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THE “CLEAN” GROWTH HALLUCINATION

ABSTRACT

Minister of the Environment and Climate Change Catherine McKenna recently published an article in which she argued that the economy and the environment go “hand in hand,” claiming the ‘clean energy’ sector held rich opportunities and carbon taxes would benefit society. Taxing the most productive Canadian sectors and raising energy costs for Canadian consumers and firms to subsidize politically-favoured industries can never be considered as benefitting the economy. This report rebuts the Minister’s claims.

Robert Lyman

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THE “CLEAN GROWTH” HALLUCINATION

SUMMARY

Minister of the Environment and Climate Change Catherine McKenna recently published an article in which she argued that the economy and the environment go “hand in hand”. As evidence, she wrote that the “clean technology sector” related to renewable energy is an immense growth opportunity for Canadian business, and that the federal government’s policy of imposing carbon taxes will contribute to economic growth. Throughout the article, she referred to carbon dioxide as “pollution”.

Statistics Canada does not include in its breakdown of Canada’s GDP any reference to “clean technology”. The notion that some energy sources are clean, and others not ignores the fact that all energy sources have both positive and negative environmental effects. StatsCan does however, report on two separate groups of economic activities: “clean energy and environmental goods and services” and “the environmental and clean technology products account”. However, most of the former category has to do with municipal sewage treatment, site remediation and environmental audits; less than \$2 billion of the \$14 billion annual income in this group is related to GHG emissions reduction. Of the latter category, which amounts to \$59.3 billion per year, again only a small portion relates to GHG emissions reduction. When one examines the data, the environmental and clean technology products account actually has held a shrinking share of Canada’s economy over the last decade. What opportunity?

The international market for renewable energy technologies is not doing much better. Global new investment in renewable energy generation has been essentially flat since 2010. In Germany, the foremost European market for renewables, the megawatts of solar and wind generation capacity added annually dropped 90% in five years, and the largest German solar equipment manufacturer has gone bankrupt. China, the world’s largest market for renewable energy, has just ended all subsidies for utility-scale solar projects; Forbes projects a 40% reduction in utility demand. In a global market suffering from massive oversupply, solar and wind equipment manufacture is perhaps the last market Canadian companies should be trying to compete in.

In Budget 2017, the federal government announced that it will spend \$1.7 billion over four years on renewable energy research and development and another \$2.4 billion over four years to promote the production and use of “clean energy”. This, along with the billions of dollars in past subsidies from provincial taxpayers and ratepayers, is not a guarantee of success, but rather a measure of this industry’s dependency on government handouts for its survival.

The notion that carbon dioxide, critical for existence of life on earth, is a “pollutant” is nonsense. Treating an odorless, colourless, benign gas that people exhale as a toxic “pollutant” would be the ultimate extension of intrusive environmental regulation.

Carbon tax rates in Canada are still relatively low – in the range of \$20 to \$30 per tonne. At this level they punish consumers but do not yet seriously affect the economy. To achieve the government’s climate targets for 2030 and 2050, however, will require carbon taxes as high as \$200 to \$300 per tonne, and destroy the economic viability of many of our energy-intensive industries in the resources and manufacturing areas. Proponents claim that the revenues will all be recycled by reducing the rates of other generally-applied taxes, but that has never been done consistently in Canada. International studies show that, in all the countries that have introduced carbon taxes, only 29% of the revenues were recycled back into the economy in the form of tax reductions. Taxing the most productive Canadian sectors and raising energy costs for Canadian consumers and firms to subsidize politically-favoured industries can never be considered as benefitting the economy.

THE “CLEAN GROWTH” HALLUCINATION

Minister of the Environment and Climate Change Catherine McKenna recently published a statement on The Future Economy.ca website entitled, “The Economy and the Environment Go Hand in Hand”.¹ This, no doubt, came as extraordinary news to Canadians in Ontario, Alberta and Saskatchewan who have seen environmentalist policies impose severe economic costs on energy producers and consumers over the last three years. She was referring, in fact, to the bright new future that she and her department see will flow from the adoption of climate policies all designed to increase the production and use of renewable energy, energy “conservation” and electrification of transport.

It would take dozens of pages to identify and refute the Minister’s statements. Instead, I will focus on her three central theses:

- That Canada’s “clean technology” sector is an important source of growth for the Canadian economy;
- That carbon dioxide is “pollution”; and
- That carbon taxes contribute to economic growth.

“Clean Technology” is not a Growth Industry in Canada

Clean Technology Has Little to do with Reducing Greenhouse Gas Emissions

It should be noted at the outset that the whole concept of “clean technology” is artificial; the analysis of Canada’s economic sectors that make up our Gross Domestic Product (GDP) contains no such category. To the extent that it refers to the energy sector, there is no source of energy whose production, transformation, transportation and use does not have both positive and negative environmental consequences.

¹ <https://thefutureeconomy.ca/spotlight-interviews/catherine-mckenna/>

Statistics Canada, however, has taken to referring to a group of economic activities as “clean technology”, and grouped them in two categories: “clean energy and environmental goods and services” and “the environmental and clean technology products account”.

StatsCan defines “clean technologies” as:

- *Any good or service designed with the primary purpose of contributing to, remediating or preventing any type of environmental damage; plus*
- *Any good or service that is less polluting or more resource-efficient than equivalent normal products which furnish a similar utility. Their primary use, however, is not one of environmental protection.*

That is a definition so broad one could drive a truck through it.

Table 1 provides a breakdown for environmental and clean technology goods and services in 2015.

TABLE 1

Breakdown of “Clean Technology” Goods and Services by Income 2015

<u>Industry Goods</u>	<u>Income (\$M)</u>
Production of wind, solar, hydro	1,300
Production of waste management equipment	616
Municipal sewage treatment services	526
Sales of equipment to respond to spills	361
Sales of smart grid and energy storage	328
Equipment for monitoring air emissions	76
Equipment for manufacture of bioenergy	51
Sub-total	3,258
<u>Services</u>	
Site remediation and emergency response	1,500
Environmental consulting (e.g. audits)	1,900
Energy efficiency services	280
Waste management services	7,300
Sub-total	10,980
Total	14,238

Source: Statistics Canada

The inclusion of equipment sold to produce hydroelectricity in the goods category tends to inflate the numbers. The inclusion of equipment and services relating to waste management, municipal sewage treatment and spill response have little or nothing to do with the climate policy Minister McKenna is promoting. **Of the \$14.2 billion in income associated with “clean technology goods and services”, less than \$2 billion are related to GHG emissions reduction.**

More surprising details arise when one compares StatsCan’s figures in the Environmental and Clean Technology Products account to the ones for clean technology goods and services. StatsCan reports that the Environmental and Clean Technology Products Account totaled \$57.2 billion in 2015 and \$59.3 billion in 2016. The agency breaks the account for 2016 down into four parts: electricity produced from “clean” sources, including hydro (\$25.4 billion, or 43%); energy and primary products (\$314 million, or 0.5 %); manufactured products (\$4.4 billion, or 7.4%); and services, largely unexplained (\$29.1 billion, or 49%). The \$59.3 billion figure is the one Minister McKenna uses to claim that “clean technology is a booming part of the Canadian economy”. The electricity production is mostly from hydro sources and the services are probably mostly related to waste recovery and treatment. **Here again, only a small portion of what is included in the “clean technology products account” relates to activities that reduce GHG emissions.**

The Clean Technology Sector is not Growing

According to StatsCan data, the ratio that the Environmental and Clean Technology Products Account represents of total Canadian GDP has remained essentially stable over the last decade, edging up from 3.0% in 2007 to 3.1% in 2016. In nominal terms, “clean” electricity’s contribution (again, including hydro) to GDP for environmental and clean technology products fell from 46% in 2007 to 43% in 2016, while the share of services rose from 45% to 49%. In real terms, the GDP at basic prices of the environmental and clean technology products sector rose by 5.2% from 2007 to 2016, but the total Canadian economy grew 14.4% over that period. **In other words, the Environmental and Clean Technology Products Account holds a shrinking share of Canada’s economy.**

<https://www150.statcan.gc.ca/n1/daily-quotidien/171213/dq171213g-eng.htm>

The International Market for Renewable Energy Technologies is in Turmoil

An important part of Minister McKenna’s thesis is that the global market for renewable energy is growing so fast that Canadian firms must become part of the suppliers. In a previous article, entitled, “The Opportunity That Isn’t Knocking”, I analyzed that claim in detail, and I recommend that you review it here: <https://blog.friendsofscience.org/2018/08/14/the-opportunity-that-isnt-knocking/>

Here are some of the key points made I made:

- After half a century evolution in global energy markets, fossil fuels continue to supply 87% of global energy needs.
- Renewable energy does not dominate energy use in any single geographic area or country.
- **Global new investment in renewable energy has been essentially flat since 2010.**
- In 2017, according to Bloomberg Energy Finance, renewable energy investment was \$280 billion. In 2016, despite the effects of lower oil prices, **global oil and gas investment was about \$700 billion, almost three times as high.**
- Of all the authoritative sources of future energy supply and demand projections, British Petroleum is the most optimistic concerning renewables. Yet, it foresees renewable energy holding no more than 10% of global energy demand by 2035.
- Investment in new renewables is crashing in Europe; **in Germany alone, the megawatts of solar and wind added annually dropped 90% in five years.** Even Germany's once-huge SolarWorld company has been driven into insolvency.

In June, 2018, the global solar energy industry suffered a huge blow, when China, by far the largest subsidizer of solar energy equipment supply and generation, announced the ending of all subsidies for utility-scale solar projects in favour of competitive bidding and greatly reduced feed-in tariffs. China accounted for about 50% of global solar equipment demand in 2017. The decision to sharply reduce subsidies is likely to slash demand there by about 40%, according to Forbes. Yet, this was inevitable because of mushrooming costs. China's state-run renewable energy fund, financed by a surcharge on users' energy bills, is in deficit by more than 100 billion yuan (U.S. \$15.5 billion).

The significant over-supply in the Chinese industries producing solar and wind equipment is driving equipment prices to distressed levels, which in turn is bankrupting competing companies across Europe and North America. It is possibly the last industry Canadians should be trying to compete in, not the first.

Historic Costs Imposed on Electricity Ratepayers

Advocates of wind and solar energy constantly refer to how low the prices of these energy sources will be in future, while ignoring the costs that have been imposed on electricity ratepayers and on taxpayers up to now.

Those historic costs, however, are enormous. They were essentially caused by the actions of several European and North American governments, in the name of addressing global warming, to accelerate the purchase and penetration in the electrical energy systems of renewable energy technologies that were not yet mature and far from competitive with existing generation sources. Typically, governments (in Germany, the United Kingdom, Spain, and Canada to name a few) offered wind and solar suppliers several advantages over conventional electricity supply; these included:



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- Feed-in-tariffs far above market rates in contracts that were guaranteed for 15 to 20 years;
- Priority access (“first-to-the-grid”) rights that required the electricity system operators to use the production from wind and solar generation when it was available, and to back out, or “curtail”, alternative sources of supply;
- Requiring the construction of other transmission and distribution systems expansions and upgrades (e.g. “smart meters” and other “smart” systems) to accommodate the additional renewable generation capacity;
- Requiring other suppliers and ratepayers to pay for the cost of additional balancing and flexibility (e.g. backup generation) to deal with situations when demand was high but the sun was not shining or the wind blowing;
- Similarly, requiring ratepayers to pay the costs of dumping surplus power supplies on export markets when the renewables plants produced electricity but the demand was low; and
- Granting renewable energy generators various tax benefits, principally in the form of accelerated capital cost depreciation and low realty taxes.

The countries of the European Union have made the largest expenditures on renewable energy generation. The main source of data on generation costs there is the European Observer, an organization that actively promotes increased use of renewable energy. According to data from this source, to the end of 2014 European Union countries spent about 1.1 trillion EUR (CDN \$1.68 trillion) on large-scale renewable energy installations. This provided a nominal nameplate generating capacity of about 216 gigawatts (GW), or nominally about 22% of the total European generation needs of about 1000 GW. The actual measured output by 2014 supplied by the renewables industry was 38 gigawatts, or 3.8% of Europe’s electricity requirements, at a capacity factor of about 18% overall. Accounting for capacity factors, the capital cost of these renewable energy plants has been about 29 billion EUR (CDN \$44.4 billion) per gigawatt.



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Canadian Government Subsidies

In contrast to most industries in Canada, the “clean technology industries” are subsidy junkies, almost completely dependent on the willingness of governments to spend taxpayers and electricity ratepayers’ dollars to support companies that would not have survived without such intervention.

Under the ecoEnergy for Renewable Power program, the federal government subsidized the generation of electricity from renewable energy sources through a refund to producers of one cent per kilowatt-hour. The cumulative cost of this program to 2021 will be \$1.4 billion.

Under Budget 2017, the federal government will spend almost \$1.7 billion over four years on renewable energy research, development, demonstration and commercialization programs, much of which will go to solar and wind industries. Budget 2017 also included authority for over \$2.4 billion over four years to promote the production and use of “clean energy”, a large part of which will go to solar and wind energy.

Provinces and territories now have in place 272 different programs to assist the production and use of solar, wind and other renewable energy sources. There is no way to know the total costs of these programs, their benefits, or even to what extent they duplicate existing federal government programs.

The Future – Life Cycle Costs vs System Costs

Those who claim that the costs of renewable energy generation will be lower in future and, in fact, will have “grid-parity” with conventional fuels like coal and natural gas rely on estimates of the levelized cost per MWh supplied (LCOE), a standard life-cycle cost metric. The LCOE approach measures mainly the projected direct costs of the generation plant technologies that will be built in the near future. It does not address the broader, or indirect, costs that the addition of renewable energy imposes on the electricity system.

LCOE analysis ignores the costs of backing up intermittent renewables and of the networks required to integrate them. Usually in North America, a large number of natural gas plants are required to stand ready, operating at very low capacity factors, to be available when demand is high and

renewables generation is not available. Silvia Pariente-David, writing in the IAEE Forum in 2016, summarized the grid integration costs.

“The system operator and the ratepayers pay twice for generation capacity. Integrating wind and solar variable energy into power systems causes costs elsewhere in the system. Examples include distribution and transmission networks, short-term balancing services, provision of firm reserve capacity, a different temporal structure of net electricity demand and more cycling and ramping of conventional plants. Typically, these “integration costs” are of three types: grid costs, balancing costs and the “adequacy costs”, or “utilization effect on conventional power plants”.



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She went on to describe a less well known but important consideration, the “merit order” effect of renewable energy (RE).

“RE penetration affects the revenues and margins of conventional power plants by lowering wholesale electricity prices and peak prices and by reducing the volume of electricity produced by thermal plants. Wholesale prices fluctuate between zero when renewables are at the margin (or even negative when low demand coincides with a very high level of wind for instance) and the variable cost of fossil fuel-fired plants when the latter are at the margin.

In a merit order based on marginal cost, RE plants will be dispatched first, as they have a zero marginal cost. As the RE capacity increases, conventional fossil fuel power plants move to the right of the merit order curve and their utilization is substantially reduced. In Spain, effective operations of CCGT fell from over 4000 hours in 2008 to 1000 hours in 2014. Not only do they not cover their fixed investment costs, but they also risk being decommissioned if they run too few hours to cover their fixed O&M. However, these plants are needed to provide the system flexibility to integrate a high level of RE. An issue for electricity systems is how to provide adequate compensation for this flexibility. Capacity mechanisms have been introduced in some European countries to remunerate that flexibility and avoid conventional power plant closure. However, capacity payments tend to create an oversupply of power generating capacity, further depressing prices. This affects negatively both the value of RE and conventional plants.”

The article can be found here:

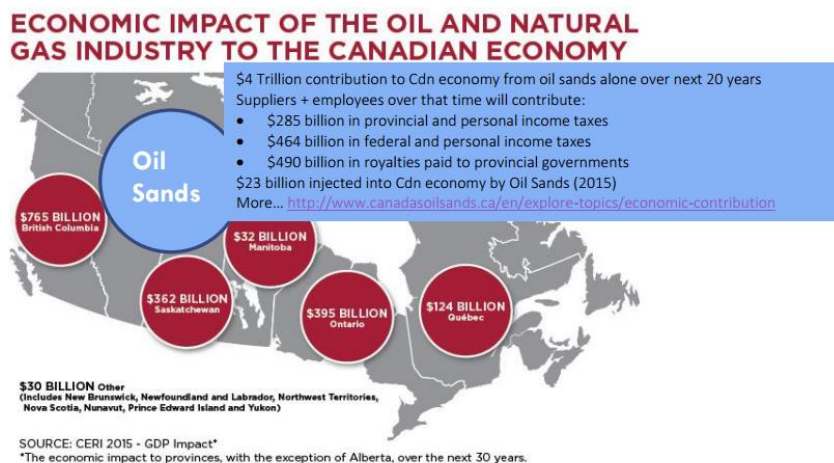
<http://www.iaee.org/en/publications/fullnewsletter.aspx?id=39>

In other words, as the prices of renewable energy decrease and its role increases, it imposes ever-higher costs on the rest of the generation and transmission system. Advocates for renewable energy ignore these costs.

Green Myopia – The Inability to see that Fossil Fuels Offer the Highest Economic Benefits

Minister McKenna's focus on the high technology and alleged economic benefits of renewable energy is a sure sign that she rarely talks to her colleague, the Minister of Natural Resources. If she did, she might be reminded of a few realities.

Among these are that Canada has enormous resources of oil, natural gas and coal, including both the conventional resources onshore and the unconventional resources in the oil sands and frontier regions. This massive natural heritage is now being exploited using extremely advanced technologies – the firms in this sector are among Canada's leading investors in research and development. Fossil fuels and mining frequently lead all industries in terms of productivity improvements, largely because of the application of new technology. In comparison, our wind resources are in the wrong places, far from our cities, and we are too far north to be a prime location for solar energy. Our natural competitive advantage is in the production and sale of non-renewables resources – geography will not be denied.



The government of Canada's climate target is to reduce total GHG emissions by 30% from 2005 levels by 2030 and by 50% to 60% from 2005 levels by 2050. These targets would involve severe curtailment of Canadians' current energy use, including that required to produce our natural

resources. This is the future Minister McKenna chooses, despite the economic benefits that flow from our natural resource wealth.

This is not the future that the countries of the world are choosing. The fastest growing source of energy use in the world is not renewables – it is natural gas. Oil consumption is growing at the rate of over 1.5 million barrels per day – the fastest rate in history. Even coal consumption, long reviled by environmentalists, is growing due to major additions in Asia. Canada has an important role to play as a producer of choice in such a world.

The Claim that Carbon Dioxide is Pollution

Those who support the thesis that humans are causing catastrophic effects on the global climate are fond of politicizing the language of the debate. This is usually intended to inject considerations of values and ethics in place of science, analysis and facts. Calling carbon dioxide emissions “pollution” is a classic example of this practice.

Lindsay Howell published a useful article on this subject in July 2018. You can read it here:

<https://blog.friendsofscience.org/2018/07/23/carbon-dioxide-is-a-pollutant/?highlight=carbon%20dioxide>

He noted that, according to the Merriam-Webster dictionary, a “pollutant” is a substance that contaminates the environment, and “to contaminate” means to make the environment unfit for use by the introduction of unwholesome or undesirable elements. Does carbon dioxide make our atmosphere “unfit for use”?

The entire notion is bizarre. The existence of life on earth is largely dependent on the ability of plants to photosynthesize carbon dioxide into sugars and to create oxygen. Over the course of the earth’s history, the concentration of carbon dioxide in the atmosphere has been far, far higher than it is today – over 300,000 parts per million (ppm) when life first appeared, 7,000 ppm 500 years ago and 1,000-2,000 ppm 65 million years ago. Today’s concentrations are slightly above 400 ppm. The slight increases in carbon dioxide concentrations over the past 150 years have had only a small effect. Much of that has been positive. A recent article in Nature Climate Science, summarized by NASA, reported a significant increase in the leaf area (a.k.a. greening) of Earth’s vegetation over the past 35 years. Most parts of the planet are experiencing record crop yields.

There is no denying that one of the central scientific issues in the debate over whether human emissions are causing catastrophic global warming is whether carbon dioxide emissions and concentrations are too high.² Too much of anything can be harmful. A small amount of rain can be beneficial, while far too much rain can cause damaging floods. When we get too much rain, however, we do not call it “pollution”, as though water had suddenly changed its fundamental characteristics and become toxic.

Much of the environmental legislation that has been passed in North America and Europe over the past sixty years has been based upon designing very strict and highly intrusive authorities to deal with toxic substances and then, having accomplished that, extending those authorities to other emissions whose nature is far less damaging to humans. **Treating an odorless, colourless, benign gas that people exhale as a toxic “pollutant” would be the ultimate extension of intrusive environmentalism.**

It is, at least, unbecoming for a Minister of the Crown to use terminology intended to mislead in place of facts when discussing a major public policy issue.

Carbon Taxes do not Contribute to Economic Growth

Minister McKenna claims that “putting a price on carbon” via a carbon tax is an efficient way to reduce consumption of fossil fuels and indirectly to stimulate investment in the “clean technologies” that she favours. She even goes so far as to imply that, because some provinces that have implemented carbon taxes have been able to maintain high rates of economic growth, carbon taxes cause economic growth.

This is deception.

There is no question that, in theory, raising energy prices will provide an incentive for energy users to reduce consumption and switch to alternatives where those are available. Economists refer to this as the “price elasticity of demand” and it varies by energy product and service based upon the availability of alternatives and the implicit value placed on the service. Thus, in general, raising prices for coal through carbon taxes, other things equal, may make it uncompetitive as a source of

² The scientific community has known carbon dioxide is not the dominant driver of climate change since 2003. <https://www.springer.com/us/book/9783642623738> Also reported in 2005 <https://www.nap.edu/catalog/11175/radiative-forcing-of-climate-change-expanding-the-concept-and-addressing> and Dr. Judith Curry’s statement to US Senate that “Carbon dioxide (CO2) is not a control knob that can fine tune climate” 2014 <https://curryja.files.wordpress.com/2014/01/curry-senatetestimony-2014-final.pdf>

thermal electricity generation because of the ready availability of low-cost natural gas in most areas in North America. In contrast, the demand for motor fuels for light duty vehicles (i.e. cars and SUVs) is typically quite inelastic (unresponsive to higher prices) because there are few alternative fuels and people want to minimize their commuting time in cities.

Thus, while raising prices will have different effects depending on the elasticity of demand, raising prices is a simple and transparent way to influence behavior and it leaves the choice of how to respond in the hands of the consumer, not some government official.

The main disadvantages of using carbon taxes and thus raising energy prices is that it raises consumer costs and can adversely affect industry competitiveness. The carbon taxes imposed in Canada so far are generally in the range of \$20 to \$30 per tonne and, while punitive for consumers, are not yet large enough to do serious economic damage by themselves. Minister McKenna neglects to mention that, to attain the government's climate targets, it will have to raise carbon taxes much, much higher. Many estimates of what is "needed" involve carbon taxes of \$200 to \$300 per tonne or higher, which would seriously harm Canada's economy and competitiveness. Carbon taxes also will have important distributional effects (e.g. making some consumers and industries worse off and others better off, and disproportionately hurting low income consumers).



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Proponents of carbon taxes say they can be designed to stimulate the economy if the revenues are used to reduce the rates of certain generally-applied taxes like personal or corporate income taxes or sales taxes. They fail to mention two important points. The first is that the same stimulation of the economy could be achieved via a reduction in government expenditures in areas that do not help the economy (of which there are many) and the subsequent reduction in tax rates. New taxes are not necessary.

The other is that the experience in jurisdictions that have implemented carbon pricing regimes (carbon taxes or Emissions Trading Systems) is that full recycling of the resulting revenues is the exception rather than the rule.

The Institute for Climate Economics (I4CE) is a think tank based in Paris that is funded by the French Caisse de Depots, the French Development Agency and Morocco's Caisse de Depots et Gestion. In October 2017, it published an article summarizing the results of its study of the use of carbon prices in the world. The article, entitled Global panorama of carbon prices in 2017, can be found here:

https://www.i4ce.org/wp-core/wp-content/uploads/2017/10/Global-Panorama-Carbon-prices-2017_FINAL_5p-2.pdf

The I4CE article contains some interesting information using data for fiscal year 2013-2014.

- More than 60% of the revenues received by governments from carbon pricing went to members of the European Union.
- On the global scale, only 29% of revenues were recycled into the economy in the form of tax exemptions.
- 34% of the revenues were used to subsidize projects that would reduce GHG emissions.
- 37%, the largest share, were allocated to the general budget.

So, the record clearly shows that politicians and treasury officials, when provided with a windfall of revenues from a carbon tax, are very unlikely to return all of it to the citizens directly. Instead, as should be no surprise to those who study public administration (or human nature), they spend it on their preferred causes, groups and industries.

Conclusion

The concept of “clean technology”, especially as applied to energy production and consumption, is a fabrication intended to denigrate fossil fuel energy sources. Most of what is treated by Statistics Canada as “clean technology” is only vaguely related to products and services that reduce greenhouse gas emissions, the climate change policy objective Minister McKenna is promoting. Far from being a large and growing portion of Canada’s economy, it is stable or shrinking, and stands a poor chance of growing rapidly in future in the face of competition from an overbuilt global renewables supply industry centred in China.

“Clean technology” has been and will for some time continue to rest on government subsidies and regulation, not the free choices of consumers in competitive markets. The billions of dollars that the Canadian government has committed to this sector is not a guarantee of success, but a measure its dependency on public support for its survival.

Calling carbon dioxide “pollution” is an attempt to cast a gas essential to life on earth as a villainous toxic. It shows how determined Minister McKenna and others are to politicize the discussion of climate change policy.

Finally, taxing the productive sectors of the economy and raising energy costs for consumers and Canadian firms can never be remotely considered as benefitting the economy, especially when the revenues so raised are spent on politically favoured industries. As the carbon tax rates rise to ever-more-onerous levels in future, the foolishness of this claim will be become clear for all to see.

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### **About the Author**



*Robert Lyman is an Ottawa energy policy consultant and former public servant of 27 years; prior to that he was a diplomat for 10 years.*

### **Related:**

“Grounded in Reality” – Challenging Smart Prosperity on Clean Tech <http://blog.friendsofscience.org/wp-content/uploads/2017/05/grounded-in-reality-may-03-2017-final.pdf>

“Due Diligence” on Renewable Demands by David Suzuki Foundation

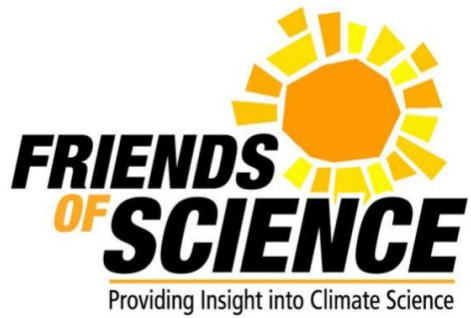
<http://blog.friendsofscience.org/wp-content/uploads/2017/04/due-diligence-suzuki-foundation-final-ap-26-2017-r.pdf>

“Let Them Eat Carbon” – Rebuttal to Ecofiscal’s report “Clearing the Air...Carbon Pricing”

<http://blog.friendsofscience.org/wp-content/uploads/2018/04/Let-Them-Eat-Carbon-FINAL-R-1-April-18-2018.pdf>

“Checkstop: Challenging the Canadian Federal Government’s Carbon Pollution Pricing System Results Report”

<http://blog.friendsofscience.org/wp-content/uploads/2018/05/Challenging-the-Canadian-Federal-Government-FINAL-R-2-May-2-2018.pdf>



## About

Friends of Science Society is an independent group of earth, atmospheric and solar scientists, engineers, and citizens who are celebrating its 16th year of offering climate science insights. After a thorough review of a broad spectrum of literature on climate change, Friends of Science Society has concluded that the sun is the main driver of climate change, not carbon dioxide (CO<sub>2</sub>).

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