.com/wp-content/uploads/2009/05/keynote-for-peo-may-2009-transforming-ontario_s-power-system.pdf

[18] "The-real-cost-of-wind-power" Eugene Henderson, *Sunday Express*, November 15, 2009. http://www.express.co.uk/posts/view/140456/-250bn

- *In a recent report, "Accessing Renewable Energy", it cautions: "The Government's plans for wind are wildly unrealistic. Wind power is going to be very expensive, very difficult and ultimately very costly."*

- It estimates that "the true costs of wind generated electricity will at times be over 3,000 per cent more than conventional power-- £300 – £800 per megawatt hour (MWH) compared to conventional generation at £23 per MWH".[19]

- The U.K. power industry watchdog Ofgem [Office of the Gas and Electricity Markets] says *"electricity prices could rise by 60 per cent by 2012,* leaving many in fuel poverty".[20]

- *Electricity authorities indicate that much of the increased cost results because wind farms produce electricity at times when it is not needed on the grid and cannot be used.*

- "Electricity customers in Britain are paying more than £1 billion a year to subsidize wind farms and other forms of renewable energy. . . Renewable energy added an estimated £13.50 to the average monthly household electricity bill last year. An additional burden fell on industrial

[19] "When they have too much power the Grid bids to shut down operators, but you can't just switch a big power station off and then hope the wind blows. By the same measure, if the wind doesn't blow you can't simply start up a power station at the flick of a switch. It will cost".

[20] Ofgem predicts that the total cost of the RO (Renewables Obligation) to consumers between 2002 and 2027, when the scheme is set to end, will amount to £32 billion. By 2020 it is estimated that the annual cost will be running at over £5 billion". *January 23, 2010 by Ben Leach and Richard Gray in Telegraph.co.uk* http://www.telegraph.co.uk/earth/energy/windpower/7061552/Wind-farm-subsidies-top-1-billion-a-year.html

users of electricity, who in turn passed on costs to their customers"

according to the *UK Telegraph.*[21]

- "Some experts claim 'the cost of upgrading the nation's electricity grid– so it is possible to use all the renewable energy – could be £250 billion or 10 times the Government's estimates'".[22]

DENMARK: *Wind turbines may have to be scrapped, replaced and resubsidized every ten to fifteen years*

In September 2009, "*Wind Energy, the case of Denmark*" was published by the Danish Center for Politiske Studier (CEPOS).[23]

It explains how Denmark's unique grid interconnections with other countries allow it to stabilize the grid by exporting wind power when it is produced in excess of needs.

- "The correlation between high wind output and net outflows makes the case that there is a large component of wind energy in the outflow indisputable . . . . The exported wind power, paid for by Danish householders, brings material benefits in the form of cheap electricity and

[21] *Ibid.*

[22] *Ibid.*

[23] CEPOS: Center for Politiske Studier, Copenhagen Denmark. *Wind Energy – The Case of Denmark*. Authors of the report include:
Hugh Sharman is the founder and principal of Incoteco in Denmark, an international energy consulting firm; Henrik Meyer a Master of Economics from Copenhagen University; and Martin Agerup, an economist, is chief executive officer of CEPOS, an independent Danish public policy organization founded in 2004.

delayed investment in new generation equipment for consumers in Sweden and Norway but nothing for Danish consumers". [24]

- Taxes and charges on electricity for Danish household consumers make their electricity by far the most expensive in the European Union (EU).[25]

- The report notes that unlike most conventional power plants with a working life of 40-60 years, *"it is a fact that many ten-year-old turbines are already past their useful life. . . This puts into question the strategic, economic and environmental benefits of a power plant that may have to be scrapped, replaced and resubsidized every ten to fifteen years".*

- *"As the decade has advanced, the rate of new building in Denmark declined sharply and to maintain their sales, the manufacturers were forced to concentrate on export markets where the subsidies are higher".*

- The report questions the apparent lack of proper cost estimates in subsidizing wind projects. "Hitherto, the radical transformation of the Danish energy system has almost entirely been driven by economic

[24] The CEPOS report was recently challenged by another report "Danish Wind Power – Export and Cost", published by Aalborg University and partly financed by the CEESA (Coherent Energy and Environmental System Analysis) Research Project which denied that wind energy was actually being exported. However, because of the flawed methodology of this challenge it has, in turn, been discounted by Paul-Frederik Bach (author of "Wind Power and Spot Prices: German and Danish Experience 2006-2008" published by the Renewable Energy Foundation in London) in a new study: "*Wind Power Variations are exported*". http://www.pfbach.dk/firma_pfb/wind_power_variations_2010_03_05.pdf .

[25] "The total probable value of exported subsidies between 2001 and 2008 was DKK 6.8 billion (€916 million) during this period. A similar amount will probably be exported prior to 2012 and larger quantities will be exported following the commissioning of 800 MW of new offshore wind capacity in 2013". (CEPOS).

considerations based on technical feasibility. The recent imposition of arbitrary targets by politicians that require unquestioning implementation by the infrastructure suppliers, without any apparent estimates of costs, is a relatively new and worrying departure for the way Denmark is organized . . . *The very fact that the wind power system, that has been imposed so expensively upon the consumers, cannot and does not achieve the simple objectives for which it was built, should be warning to the energy establishment, at all levels, of the considerable gap between aspiration and reality.* Denmark needs a proper debate and a thorough re-appraisal of the technologies that need to be invented, developed and costed before forcing the country into a venture that shows a high risk of turning into an economic black hole".

Jytte Kaad Jensen, a chief economist for ELTRA, Denmark's largest electricity distributor has lamented: "In just a few years we've gone from some of the cheapest electricity in Europe to some of the most costly." The Danish Member of Parliament, Aase Madsen who formerly chaired the Parliamentary Energy Policy Committee admitted: "For our industry it has been a terribly expensive disaster".

GERMANY: *"The government should always keep cost-effectiveness as a critical component when deciding between policies and measures"*—International Energy Agency (IEA) advice to Germany

A similar conclusion was reached in Germany in the report from the Rhine-Westphalia Institute for Economic Research referred to above.

- *"Germany's principal mechanism of supporting renewable technologies through feed-in tariffs imposes high costs without any of the alleged positive impacts on emissions reductions, employment, energy security, or technological innovation".*

- "On-shore wind requires feed-in tariffs that exceed the per-kWh cost of conventional electricity by up to 300% to remain competitive".

- "Subsidies for wind converters installed between 2000 and 2010 may total $28.1 billion (U.S.). Consumers ultimately bear the cost of renewable energy promotion. *In Germany this has meant hefty increases in electricity bills.* The "price mark-up due to the subsidization of green electricity . . . accounts for about 7.5% of average household electricity prices".

- The report also questions the rationale of legislation that subsidizes production of technology which is only "theoretically promising". *"In the early stages of development of non-competitive technologies, for example, it appears to be more cost-effective to invest in R&D (research and development) to achieve competitiveness, rather than to promote their large-scale production".*

SPAIN: *Subsidization of renewables has caused spiraling energy prices and high unemployment*

"Right now there is a debt related to these renewable energies of 16 Billion Euros [$21,676,809,607 US] that nobody knows how to pay"--

Dr. Gabriel Calzada Alvarez, Economics Professor at King Juan Carlos University [26]

The report from King Juan Carlos University in Madrid, "*Study of the effects on employment of public aid to renewable energy sources*", published in 2009,[27] was the first major economic report to examine the effect of renewable energy subsidies on electricity cost and employment. It used data exclusive to Spain, another European country that has invested extensively in publicly subsidized renewable energy projects.

According to the report, Spain is now suffering from high unemployment partly as a result of spiraling electricity costs and the consequent departure of much of its manufacturing industry.

- *"These costs do not appear to be unique to Spain's approach but instead are largely inherent in schemes to promote renewable energy sources".*[28]

The report made some astonishing revelations.

- "The total over-cost– the amount paid over the cost that would result from buying the electricity generated by the renewable power plants at

[26] Dr. Gabriel Calzada Alvarez, Economics Professor at King Juan Carlos University, addressing a Heritage Foundation seminar last May.

[27] *Study of the effects on employment of public aid to renewable energy sources.* Gabriel Calzada Álvarez PhD., Raquel Merino Jara, Juan Ramón Rallo Julián; Technical Consultant: José Ignacio García Bielsa: Universidad Rey Juan Carlos, Madrid, March 2009. http://www.juandemariana.org/pdf/090327-employment-public-aid-renewable.pdf

[28] Other similarly fiscally distressed European countries in the "PIIGS" group which also undertook extensive renewable energy subsidization include Portugal, Ireland and Greece, all now suffering considerable fiscal pain.

the market price-- that has been incurred from 2000 to 2008[29] amounts to 7,918.54 million Euros (approximately $10 billion US)".

- *"Renewables consume enormous taxpayer resources. In Spain, the average annuity payable to renewables is equivalent to 4.35% of all VAT collected, 3.45% of the household income tax, or 5.6% of the corporate income tax for 2007".*

- "Spain's energy regulator indicated that *"the price of a comprehensive energy rate (paid by the end consumer) in Spain would have to be increased 31% to begin to repay the historic debt generated by this rate deficit mainly produced by the subsidies to renewables.* Spanish citizens must therefore cope with either an increase of electricity rates or increased taxes (and public deficit), as will the U.S. if it follows Spain's model".

The study offers a caution against "a certain form of green energy mandate":

- *"Minimum guaranteed prices generate surpluses that are difficult to manage. In Spain's case, the minimum electricity prices for renewable-generated electricity, far above market prices, wasted a vast amount of capital that could have been otherwise economically allocated in other sectors. Arbitrary, state-established price systems inherent in 'green energy' schemes leave the subsidized renewable industry hanging by a very weak thread and, it appears, doomed to dramatic adjustments that will include massive unemployment, loss of capital, dismantlement of*

[29] "The total subsidy spent and committed to renewable sources amounts to 28,671 million euros ($36 billion US)". Adjusting by 4% and calculating its net present value [NPV] in 2008.

productive facilities and perpetuation of inefficient ones. These schemes create serious "bubble" potential, as Spain is now discovering[30].

- "The energy future has been jeopardized by the current state of wind or photovoltaic technology (more expensive and less efficient than conventional energy sources). *These policies will leave Spain saddled with and further artificially perpetuating obsolete fixed assets, far less productive than cutting edge technologies, the soaring rates for which soon-to-be obsolete assets the government has committed to maintain at high levels during their lifetime".*

- "The regulator should consider whether citizens and companies need expensive and inefficient energy– a factor of production usable in virtually every human project-- or affordable energy to help overcome the economic crisis instead".

- *"These schemes create a bubble, which is boosted as soon as investors find in 'renewables' one of the few profitable sectors while when fleeing other investments. Yet it is axiomatic, as we are seeing now, that when crisis arises, the Government cannot afford this growing subsidy cost either, and finally must penalize the artificial renewable industries which then face collapse".*

The Government of Ontario would ignore the advice of experience at its peril.

[30] The Premier of Ontario and his MPPs were made aware of the contents of this report.

ONTARIO: the Government has not disclosed any realistic cost accounting for its renewable energy plan

The spin:

"We anticipate that associated with the investments that I'm speaking about today, [the increase will be] approximately one per cent per year." – George Smitherman, Minister of Energy and Infrastructure discussing the electricity price impacts of the GREEN ENERGY ACT.[31]

The reality:

"As electricity prices in the province increase, the province becomes less competitive relative to its neighbours, and you run the risk of actually losing jobs," -- Benjamin Grunfeld, Senior Consultant, London Economics

Electricity bills have already risen 16% and much more is on the way. (Not all the proposed increases have been disclosed and division between energy cost, delivery cost and other costs seems designed to blur the issue. The following list is incomplete but indicates the trend towards a huge rise in the price of electricity).

Nov 1, 2008: **12%**. The minimum priced electricity part of your bill rose 12%. *(An insert with the bill attributed the increase to renewables and new natural gas plant connections).*

February 2009: increase for delivery.

May 1, 2009: another increase of **2%.**

Nov 1, 2009: another increase of **2%**.

[31] Canadian Press: http://toronto.ctv.ca/servlet/an/local/CTVNews/20090406/green_legislation_090406/20090406/?hub=TorontoNewHome

April 15, 2010: Hydro consumers will have to pay an additional $53, 695, 310—about **$4** per year (but this can be increased each year) as part of the Assessments For Ministry of Energy and Infrastructure Renewable Energy Program Costs.[32]

May 1, 2010: Toronto Hydro has obtained approval from the Ontario Energy Board to raise rates for a typical household by $3 to $4 a month or $36 to $48 a year. This will be in addition to the higher prices charged on the energy portion of the bill.

July 1, 2010: another **20%**. 8% will be added by the new HST. (Previously electricity costs were exempt from provincial sales tax). With the smart meters which are due to go into service sometime this year, these two items are estimated to add at least 20% to your bill.

January 2011: **9.6%.** Ontario Power Generation has announced it is applying to increase its rates by 9.6 per cent. [33]

2011: another increase of **13%** "Hydro One is also seeking permission to raise the delivery portion of hydro bills in Ontario by 13.3% in 2011, in an attempt to raise over 250 million dollars to cover increased distribution costs. Much of that cost is tied to its Green Energy Plan for 2010-2014"[34].

According to a report in *The Toronto Star* (April 10, 2010), manufacturing companies are concerned about rising electricity prices after 184 renewable

---

[32] A new government document, "Ontario Regulation Made Under The Ontario Energy Board Act, 1998, Assessments For Ministry of Energy and Infrastructure Renewable Energy Program Costs" requires that as of April 15, 2010, hydro consumers will have to pay an additional $53,695,310. Energy Minister Brad Duguid claims "this is something consumers should be embracing. It's about $4 this year. . . . It gets reassessed every year. . . . The alternative is to keep polluting the lungs of our kids through coal, or not have a reliable supply of energy, which would be disastrous to our economy and to our quality of life". (It does not appear that the rookie energy minister is any better informed of the cost/benefit of renewable energy than his predecessor).

[33] Keith Leslie. Ontario Power Generation applies for 9.6 per cent rate hike to start Jan. 2011. Canadian Press. *Macleans*, March 29, 2010.

[34] *Ibid.*

power contracts were awarded this week. One analyst, Ian Howcroft, Ontario vice president of Canadian Manufacturers and Exporters told *The Star* that "Some of the members we represent have real concerns about their future ability to operate in Ontario if—as one member puts it—we become an island of high prices". "Bruce Sharp of Aegent Energy Advisors had earlier predicted prices would rise about $304 a year for a typical household because of the harmonized sales tax, time-of-use pricing and other factors."

"With the awarding of [184 renewable energy contracts this week], he says a figure more likely is an increase of $377 per household by the end of 2011. That would push the annual bill for a home using 1,000 kilowatt hours of electricity to $1,585 from today's level of $1,208, he figures."

"The new contracts for wind, solar and water-powered generation will pay the companies . . . close to four times the standard market price. Sharp estimated the renewable energy contracts awarded to date will provide about 5 per cent of the province's power. But they'll make up 11 per cent of the total cost of generation because of the price."

"Energy minister Brad Duguid downplayed the impact when he made the announcement Thursday. His officials wouldn't estimate the average price that will be paid under the new contracts. But Sharp said that higher prices for energy producers can mean job losses for energy consumers. 'If we're raising the price of energy, what are we doing to energy-intensive businesses?' he said".

Compare the Energy Minister Smitherman's comments in March 2009:

> *"Electricity is the lifeblood of Ontario's economy. Without ample, clean, affordable energy, our economic output will suffer and our quality of life*

will be diminished. Keeping the cost of energy down for working families and the business community remains a first priority for this government.[35]

At that time he was confronted with an independent study by *London Economics*, a consulting firm which was commissioned by the opposition Conservatives, and which predicted that household electricity bills could rise by $270 to $780 a year on average between 2010 and 2025.[36] The report concluded that Ontario should explore more "cost-effective" ways to reduce its greenhouse gas emissions. According to CTV, "Smitherman insisted any additional costs to consumers will be minimal and accused the Opposition of harbouring a secret agenda to keep Ontario's polluting coal-fired plants open".

"Outside the legislature, Smitherman dismissed the report's cost projections as flawed and based on 'wild speculations'. '*Residents can expect their electricity bills to increase about one per cent per year* and they can reduce their costs through conservation efforts aimed at reducing energy consumption', he said. Government officials could not be immediately reached for comment on how Smitherman arrived at that figure".[37]

Either the true costs of the Green Energy Act were never calculated or they are not being disclosed to the public, despite demands to know from a number of

---

[35] George Smitherman in the *National Post*, March 21, 2009: http://network.nationalpost.com/np/blogs/fullcomment/archive/2009/03/21/george-smitherman-in-defence-of-ontario-s-green-energy-act.aspx#ixzz0huSL7v3I

[36] Canadian Press: http://toronto.ctv.ca/servlet/an/local/CTVNews/20090406/green_legislation_090406/20090406/?hub=TorontoNewHome

[37] *Ibid.*

stakeholders, including the *Toronto Board of Trade*.[38] However, there seems no reason to believe that the additional cost of renewables to Ontario electricity consumers will be much different from the inflationary examples we have seen in the European countries.[39]

Items which will have a major effect on the cost of electricity in Ontario will be:

1. New transmission lines

Thousands of miles of new transmission lines will be needed to move renewable energy from its disparate production areas to the cities. Former Energy Minister Smitherman admitted that this will cost five *billion* dollars. (One opposition MPP has estimated that "the cost of transmission lines alone would add 30% to everyone's electricity bill"). Since transmission capacity must be available for the full nameplate capacity of renewables, this investment will be used only 30% of the time by the wind energy and even less for solar—hardly a cost effective

---

[38] "'Ontarians need to know exactly how provincial government contracts for wind-generated electricity will impact their hydro bills', Tory energy critic John Yakabuski says. 'I think we need full disclosure on these contracts when they're signed with wind developers,' he said yesterday. 'The government's Green Energy and Economy Act offers a feed-in tariff of about 13.5 cents per kw/h for wind power. That price — which exceeds the current cost of electricity — will become a part of future hydro bills', Yakabuski said. 'Wind-generated electricity will also be brought onto the grid when cheaper alternatives are available', Yakabuski said. 'My concern is that these people are not in this because they have a burning desire to save the earth or be kind to the environment. They have a burning desire to make money. We've actually had times this year where we've spilled hydraulic power ... paying significantly higher prices to accommodate the wind and letting water pass by our dams at 3 cents a kW/h or less,' he said". Antonella Artuso, Queen's Park Bureau Chief *Toronto Sun*, Sept 29 2009.

[39] In February, the Clean Energy Association published "THE RISING COST OF POWER IN ONTARIO: A RATEPAYERS' PERSPECTIVE: February, 2010. The Association projects that "Since McGuinty took office, the total average residential electricity bill has already increased by 23%. By the time we get to the end of 2012 it will have increased by 57%". http://www.caealliance.com/RISING_COST_OF_POWER_IN_ONTARIO_revised_feb_10_2.pdf

investment. The Green Energy Act specifies that these and other infrastructure costs are to be passed on directly to consumers and taxpayers, not billed to the for-profit producer corporations. It also has to be noted that the new transmission lines will do nothing to restore the aging and increasingly unreliable hydro lines now servicing domestic and rural customers.

2. Contracts with producers of renewables (feed-in tariffs)

Another huge inflationary expenditure will be the cost of purchasing power from the generators of renewable energy under the feed-in tariff (FIT) at 4 to 20 times market price. The latest contract offered by the Government for onshore wind is 13.5 cents a kWh, (plus a significant "adder" for Samsung). For offshore wind, 19 cents per kWh is being given. Solar ranges from 54 cents to 80.2 cents a kWh.[40] *It should be remembered that the average price of power paid on the spot market to producers in 2009 was approximately 3.23 cents per kWh.*[41]

Tom Adams has pointed out: "*Nowhere does the Act or associated policy statements make clear what limits apply to renewable energy procurement. Where once transmission investments were considered principally on the basis of cost effectiveness, the new act states that renewable generators have the 'right to connect' ".* Inevitably, this leads to the same problems Europe has already experienced: we are now committed to buying renewable energy at prices that far exceed the electricity market rate, *even when lower priced electricity is available to the grid*.

[40] 10kw or less is 80.2 cents, 10 to 250kw is 71.3 cents, 250 to 500kw is 63.5 cents and more than 500kw is 53.9cents.

[41] This is the price OPA pays, not what we pay on our hydro bills.

An example of the seriousness of the inflationary nature of this arrangement can be seen in data from the first three months of 2009 when Ontario wind turbine developers were paid every day an average of approximately $446,400 above the energy market price (weighted spot price) for electricity-- a total of $37,994,000.00 above the energy market price for the first 3 months of 2009.

William K. Palmer, P. Eng., has made a similar calculation of the additional amount consumers have paid out for wind energy over the year 2008-2009:

> "The 2,293,363 MWh produced by the wind turbines at the Hourly Ontario Electricity Price (HOEP) would have cost the Ontario consumer $67,014,664.85. (Costing the number of MWh produced each hour times the HOEP or that hour, and adding all together)".
>
> "At $135 a MWh, the same number of MWh would have cost the Ontario consumer $309,604,069.46. *A premium of over $242 million was paid to the wind producers. All for power produced not when we need it, but when the wind chooses to blow".*[42]
>
> "If we assume we had 6000 MW of wind turbines in Ontario instead of about 1085 MW, the premium paid would be over $1.6 billion - money out of the pocket of consumers to the wind developers. Plus, we'd be

[42] How this calculation was made: "The IESO site gives hourly wind farm output by wind farm and the total for all wind farms (in MW), the Hourly Ontario Electricity Price (HOEP), the Hourly Demand (in MW), and a number of other interesting items. For each hour, I looked at the HOEP and calculated how much would have been paid for the MW produced by wind turbines for that hour at the HOEP. Then I calculated what would have been paid for the wind energy at the price the government has committed to pay, 13.5 cents a kWh, (This ignores the additional 1 cent federal eco-energy grant, for a total of 14.5 cents a kWh, or $145 a MWH)".

losing the taxes paid on the profit as the developers can depreciate the cost of the turbines at about 30% a year, and thus pay very little taxes for the first three years, then can flip the wind farm to someone else to restart the depreciation".

3. Cost of stabilizing the grid (back-up)

The *Ontario Reliability Outlook Report* published by the IESO (Independent Electricity System Operator) in December 2009[43] raises serious concerns over grid stability for Ontario following the addition of unpredictable renewables.

"**Dispatchability of Variable Resources**:

"In stark contrast to the concerns of just a few years ago created by high demand and low supply, Ontario is now experiencing significant levels of over supply and low demand. Surplus Baseload Generation (SBG) occurs when demand is exceeded by the energy output from generators that can't readily adjust their output, whether it is for technical or contractual reasons".

"A weak economy combined with conservation efforts and mild weather has resulted in unusually low overnight and weekend demand, creating ongoing SBG (Surplus Baseload Generation) conditions. *For the most part, excess generation is handled through exports. This spring, however, Ontario started to experience SBG on a weekly basis, resulting in nuclear unit reductions on 54 days, nuclear shutdowns on five days*[44] *and water spillage at hydro facilities on 33 days. These actions impose*

[43] *The Ontario Reliability Outlook, December 2009.* IESO. http://www.ieso.ca/imoweb/pubs/marketReports/ORO_Report-Dec2009.pdf

[44] William Palmer has commented: "It was not a total nuclear shutdown, only of 1 unit – and I think it was for more than 5 days total. I recall that the total nuclear reduction was equivalent to about 40 days of unit shutdown (derating plus outages)

additional costs on generators, increase wear and tear on equipment and result in an inefficient approach to managing the power system".

"Even though the IESO now publishes daily SBG forecasts to help generators plan around SBG conditions, more significant steps are needed. As the amount of renewable generation continues to grow, the amount of non-dispatchable (or non-manoeuvrable) generation will also increase, reducing flexibility in the system even further".

"**Solar Energy and Peak Demand**:

"Solar-powered generation is emerging in Ontario as a new energy resource. Currently, solar capacity in Ontario is in its very nascent stages, but is expected to grow significantly within distribution systems under the FIT and micro FIT programs. Solar photo-voltaic (PV) outputs are less persistent than wind – meaning they can change output significantly within minutes or even seconds".

"As increasing levels of variable generation come into service, system operators may not have enough flexible generation within their own balancing areas to ramp down when wind output is increasing or vice versa". [45]

In order to try to maintain grid stability, "Twenty-four hundred megawatts of new natural gas resources are currently in development, adding to the 4,700 MW of gas-fired generation that has already been integrated into the supply mix since 2003".[46]

---

[45] IESO *ibid.*

[46] IESO, *ibid*. Compare: James Oswald *et al.* from Coventry University in the U.K. has pointed out in his study, "*Will British weather provide reliable electricity?*"

- "The volatile power swings will require fossil fuel plants to undergo more frequent loading cycles, thus reducing their reliability and utilisation.

Speaking of the new gas plant to be built in Oakville, Energy and Infrastructure Minister George Smitherman said "the gas plant will provide a stable supply as the province moves to support renewable energy projects".[47]

Since gas will be needed to support wind and solar, Premier McGuinty's statement of February 26, 2009 in the legislature is inconsistent with his contention that renewable energy will have only a minimal impact upon electricity bills: "With absolute certainly", he told the house, "oil and gas are going to go up in terms of their costs; we know that for sure. We also know that when we buy oil and gas from Alberta, we don't create any jobs in Ontario whatsoever".[48]

4. Cost of offloading surplus generation to neighbouring markets

---

- "Reduced reliability will require more thermal capacity to be built to compensate, whilst achieving the same level of system reliability. Cost of wind calculations would be more accurate if they included this factor.
- "Reduced utilisation will encourage generators to install lower cost and lower-efficiency plants rather than high-efficiency base load plants. These have higher CO2 emissions than high-efficiency plants. Carbon saving calculations would be more accurate if they included this factor.

"Power swings from wind will need to be compensated for by power swings from gas-powered plants which in turn will induce comparable power swings on the gas network as plant ramps up and down. This will have a cost implication for the gas network. Calculations of cost of wind would be more accurate if they included this factor".
http://www.wind-watch.org/documents/wp-content/uploads/oswald-energy-policy-2008.pdf

[47] Tyler Hamilton**: "**Oakville residents vow power plant fight**".** *Toronto Star*, Oct 1 2009.

[48] Hansard Transcripts: *Official Records for 26 February, 2009*. 1040. Hon. Dalton McGuinty.

The IESO also indicates that as wind resources increase, the surplus generation will have to be sold to neighbouring markets in order to maintain grid stability.

> *"Already, interties play an important role in addressing SBG, with neighbouring markets taking in excess energy. Greater levels of wind resources will drive system operators to want increased access to ramping and ancillary services from neighbouring jurisdictions to make up for changes in wind output".*

Selling off excess energy at below cost to the United States, for example, would put Ontario in the same position as Denmark: Ontario consumers and taxpayers will be subsidizing American electricity consumption.[49]

5. Cost of inefficiencies caused by inaccurate wind forecasting

In the *"3-Hour Ahead Accuracy of Wind Forecast (2007)"*, Hok Ng of the Independent Electricity System Operator, Ontario calculated that, based on previous data, if the forecast error percentages remained the same in 2009, "we could expect the annual costs of inefficiencies to increase: due to over-forecast: $866K; due to under-forecast: $37K. As more wind and solar are added to the grid, these numbers will increase".[50]

---

[49] Hansard, 26 February 2009: **"Mr Paul Miller:** Electricity already costs $72 per megawatt hour in Ontario, the second-highest in Canada. We have Niagara Falls, the biggest producer in North America for electricity. We sell it to the States. **Hon. George Smitherman:** No, we don't. **Mr. Paul Miller:** Yes, we do. We have many falls up north that are not being utilized. There are towns and cities in northern Ontario that could be self-sufficient with electricity, but they're putting it into the grid and then their prices go up. It doesn't make sense".

[50] Much talk of improved weather forecasting comes from the wind industry, but the most lay observers would agree that weather prediction seems to be less accurate than ever.

Toronto Board of Trade calls for transparency and accountability regarding price impact

On April 24, 2009, the Toronto Board of Trade wrote to the Minister of Energy:

> "The details of how our move to a green economy will be achieved while ensuring a secure, reliable and affordable supply of electricity are not yet known. The Board believes there needs to be transparency and accountability regarding price impact, conservation and environmental claims, as well as with regard to job creation. A balance needs to be struck between security of supply, environmental concerns and price competitiveness; a balance also needs to be managed between the rate and pace of change and Ontario's global competitiveness".
>
> "For example, you have been admirably frank that the *Green Energy Act* will result in higher energy prices in Ontario. While some numbers have been suggested, it is unclear how much energy costs will increase as a result of the Act, particularly as relates to the impact of the proposed feed-in tariff".
>
> "There is repeated reference that the *Green Energy Act* will move Ontario into the same league as Germany, Denmark and California in terms of addressing climate change and supporting green technology. *The Board notes, though, that these jurisdictions have electricity costs that are up to 8 times what Ontario is currently paying for electricity*. This

adjustment will take place as we are moving toward greater reliance on electricity, particularly in the transportation sector (for example, electric cars and the electrification of GO Transit)".

"The Board believes that there needs to be greater understanding and study of the impact that the Green Energy Act will have on electricity costs, on the overall desire for more electrification and the expected associated impact on Ontario's global competitiveness as a jurisdiction in which to do business. Due to the importance of electricity pricing in business competitiveness, all relevant actors, including the business community should be involved in this analysis".

"Our pursuit of a leading green economy in North America must work in tandem with our pursuit of a leading economy overall. In this context, keeping Ontario's electricity price competitive in the context of environmental sustainability will be key to ensuring the economic health of the province".

III. Job creation: 50,000 new "green" jobs? Really? And how many job losses?

The spin:

"The Green Energy Act (GEA), will help the government ensure Ontario's green economic future by: building a stronger, greener economy with new investment, creating well-paying green jobs and more economic growth for Ontario – a projected 50,000 jobs in the first

three years; better protecting our environment, combating climate change and creating a healthier future for generations to come". [51]

The reality:

"*Recent studies in Denmark and Germany find that very few net new jobs have been created as a result of renewable energy policies. In the case of Denmark, they have cost between US $90,000 to US $140,000 per job per year in public subsidies, and in the case of Germany, up to US $240,000 per job per year*". [52]—*Professor Michael Trebilcock*

"Europe's southern periphery is now bankrupt. But the wind-subsidy proposals being floated in Congress suggest that American political leaders have yet to understand that "green power" means generating electricity by burning dollars". – Report from King Juan Carlos University

DENMARK: "Subsidies unprofitable to society"

The CEPOS report from Denmark (September 2009) revealed that *"The effects on the overall economy of government subsidizing the wind industry in the 1990's were negative according to the most authoritative report* from the independent, but government-funded Danish Economic Council. *'The wind power expansion in the 1990's is an example of a policy that was unprofitable from society's point of view".*

[51] Ontario Ministry of Energy and Infrastructure web site. http://www.mei.gov.on.ca/en/

[52] Michael J. Trebilcock, *Financial Post*, 6 Mar 2010.

- "As the decade has advanced, the rate of new building in Denmark has declined sharply -- and to maintain their sales, just as in Spain, *manufacturers have been forced to concentrate on exporting their technology to foreign markets* (USA) where the subsidy potential is higher".

- *"This implies that the effect of the government subsidy has been to shift employment from more productive employment in other sectors to less productive employment in the wind industry".*

The CEPOS report cautions other governments:

"In that way a US expansion is expected to be predominantly domestic, and at the same time the industry is probably going to face foreign competition from companies such as Vestas, Siemens and new low cost producers in countries like India".

"The Danish experience also suggests that a strong US wind expansion would not benefit the overall economy. It would entail substantial costs to the consumer and industry, and only to a lesser degree benefit a small part of the economy, namely wind turbine owners, wind shareholders and those employed in the sector".

SPAIN: 16 billion Euros in debt from renewable energy subsidies; 20% unemployment

The report published in Spain by King Juan Carlos University in Madrid made it quite clear that government subsidized "green" jobs have not been economically viable.

- "Despite its hyper-aggressive (expensive and extensive) "green jobs" policies *it appears that Spain likely has created a surprisingly low number of jobs*, . . . just one out of ten jobs has been created at the more permanent level of actual operation and maintenance of the renewable sources of electricity.

- *"The high cost of electricity due to the green job policy tends to drive the relatively most energy-intensive companies and industries away, seeking areas where costs are lower."*

- *"Since 2000, Spain spent €571,138 to create each "green job", including subsidies of more than €1 million per wind industry job. The study calculates that the programs creating those jobs also resulted in the destruction of nearly 110,000 jobs elsewhere in the economy, or 2.2 jobs destroyed for every "green job" created.* [53]

- *"The reality is far from what has typically been presented, and that such schemes also offer considerable employment consequences and implications for emerging from the economic crisis".*

- "In early 2009 the Socialist government of Spain reduced alternative energy subsidies by 30%. At that point the whole pyramid

[53] "Principally, these jobs were lost in metallurgy, non-metallic mining and food processing, beverage and tobacco. Each "green" megawatt installed destroys 5.28 jobs on average elsewhere in the economy".

collapsed. They are firing thousands of people. BP closed down the two largest solar production plants in Europe. They are firing between 25,000 and 40,000 people. . ."[54]

- On March 16, 2010, the *Wall Street Journal* reported a *Dow Jones* news item indicating that bubble has now burst. "Spain's wind power industry will have shed two thirds of its jobs by year-end, according to the country's wind power association (AEE). [55]

- "AEE head Jose Donoso, who is also development director at turbine maker Gamesa Corporacion Tecnologica SA (GAM.MC)" added that *"the sector currently is seen as high risk for investors."*[56]

- "What do we do with all this industry that now is collapsing that we have been creating with subsidies? The bubble is too big. We cannot continue pumping in enough money. . . . *The President of the Renewable Energy Industry in Spain (wrote a column arguing that) ...the only way is finding other countries that will give taxpayers' money away to our industry so that it can take it and continue maintaining these jobs."*

[54] Addressing a Heritage Foundation seminar last May, Dr. Gabriel Calzada Alvarez, Economics Professor at King Juan Carlos University (one of the authors of the study).

[55] In a joint press conference with union representatives, AEE said it estimates jobs in the sector will fall to about 15,000 at the end of 2010, from 45,000 two years earlier".

[56] "Spain To Shed 2/3 Of Wind Power Jobs By End-10 -Industry Group" Juan Montes, EFE Dow Jones http://www.smartmoney.com/news/ON/?story=ON-20100316-000284&&hpadref=1#ixzz0ie0ZhwwD

GERMANY: Initially expansive effect on net employment gives way to contraction as production costs of power increase

The German report from the Institute for Economic Research (cited above) provides a similar dismal picture of German "green" job creation. Using current data and a wide range of recently published studies, the report also demonstrates that:

> *"While employment projections in the renewable sector convey seemingly impressive prospects for gross job growth, they typically obscure the broader implications for economic welfare by omitting any accounting of off-setting impacts. These impacts include, but are not limited to, job losses from crowding out of cheaper forms of conventional energy generation, indirect impacts on upstream industries, additional job losses from the drain on economic activity precipitated by higher electricity prices, private consumers' overall loss of purchasing power due to higher electricity prices, and diverting funds from other, possibly more beneficial investment".*

> *"The hope of increased energy security by reliance on wind and solar energy has not materialized. Due to their back-up energy requirements, it turns out that any increased energy security possibly afforded by installing large PV [solar] and wind capacity is undermined by reliance on fuel sources– principally gas – that must be imported to meet domestic demand".*

The report is highly skeptical of the ability of "green" energy to create jobs and revive the economy. It points out that *"it is most likely that whatever jobs are*

created by renewable energy promotion would vanish as soon as government support is terminated".

> "Additional job losses will arise from the drain on economic activity precipitated by higher electricity prices . . . . *Private consumers' overall loss of purchasing power due to higher electricity prices adds up to billions of Euros*".

> "Several recent investigations of the German experience support such skepticism". They "find an initially expansive effect on net employment from renewable energy promotion resulting from additional investments. *By 2010, however, this gives way to a contractive effect as the production costs of power increase*".

Even more disturbing in view of the government of Ontario's energy policy is the reminder that there must be robust foreign trade if manufacturers of renewable energy technologies are to succeed.

> *"Whether favourable conditions on the international market prevail for PV [photovoltaic or solar], for example, is highly questionable, particularly given negligible or even negative net exports in recent years. . . . A recent article in the German Financial Times reports that the situation remains dire, with the German solar industry facing unprecedented competition from cheaper Asian imports* (*FTD* 2009). In the end, Germany's PV promotion has become a subsidization regime that, on a per-worker basis, has reached a level that by far exceeds average wages."

"A major obstacle for exporters will be "the Chinese turbines of untested quality that are now flooding the marketplace. Europe's subsidy-driven turbine meisters are being chased from their home markets".[57] "The Chinese are quickly emerging as the biggest players in the development of renewable technologies, putting up wind farms almost as fast as they build coal-fired plants [to support them] and selling wind turbines abroad".[58]

UNITED STATES: Two billion dollar stimulus created no U.S. wind power jobs

"Despite promises that stimulus money directed to the wind power industry would create plentiful "green" jobs for unemployed Americans, the American Wind Energy Association (AWEA), a trade group, reports no increase in overall U.S. wind industry jobs and an actual decline in manufacturing jobs in the industry. Wind equipment manufacturers cut as many as 2,000 jobs last year according to the AWEA."

"Nearly $2 billion from the stimulus package was spent on wind power job creation, but close to 80 percent of the money went to foreign wind power companies," according to a report by the Investigative Reporting Workshop at the American University School of Communication in Washington, DC.[59]

---

[57] Andrew Walden *Hawaii Free Press*, Feb 15 2010. http://www.americanthinker.com/2010/02/wind_energys_ghosts_1.html

[58] Bill McKibben. "Heavy Weather in Copenhagen". *The New York Review*, March 11, 2010.

[59] Choma, Russ. "Renewable energy money still going abroad, despite criticism from Congress". Investigative Reporting Workshop, American University School of Communication. http://investigativereportingworkshop.org/investigations/wind-energy-funds-going-overseas/

"In addition to the lack of new wind power jobs, the overwhelming majority of wind power stimulus money has gone to foreign companies". [60]

The American Wind Energy Association (AWEA) claims the stimulus was a success despite the lack of job creation because it "saved" roughly 40,000 jobs that would have disappeared without government assistance.

Daren Bakst, a regulatory analyst at the John Locke Foundation in North Carolina, points out that even the alleged "saved" jobs were preserved only by sacrificing jobs in other, more productive sectors of the economy.

"What we don't see is how many jobs we are losing because we are diverting that money from far more productive uses," Bakst said. "When the government takes taxpayer dollars to pick winners and losers, we are all going to be losers. Taking taxpayer dollars and transferring them to a costly and unreliable form of electricity generation isn't exactly a formula for economic growth."

There are already many failed attempts at job creation in the U.S.. Sparse demand is the main reason for shutting down government subsidized green technology manufacturing enterprises, especially wind turbine blades and towers.[61]

---

[60] Thomas Cheplick. "2 Billion Dollar 'Stimulus' Created No U.S. Wind Power Jobs". The Heartland Institute : *Environment & Climate News*, April 2010 http://www.heartland.org/environmentandclimatenews.org/article/27142/2_Billion_Dollar_Stimulus_Created_No_US_Wind_Power_Jobs.html

- [61] West Texas: October 2009: $1.5 billion Federal subsidy to wind farm. 330 jobs anticipated. But the most important components are now to be manufactured in China where 2,000 jobs would be created.

- Windsor, Colo: Hexcel Corp., which makes material for wind turbine blades for the Danish maker Vestas, used $3 million in tax credits for work on a plant in Windsor, Colo. The facility is open, but it's operating at relatively low capacity because of the sparse demand.

Where are the high paying jobs?

According to “a new study by the U.S. Senate Subcommittee on Green Jobs and the New Economy, (which drew on reports "overwhelmingly" authored by "green-jobs advocates and supporters), "massive taxpayer subsidies are required, higher energy prices result, and existing jobs are lost.”

- “The alternative technologies at the heart of Mr. Obama's plan, relying on mandates and far greater handouts, will inevitably raise energy prices -- and high power prices are job killers. *Industries that make physical products, whether cars or chemicals or paper cups, are energy-intensive and gravitate to low-cost-energy locales”.*[62]

- “With some of the highest electricity prices in the country, California and New York have hemorrhaged manufacturing jobs. California-based Google houses its massive server farms in states like North Carolina and Oregon, which have lower electricity costs”.

- Two other Vestas factories for wind turbine parts in Brighton and a tower factory in Pueblo, Colo., are under construction. The three new factories qualified for a combined tax credit of $51.8 million. Vestas recently stopped production at its first factory, however, because of the tight credit market and low demand, said spokesman Andrew Longeteig.

- Dennis Randall, the executive vice president and general manager at Schuff Steel's Midwest Division, said that *current demand for towers already is satisfied with existing capacity. "That's the biggest obstacle at the moment."*

[62] Report by the U.S. Senate Subcommittee on Green Jobs and the New Economy. Ranking Member Senator Kit Bond. Spring, 2009 http://bond.senate.gov/public/_files/BondGreenJobsReport.pdf

- "Low pay is not uncommon in wind and solar energy, green construction. . . . Jobs in renewable energy manufacturing facilities pay as little as $11 an hour".

- "Wage rates at many wind and solar manufacturing facilities are below the national average for workers employed in the manufacture of durable goods. In some locations, average pay rates fall short of income levels needed to support a single adult with one child".[63]

- Some wind and solar manufacturers have already begun to offshore production of components destined for U.S. markets to low-wage havens such as China and Mexico. [For example, General Electric which is proposing wind turbine developments in Ontario, now has three wind turbine manufacturing plants in China].

ONTARIO: The Samsung Deal

On January 21, 2010 the Premier of Ontario signed an untendered, half billion dollar agreement with a foreign consortium led by Samsung C&T Corporation and the Korea Electric Power Corporation behind closed doors. Although Samsung Heavy Industries is a ship building firm that has experienced a recent drop in orders, it hopes to adopt the technology used to make ship propellers to manufacturing wind turbines.[64] (The company appears to have no previous experience at building wind turbines, however). Nevertheless, it has committed

[63] *Ibid.*
[64] "Samsung Heavy Industries turning towards wind turbine production", May 25th, 2009. Renewbl.com. http://www.renewbl.com/2009/05/25/samsung-heavy-industries-turning-towards-wind-turbine-production.html

to generate 2,500 megawatts of wind and solar power in Ontario and to create 16,000 new jobs through the manufacture of wind and solar technology for use in Ontario and *export across North America*. The secret deal allows the consortium feed-in tariff prices as well as an economic development "adder" (EDA) as a stimulus for operating four manufacturing plants in Ontario which will produce towers, solar inverters, solar module assembly, and blades. *According to the Premier, the EDA, would cost approximately $437 million and add only an average $1.60 annually to a residential hydro bill*, a figure many dispute.

However Randall Denley in the Ottawa Citizen (Jan. 24, 2010), says "the new manufacturing jobs entailed in the massive Samsung renewable project . . . will cost $300,000 each in public subsidies." The consortium would also have priority access to Ontario's transmission lines. "*About $2.3 billion will be spent by Hydro One on transmission and distribution projects over the next three years*", Denley adds.

Does the government not investigate its business partners?

The *London Times* has revealed a long bribery and tax-evasion probe of the Samsung chairman who was indicted for evading $113 million in taxes and for breach of trust.[65]

- *Does the Ontario Government not conduct any investigation of companies before entering a business partnership on behalf of the taxpayers of Ontario?*

[65] Leo Lewis, Business Correspondent. "Samsung chairman Lee Kun Hee resigns after corruption probe". *London Times*, 23 April, 2008.

The Government's announcement of the Samsung deal suggests, once again, that it is ignoring the reality of the market[66] and the cost/benefit of producing renewable energy.[67]

Where is the business plan?

A broad range of critics have questioned the government's business plan of subsidizing the manufacture of solar panel[68] and wind turbine technology.

Tom Adams, former director of *Energy Probe* mused that "consumers and competitors have suffered a blow but more importantly our standards of public administration have been damaged. Secret negotiations for multi-billion dollar twenty year government contracts invite corruption. *The names Samsung and Korea Electric Power Corporation still don't show up on the Ontario Lobbyist Registry.* This absence is particularly difficult to understand since it appears that these foreign firms were able to get the Ontario government to issue a directive to the OPA to ensure preferred access to scarce transmission capacity".

---

[66] Compare the 10 year life now being observed for many wind turbines to the spin: these "renewable energy projects will deliver an estimated 110 million megawatt-hours of emissions-free electricity *over the 25-year lifetime of the project*".

[67] The Samsung agreement was a pet project of the former energy minister, George Smitherman. After the press reported acrimonious conflict with the rest of cabinet over the proposed deal, Mr. Smitherman abruptly resigned. According to the *Toronto Sun*, "He . . . will be giving up his $165,000 salary for seven to eight months. However, Smitherman is eligible for a severance of roughly $245,000 when he quits provincial politics". $245,000 for quitting?
http://www.torontosun.com/news/torontoandgta/2009/11/10/11693946-sun.html

[68] Dr. Wayne Hocking, Professor of Physics & Astronomy at the University of Western Ontario has commented: "The decision to 'go green' on a massive scale, without due care and planning, is risky. These things need to be done in a measured manner. Solar cells still deliver less energy over their lifetime than is required to manufacture them, so their advantages are currently cosmetic". Western News, Mar 11, 2010.
http://communications.uwo.ca/western_news/PDF/2010/WNews_March11_2010...

The Premier's announcement met with perplexity from the *Financial Post* on March 11 2010. Terrence Corcoran wrote:

> "While investment analysts are telling their clients to get out of solar power firms and warning about the continuing risks in wind and bioenergy schemes, Ottawa and the provinces are on a mad populist stampede to throw billions of dollars at the green energy monster. *The politicians don't seem to be keeping up with the trends. 'Don't try to catch a falling knife,' warned J.P. Morgan this week in a report that told investors the market continues to fall out of the solar panel module market. It downgraded a bunch of solar companies that have already been in a tailspin since the first signs of a solar crash back in 2008".*[69]
>
> *"[Governments are] using some of the most regressive interventionist methods known to economics. Subsidies, trade protectionism, market-distorting prices, back-door tax hikes, carbon taxes, massive regulation, big secret deals with rent seeking corporations, cross subsidies from one industry to another -- no policy option is too crazy for green energy".* [70]

---

[69] "[Chinese solar producer] Jiang estimated that Chinese solar manufacturers held a little less than half the global production capacity, but he told the RETECH renewable energy conference that figure was likely to rise to between 60 to 70 percent. GCL is one of the largest makers of polysilicon, the material that is used in the majority of solar panels to turn sunlight into electricity. "We are looking for a lot of products to go to Canada, the United States and Europe," he told the conference. "China wind and solar companies seek growth in U.S., Europe" Feb 5 2010.

[70] "J.P. Morgan documents the rise and fall of a half dozen companies that are now trading at a fraction of their market highs. . . . Solar panel prices plunged last year and appear to be heading lower still this year. Stock prices, already battered, could go lower. '*We believe significant downside risk remains even from these levels and continue to be wary.*' Making money in solar is still a problem. ENER has annual revenue of $367-million, but lost $1.54 a share. Evergreen lost $21-million on $74-million in revenue. The dot. comish quality of the solar industry is obvious. Even worse from an economic perspective are the perverse government policies driving the market". *Ibid.*

> *"Ontario insists on local content in solar and wind equipment, thus guaranteeing rate payers will pay high prices for equipment that is available on the open market at deep discounts".*[71]

In a report for *Energy Probe* dated March 5, 2010, Michael Trebilcock, Professor of Law and Economics at the University of Toronto, called for an audit the Ontario government's green programs.

> "Ontario's provincial auditor or other independent groups should periodically audit the programs and subsidies being offered through the recently passed Green Energy Act to ensure the programs are producing the promised environmental and economic benefits".

His report argues that "top-down government policies are often incapable of 'picking winners.' As a result, the government should be audited to ensure that it is pursuing the best and most economic policies in regards to cost per ton of carbon abated and cost per net job created".

"If the real motive behind the Green Energy Act is to cut emissions and create 'green' jobs", the report says, "providing technology-specific

---

[71] "Over the past two years, there have been numerous announcements of high-profile, technology-intensive projects in alternative energy funded in part by government money. In 2008, the Democratic Governor of Massachusetts backed a $58 million incentive package for Evergreen Solar, an energy panel maker promising 350 new jobs and promoted as the centerpiece of the state's efforts to make itself a green energy and job hub. At about the same time, General Electric was sweeping up subsidies for its solar-panel manufacturing facility in Delaware that employed 82 workers.
Both have turned into job-creating busts. GE announced this fall that it is shutting down production. While there remains a bubble in investment money available to finance green projects, the demand for alternative energy technology is just not there yet. Evergreen Solar did temporarily add workers, but the expectations (read: green hype) far exceeded sales, and the company, which lost $167 million this past year, is now shuttering capacity and shifting what's left to China".
http://thegovmonitor.com/world_news/united_states/misconceptions-of-the-green-economy-before-copenhagen-climate-summit-16068.html

subsidies runs a high risk of failure. The report highlights a number of examples—such as wind energy and corn-based ethanol—where the promised environmental and economic benefits were either far less than expected, or nonexistent.

Instead, the report argues, "the government should pursue a 'winner neutral' policy that focuses on investments in an array of energy technologies from a number of market actors".

> "Governments have a terrible track record of picking winners," says lead author Michael Trebilcock. "Many of the decisions being made in regards to recent 'green' legislation may be more for political reasons, rather than the declared environmental and economic ones."[72]

Conclusion

By referring to the economic experience of those European countries that have vigorously promoted wind energy over the last two decades, this report demonstrates that the decisions of the Ontario Government did not take into consideration the actual reality of introducing large scale industrial wind energy onto the grid. In fact, the government's enthusiastic claim to embrace cheap, "clean", environmentally benign electricity at the same time as diminishing CO_2 emissions appears to have ignored much of the information that was available to them, leaving an energy policy based on little more than a leap of faith.

---

[72] "Policy Analysis: *The Perils of Picking Technological Winners in Renewable Energy Policy*". An Energy Probe study by Michael J. Trebilcock and James S.F. Wilson March 5, 2010. http://www.probeinternational.org/files/The%20Perils%20of%20Picking%2...

The question remains as to the origin of this piece of prodigious insanity, in which all rules of logic and principles of economics were turned upside down.

Was it the result of undue influence from aggressive industry lobbyists who have taken pains to overlook critical practical considerations associated with grid stability and *real cost?*

Was it a failure of provincial decision makers to exercise due diligence by investigating *all* the relevant studies pertinent to the issue before encouraging large scale developments?

Was it the result of a domineering and overly-zealous minister who had no previous experience with the complexities of electricity generation (and who has since quit before completing his term)?

Was it the consequence of unprecedented pressure of a small group of government and industry-funded "environmentalist" NGOs who had no trouble winning the inexperienced minister over to their agenda?

Or is there something more sinister involved such as the inappropriate influence of multinational corporations in government decision making?

The answers to these questions will have to come from the provincial Auditor General and from a public inquiry. What is amply evident at this point however, is that neither the Premier, nor his Ministers of Energy and Infrastructure, Environment, or Natural Resources carried out meaningful consultations with the electorate. Nor did they appear to listen to, comprehend, fully investigate, and

accommodate the concerns of the hundreds of people who responded to the Environmental Bill of Rights Registry process, who participated in good faith in the "workshops" held by various ministries, or who presented (or tried to present) information to the Standing Committee on Government Affairs when it was reviewing the Green Energy Act. Many allegations of failure of process are already being investigated by the provincial Ombudsman.

We leave the last word to Professor Trebilcock:

> "Before mortgaging its long-term future by awarding hundreds more 20-year fixed-price contracts to wind developers, the province of Ontario urgently needs an independent, objective, expert investigation, . . . by the Auditor-General, of the prospective economic, environmental and employment effects of wind power and other renewable energy policies in the province".
>
> "But corporate enthusiasm for subsidized wind power should not be confused with the longer-term public interest. In terms of cost, CO_2 and jobs, wind power attracts a failing grade. It gets worse, with poor marks for localized impacts on flora and fauna, for potentially adverse health effects on local residents from persistent exposure to low intensity turbine noise, for potentially adverse impacts on local property values and for an environmental review process which the Ontario Environmental Commissioner describes as 'broken.' All render renewable energy policy, at least as currently conceived by the Ontario government, one of the least compelling options in the challenging economic environment in which the province finds itself now".[73]

[73] Michael J. Trebilcock. "Blowing away taxpayers". *Financial Post*, 6 Mar 2010.

References

Adams, Tom. "Transforming Ontario's Electricity Paradigm: Lessons Arising from Wind Power Integration". Keynote Address for the Professional Engineers of Ontario Annual General Meeting at McMaster University May 9, 2009. http://tomadamsenergy.com/wp-content/uploads/2009/05/keynote-for-peo-may-2009-transforming-ontario_s-power-system.pdf

Álvarez, Gabriel Calzada, *et al. Study of the effects on employment of public aid to renewable energy sources.* Universidad Rey Juan Carlos, Madrid, March 2009. http://www.juandemariana.org/pdf/090327-employment-public-aid-renewable.pdf

Bach, Paul Frederik. *Wind Power Variations are exported.* 5 March, 2010. http://www.iea.org/work/2004/nea/bach.pdf

Bach, Paul Frederik. *Wind Power and Spot Prices: German and Danish Experience 2006-2008.* Renewable Energy Forum. 12 May, 2009. http://www.ref.org.uk/Files/spot.price.leaflet.05.09.pdf

Campbell, Arthur. *Government Support for Intermittent Renewable Generation Technologies.* Massachusetts Institute of Technology, April 6, 2009. http://econ-www.mit.edu/files/3563

Frondel, Dr. Manuel; Ritter, Nolan; Vance, Prof. Colin, Ph.D., Scheffer, Fabian; & Schmidt, Prof. Christoph. *Economic impacts from the promotion of renewable energies: The German experience.* Final Report. Rheinisch-Westfälisches Institut für Wirtschaft sforschung (Rhine-Westphalia Institute for Economic Research) October 2009. http://www.instituteforenergyresearch.org/germany/Germany_Study_-_FINAL.pdf

Impact of Wind Power Generation in Ireland on the Operation of Conventional Plant and the Economic Implications ESB National Grid, February 2004. http://www.eirgrid.com/media/2004%20wind%20impact%20report%20(for%20updated%202007%20report,%20see%20above).pdf

Lang, Peter. *Cost and Quantity of Greenhouse Gas Emissions Avoided by Wind Generation.* February 2009. *http://www.windaction.org/documents/20052*

Liik, O, Oidram, R, Keel, M Tallinn. *Estimation of real emissions reduction caused by wind generators.* Technical University, 5 Ehitajate tee, Tallinn 19086, Estonia, 2003. http://www.etsap.org/worksh_6_2003/2003P_liik.pdf

Oswald, James *et al.* "*Will British weather provide reliable electricity?*" Elsevier: Oswald Consultancy Ltd., The TechnoCentre, Coventry University Technology Park, Puma Way, Coventry CV1 2TT, UK., 2008. *http://www.wind-watch.org/documents/wp-content/uploads/oswald-energy-policy-2008.pdf*

Sharman, Hugh & Meyer, Henrik. *Wind Energy– The Case of Denmark*. Copenhagen Denmark: CEPOS: Center for Politiske Studier, September 2009. http://www.instituteforenergyresearch.org/denmark/Wind_energy_-_the_case_of_Denmark.pdf

Trebilcock, Michael J. *Speaking Truth to "Wind" Power*. C.D. Howe Institute, April 15 2009. http://www.cdhowe.org/pdf/Verbatim_(Trebilcock).pdf

Trebilcock, Michael & Wilson, James. "*Policy Analysis: The Perils of Picking Technological Winners in Renewable Energy Policy*". An Energy Probe Study, March 5, 2010. http://www.probeinternational.org/files/The%20Perils%20of%20Picking%2...

United States Senate, Subcommittee on Green Jobs and the New Economy. *Yellow Light on Green Jobs*. Ranking Member Senator Kit Bond. Spring, 2009 http://bond.senate.gov/public/_files/BondGreenJobsReport.pdf