"Just because it's a good idea doesn't make it a good investment …This has been a noble way to lose money."

 Joseph Dear,
past CIO of CalPERS on cleantech,
Wall Street Journal, Mar. 25, 2013

GROUNDED IN REALITY

Challenging Smart Prosperity on Cleantech

Rebuttal to "Accelerating Clean Innovation in Canada"

Overview

Cleantech and decarbonization are the Holy Grail of investment and government subsidy hype, but practically speaking there have been numerous catastrophic failures of cleantech in recent years, both as investments and as subsidized programs. Tried and true natural resources are required to produce all clean tech products and innovations. This document examines some of the key success factors of nations like Finland, Israel, Denmark and Sweden which feature 'cluster' qualities touted by Harvard economist and author Michael Porter as competitive factors for economic success. This report reviews these markets and looks at some comparative factors regarding Canada's competitiveness among nations.

FRIENDS OF SCIENCE

May 3, 2017

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GROUNDED IN REALITY

REPLICATING SUCCESS

Smart Prosperity Institute issued a policy brief in April 2017 entitled "Accelerating Clean Innovation in Canada." This document responds to that brief, rebutting and deconstructing much of the 'cleantech' hype with a more grounded approach.

In ***"Accelerating Clean Innovation in Canada"*** the premise appears to be that if government would just underwrite 'clean' industries with subsidies, set clean energy standards (such as no emissions or low-carbon standards), put a price on carbon, engage in proactive procurement of goods to give clean industries a financial lift and market profile (i.e. buying Tesla cars for government fleets, installing fast charging stations), and establish clean tech/hi-tech 'clusters,' then it will follow that there will be success. Smart Prosperity claim that then Canada will "tap into a fast-growing global market expected to be worth as much as C$2.5 trillion by 2020."

Friends of Science Society argues that Smart Prosperity presents selective information without context, thus misleading the public on the actual costs and probabilities in developing a competitive clean tech cluster.

Likewise, reference is made to countries like Finland, Israel, Denmark and Sweden (FIDS) which have become world leaders in cleantech. Friends of Science Society offers a general overview of some of the demographic, historic, cultural and contextual factors that appear to be the key drivers of the FIDS success, as a platform for discussion about the challenges Canada faces in a globally competitive environment.

One thing is clear; no product in the world can be made

THESE FINDINGS INFORMED BY:

- Over 14 years of climate science, policy and economics review
- Climate science, economics and policy review by cadre of experienced professionals with real world experience in energy development, technological innovation and business
- International network of climate scientists, economists, Professional Engineers, business experts, investigative journalists and authors.
- Network includes past IPCC expert reviewers
- Summarizing relevant information from over 15 detailed reports
- Expert presentations at 14 annual events
- In-house Boots-on-the-ground experience in energy and CCS

without mined resources, reliable power and fossil fuels. Fossil fuel by-products create a cascade of products and services that all people rely on everyday. Canada has an existing **Supercluster** of oil/gas/oil sands/coal. Hi-tech leaders like Samsung operate from South Korea, a country with no fossil fuels. We buy their 'clean-tech.' They buy our coal. It is unlikely we can compete with them on clean-tech, though we may find and develop niche markets.

One of our findings is that all successful cleantech countries also feature busy ports with global transportation networks. The smooth flow of goods and services is key to a country's success. Canada's vast distances and challenging geography and weather make this harder for all industries to succeed. On top of that, Canadian ports and export markets for oil and gas are subject to blockades and regulatory challenges by Canadian anti-oil/LNG/tanker activists.

Contrary to Smart Prosperity's position, replicating clean-tech success is not a matter of more government subsidizes, more regulation, more onerous standards, and more (carbon) taxes. It's a matter of having a unified national vision and purpose, cadres of highly qualified scientists and technicians, championing entrepreneurs, and most importantly, moving goods to market. We examine some of these relevant factors in this report.

DECARBONIZATION

The Holy Grail of the low-carbon initiative is to 'decarbonize' society—to move electrical generation, transportation, and manufacturing off fossil fuels like oil, natural gas and coal, to energy production from wind and solar.

First, the source of the 'decarbonization' push is the Intergovernmental Panel on Climate Change Summary for Policy Makers (IPCC SPM). Many policymakers understand this as a clear directive from an authoritative body.

However, in correspondence with the IPCC, they clearly stated to Friends of Science Society that: ***"I'd like to point out that the IPCC does not make recommendations on any topic and you will not find any recommendations in any of our reports."***

In responding to that same letter, Friends of Science Society asked the IPCC for supporting evidence for their suppositions that wide-scale wind and solar can cost-effectively decarbonize. The IPCC have none to offer. As the Ontario Society of P. Engineers have found, wind and solar increase costs; more wind and solar on the grid increases carbon dioxide emissions due to the requirement for natural gas back-up, which must ramp up and down to meet the intermittent nature of 'renewables.' Several studies show the deficiencies of wind and solar; low energy return on energy invested coupled with high cost.

We are told in the **"Accelerating Clean Innovation in Canada"** brief by Smart Prosperity Institute that the price of wind and solar devices are dropping, and that this is an incentive to adopt them. The price drop is primarily due to both a slow-down in the renewables markets and uncertainties about subsidies programs across the EU and UK as taxpayers object to burdensome subsidies. As well, most wind/solar manufacturing has moved to developing nations where labour costs are low and there are virtually no environmental regulations or costly reclamation requirements. The environmental damage done results in measurable costs but these destructive externalities are not accounted for.

Vast regions of China have been devastated by unmitigated, unreclaimed rare earth mineral mining, leaving a radioactive wasteland. Solar panel processing toxins have poisoned rivers. Forests are rapaciously burned in Indonesia for palm oil, in demand for cooking, cosmetics and biofuels. There are tangible costs and measurable damage as outcomes, all due to climate change policies.

Yet we're told by carbon pricing advocates like Smart Prosperity that the "social cost" is in the carbon risk. Carbon dioxide is a benign, odourless, colourless gas, essential for life.

However, pricing carbon does allow for the trading of this invisible 'commodity', which in turn encourages fraud and unethical industries to increase their noxious emissions in order to make more money on carbon trading. This is not good for the environment or climate change initiatives.

CANADA IS ALREADY A CLEANTECH NATION

All cleantech starts with "earth" tech—hydrocarbons and mineral resources

Canada already is a 'cleantech' nation. Our global leading supercluster is oil and gas. Nothing can be manufactured without it. This report exposes the flaws in the Smart Prosperity logic and looks at Canada's competitive challenges.

In Smart Prosperity Institute's brief, the word 'clean' or 'cleantech' appears some 200 times by page 18. "Clean" seems to be an all-purpose word for any type of innovation that "improves environmental performance" or the "sector of the economy focused exclusively on developing next-generation green innovations such as renewable energy, systems, biochemicals, or emission-free vehicles."

Unacknowledged in the Smart Prosperity brief is that all of these “cleantech” devices are manufactured with energy produced by coal, natural gas, oil, (or by hydro or nuclear facilities that are also made from fossil fuels). These are Canada’s number one marketable commodities. All ‘clean-tech’ nations use fossil fuels in abundance. Canada’s market access is blocked. Why is Smart Prosperity misleading the public and policy-makers on this fact?

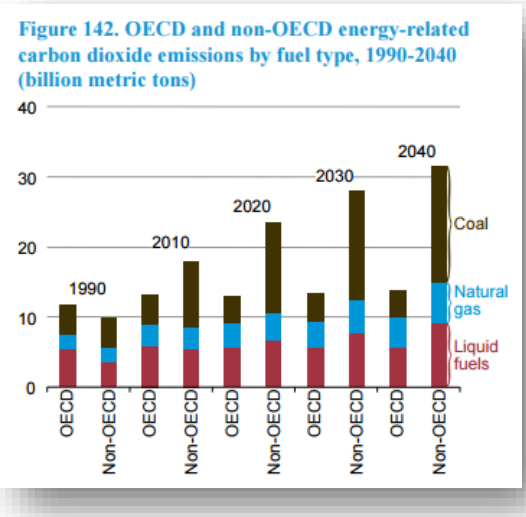
PHASE-OUT FOSSIL FUELS BY 2050? UNLIKELY.

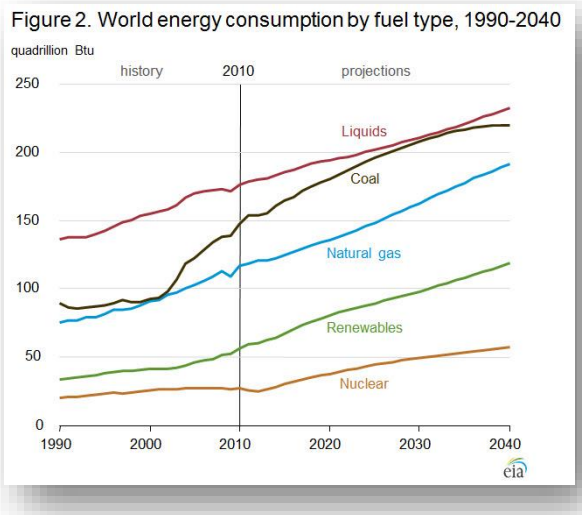
Smart Prosperity references the 2016 Analytica Advisor ***“Canadian Clean Tech Industry Report”*** in their ***“Accelerating…”*** brief. Subsequent to the Smart Prosperity document’s publication, the synopsis of Analytica’s 2017 report was issued in April. We assume many of the players and parameters are common to both reports and will reference the 2017 synopsis.

Analytica makes an astounding claim on page 3, that *“in the next 35 to 85 years, we will transition to a world in which we no longer burn fossil fuels to meet our energy needs.”*

This claim is not supported by any rational evidence. If anything, the use of coal, liquids (gasoline, kerosene) and natural gas are projected to grow dramatically. While ‘renewables’ will grow as in Figure 2, this ‘renewables’ figure includes hydro. Wind and solar make up only about 1% of the world energy mix, and rely on vast amounts of fossil fuels for the production of turbines and panels, as well as the 24/7 natural gas back-up (except where hydro is available).

Unless some breakthrough technology reaches viable market penetration, Analytica’s claims are not grounded in a realistic assessment of how things are made.





Source: US EIA 2013

CLEANTECH—AWASH IN RED INK

Analytica Advisor's 2017 summary ***"Canadian Clean Tech Industry Report"*** also states that *"the [cleantech] industry is awash in red ink and shareholder returns are negative."*

Sadly, the synopsis does not break out which type of clean tech industries are discussed—some like water and waste management have practical applications here and abroad; others of the more esoteric nature on the 'green' ideological spectrum may simply be, as Joseph Dear, past CIO of CalPERS put it—*"a noble way to lose money."*

"CalPERS had close to a 10 percent negative return (9.8 percent) on the around $900 million that it's put in the cleantech sector, which includes $460 million that it's put into clean tech venture funds".

This painful truth does not mean we should not pursue clean tech innovation, but rather that we should learn from experience of others. Indeed, cleantech has an unfortunate reputation for large subsidies combined with spectacular fails.

Further, many alleged 'clean' devices, like wind and solar panels, are produced in the least environmentally sound conditions in developing nations. While Smart Prosperity and Analytica tell us there is a "climate risk" and a "carbon risk" it is odd that rapacious mining practices overseas with no hazmat gear for labourers or reclamation and toxin management for mining, goes without a 'reclamation' or 'reparation' risk as a measurable and provable damage and financial cost.

On page 12, of "Accelerating…" Smart Prosperity claims that clean innovation benefits (cleaner air and water) have no market value because "*markets fail to put a price on environmental harm."* **Wind and solar would be out of business if the market put a price on their unmitigated manufacturing damage to the environment.**

Cleantech – "A Noble Way to Lose Money" – Joseph Dear, past CIO of CalPERS

In Ontario, a *"Better Place" electric vehicle company was cited as a case study in successful 'sustainable' investment in the October 2012 report "Accountants for Business – Canada and the Green Economy." As reported by CBC Television May 27, 2013 Better Place went from an* ***asset value of $2 Billion*** *in 2012 to a* ***bankruptcy value of $12 million by 2013****. Some of Wall Street's expert investors lost a spectacular $900 million according to a May 28, 2013 report in the Wall Street Journal.*

CLEANTECH—THE CANADIAN WAY

Chinese rare earth mineral mines look much like Canadian oil sands tailings ponds – but no one decries wind turbines as **'dirty wind.'** People labour without hazmat or safety gear there. Toxic waste goes unreclaimed.

The satellite view above of Baotou China rare earth mineral mines and a spewing jet of waste processing fluid look much like the images used to smear the reputation of the 'tar' sands of Alberta worldwide as 'dirty' oil In fact, **this is mining**—a process required for all manufactured goods whether Tesla, cellphone, laptop, or IKEA tea kettle. The difference between such places in the developing world is that resource operations in Alberta and most of Canada **must** have prior, approved, cradle-to-grave development, decommissioning and reclamation plans in place. Environmental damage is mitigated at every step. Worker safety is paramount. Heavy equipment reduces hard labour, danger and risk. In Alberta, **reclamation is the law**.

SOCIAL COST OF CARBON SHOULD INCLUDE THE BENEFIT - FUND IAM SHOWS $17.00 NET BENEFIT

On April 20, 2017, Lux Research claimed Canada's carbon tax represented a $120 billion 'opportunity' to reposition Canada as a global cleantech hotspot destination.

Canadians opposed to the carbon tax might prefer that money remain in their own pockets, since Analytica reports that Canadian cleantech is 'awash in red.'

As economist Dr. Ross McKitrick revealed at his 2013 presentation "The Pause in Global Warming: Climate Policy Implications," the projected damages from fossil fuel use, in terms of the presumed human caused global warming, is calibrated to the climate models (simulations) used by the Intergovernmental Panel on Climate Change (IPCC).

However, these models have projected warming at far higher rates than we see. This means the cost of carbon (aka Social Cost of Carbon) is set far too high.

The Integrated Assessment Models (IAM's) used for calculating the "Social Cost of Carbon" do not include a calculation of the **benefits of fossil fuel** use, creating an even more distorted picture and price. The FUND Model— Climate Framework for Uncertainty, Negotiation, and Distribution, originally developed by IPCC lead author economist Richard Tol, is the only Integrated Assessment Model that does incorporate the social benefits of fossil fuel use as well as predicted costs, and this ends up with carbon dioxide delivering a net benefit of **$17.00 per ton of Carbon Dioxide.**

Based on proper cost-benefit analysis, this means the federal and provincial governments collecting carbon taxes owe taxpayers a huge debt.

97 SERVANTS EACH

Each person has the equivalent of 97 servants thanks to fossil fuels, based on the early calculations of French economist and demographer Emile Levasseur who described how, if one steam horsepower was equivalent to the power of 21 men, in 1840, French industry had a million new workers, thanks to steampower. By 1885-87 that number had risen to 98 million or "deux esclaves et demi par habitant de la France" (two and a half slaves for each inhabitant of France.) - Matthew Sinclair , author of

"Let them eat carbon; The price of Failing Climate Policies and how governments and big business profit from them"

CLEANTECH— "RENEWABLES" NOT DOABLE. WHY? MATH. PHYSICS.

Germany went heavily into renewables, hoping to capture the world market with this potential equivalent for conventional power. It was initially thought by many politicians and the eco-activists that wind and solar could easily replace conventional power with 'clean, green, free' resources. But as Prof. MJ Kelly of Cambridge writes, wind and solar exacerbate wasteful use of materials and fuels, returning less energy than that for our basic societal survival needs.

On the grid, wind and solar become monsters, consuming billions of dollars for new transmission lines and integrations. Investors would not voluntarily build wind without the promise of subsidies up front—in every case we have studied.

Germany is now spending some 1,000 billion euros on wind-solar 'cleantech' in its energy transition; it created 380,000 jobs—but at a subsidy of $57,000 Cdn per year per job.[1] Germany is building more coal plants. 'Renewable cleantech' like wind and solar cannot provide suitable power generation for modern industry and modern society. It's simply a matter of math and physical principles. Energy is not renewable.

CLEAN COAL AND CCS DOABLE-CANADA DOES IT.

It is odd that Canada has developed complete 'clean coal technology' (Carbon Capture and Sequestration) yet as a nation, is reluctant to commit to using it. Instead, the cheapest, most reliable forms of power in Canada—coal fired power plants—are being shut down by the same government and advisors like Smart Prosperity and Pembina Institute, who claim Canada should develop cleantech to market to the world. We did. Indeed, Norway, the cleantech hero, has announced further study into CCS.

There are over 7,000 coal plants in the world, many in developing nations struggling to feed their people. Capturing emissions and recycling them into useful materials like fertilizer, made from coal stack emissions, should surely ***qualify.***

[1] For example, if 380,000 jobs were created in 2012, and €14 billion were disbursed in payments to renewables that same year (total amount of EEG levy per year.), then it can be calculated that each job received a €35,000 subsidy per year. (~$57,000 Cdn/job) (p. 24) Findadvice "Development and Integration of Renewable Energy: Lessons Learned from Germany" Posner et al (2014)

CLEANTECH—60,000 JOBS EVERY YEAR TO 2020. REALLY?

You can forecast anything, delivering actual results is a different story.

"The Firm: The Story of McKinsey and its Secret Influence on American Business"

by Duff McDonald

Smart Prosperity's report states that McKinsey foresees 'clean innovation' in Canada's energy sector as leading to the development of some 60,000 new jobs every year from now to 2020, an astonishing forecast that does not appear to be tied to a specific industry or product, particularly considering the rocky state of economies and geopolitics world-wide.

According to our report "Green Jobs—Rhetoric or Reality" some 2.2 jobs are lost for every 'green' job created.

> *McKinsey's optimism should be weighed against this comment:*
> *"It's an impossible number to quantify [the firm's economic impact], given that McKinsey doesn't actually make final decisions for its clients, but it may not be too far off the mark to suggest that McKinsey has been the impetus for more layoffs than any other entity in corporate history." (96) "The Firm"*

Smart Prosperity pitches wind and solar as cleantech. Sober assessments of the cost of wind and solar by Professional Engineers, not management consultants, demonstrate that in northern climates, solar Photo Voltaic (solarPV) is an energy sink (takes more energy to make a panel than it ever produces) and that wind energy costs 9 times more than conventional power and must be backed up 24/7 by conventional power (typically natural gas), meaning there is no benefit to the environment or greenhouse gas reductions (GHG) vis a vis climate change targets... but taxpayers are saddled with 20 and 40 year fixed subsidy contracts which pay back to diverse investors, such as tax-free pension funds and tax-free sovereign wealth funds.

Given the fact that McKinsey is a consultant to vast numbers of corporations in numerous countries, including its present CEO having had substantial influence in Asia (particularly during bank restructuring in South Korea) healthy skepticism of such employment claims might be in order. There is the potential these might be promotional efforts on behalf of clients, or simply magical thinking by people who have never implemented real engineering or energy projects.

Alberta is already suffering a net job loss of some >100,000 people due to a drop in oil prices and on-going blockades of pipelines to export markets. Opening access to markets via pipeline and tanker traffic would put many of those people back to work within months in an established

industry that needs no subsidies – that in fact subsidizes everything in Canada.

It is our view that wishful thinking about "Accelerating Clean Innovation in Canada" should be shelved and Canada should proceed with caution.

Find out "Why Renewables Cannot Replace Fossil Fuels by 2050"

NO MORE ENRON - PLEASE

"Accelerating…" makes references to McKinsey and Company reports. While this company has a global presence and for decades has consulted with some of the highest profile organizations and governments, Duff McDonald reports in "The Firm…" that McKinsey's consulting has lead to some spectacular failures including K-Mart and Enron. McKinsey was reportedly an integral part of creating the architecture of Enron, with Enron the acknowledged father of complex renewable energy financing deals, reportedly a financier of environmental groups to furthering the hype on climate change fears as a means of gaining public acceptance for burdensome energy costs. Author Lawrence Solomon reports that Enron underwrote large environmental non-governmental groups (ENGOs) like Nature Conservancy, that drove public opinion on climate change. He reports that Enron also commissioned scientist James Hanson to write a report on climate change, while burying a report of its own that found carbon dioxide was not a critical risk to global warming.

Indeed, numerous ENGOs in Canada have been funded by offshore foundations which appear to have set goals. The multi-million dollar ClimateWorks group of 13 large US based foundations state that their goal is to fund local ENGOs to change policy to move off fossil fuels.

One member, the Oak Foundation, in 2014 funded a $75 million grant over 5 years, and featured an article (See Appendix I) on its website stating that it had funded various groups in the EU and North America for affecting local policy with the end goal of establishing two cap and trade systems. Oak funded the Pembina Institute prior to its "Costly Diagnosis" report which was instrumental in the coal phase-out policies in Alberta.

CLEANTECH COSTS THE PUBLIC DEARLY

In Alberta, a province rich in high quality coal, coal-fired power generation costs about 2¢/kWhr (kilowatt hour) at the gate (prior to administration/distribution costs). By contrast:

"In Ontario, Samsung agreed to build plants to manufacture components for wind and solar

projects in Toronto, Tilsonburg and Windsor, and said Thursday it would have its fourth plant up and running in London by the end of this year. The four manufacturing plants will create about 900 jobs, which Chiarelli said are guaranteed until 2016.

In exchange, Ontario agreed to buy heavily-subsidized power from Samsung and guarantee the company space on the province's crowded electricity transmission grid.

Ontario will pay Samsung 13.5 cents a kilowatt hour for wind power and 44.3 cents a kilowatt hour for solar power, which drops to 10.5 cents for wind, and 29.5 cents for solar in the later phase of the contract." Source: Global News, June 20, 2013

CANADA FACES COMPETITIVE CHALLENGES

Blue Sky thinking should not prevail over grounded reality. As will be discussed subsequently, Canada is not in the most competitive circumstance and it seems obvious that geopolitical forces are at play to finance a 'green' Blockadia of Canadian exports of our resource products. It is unclear as to whether the forces behind this blockade are other oil/gas/coal competing nations, domestic players envious of the fossil fuel rich west, or possibly external forces within the British Commonwealth or *la francophonie* (or both), or American corporations or foundations with an eye on Canada's resource wealth, so close to their home and so weakly protected by our fractured nation.

The 'Enron method' of clean tech opportunists funding ENGOs to block or advocate for certain policies is in full play in Canada, as reported by Vivian Krause and others. That said, let us examine the competitive advantages of these small nations versus Canada.

To reiterate, this report is not intended to be an exhaustive study of these competitive forces but rather to inform the audience that the logic and research of Smart Prosperity report seems thin considering readily available evidence.

Pictured above typical oil tanker traffic in and out of Europe. No blockades.

Canada is losing $50 million a day due to pipeline blockades. All 'cleantech' relies on natural resources. Cleantech initiatives/start-ups will not give Canada any competitive edge if our natural resource products of greater value from established industries can't get to market.

ELECTRIC CARS– NORWAY'S $861.9 BILLION SOVEREIGN WEALTH FUND AND TESLA

Smart Prosperity's "Accelerating…" report gives various 'cleantech' examples without context. One is the reference to Norway and its adoption of electric cars, principally the Tesla. Smart Prosperity suggests electric vehicles are an appropriate model for Canada going forward. However, Norway occupies a unique position in the world, via its state-owned oil resources, it has built up the world's largest Sovereign Wealth Fund, established in 1990.

Accordingly, this fund is richly applied to benefit its citizens, thus the subsidizing of $100,000 Tesla's for Norwegians is a drop in the bucket. If Norway is a significant investor in Tesla, this move is an excellent international ad campaign of affirmative climate action and a 'national' testimonial form of salesmanship.

Clearly, for Norway, a country of some >5 million population concentrated in the south around seaports, with relatively mild winters modified by the warm Gulf Stream influence and powered almost exclusively by vast hydro resources, having a national fleet of high-end electric vehicles is almost a 'no-brainer.' Norwegians have been looking to find a way to reduce air pollution, 65% of which comes from a combination of diesel vehicles and their love for soot-emitting wood fireplaces.

However, no evidence supports the push for the incorporation of Tesla or any other electric vehicle standard nationwide in Canada.

Canada has the third best air quality in the world and is also sparsely populated, challenged by vast distances, and extremely cold winters – often accented by mountains of snow, as was the case in New Brunswick this year with record snowfalls in the meters. Fredericton's February snowfall topped past records at 107 centimetres.

High-end urban electric vehicles like Teslas would literally be a potential death sentence in such conditions; the passenger compartment of an electric vehicle must draw on the battery to warm the car, further reducing power and range of the car. Being stuck in a snowstorm on an outlying urban or isolated rural road is a life-threatening circumstance in Canada as it is, but when stuck, a person can rely on intermittently turning on the engine to heat the vehicle while waiting for help. That would be short-lived with any electric vehicle.

While many Albertans are mocked by fellow Canadians for their preference for 'big trucks' – once you've been stuck on a winter road on the prairies or in the mountains in a snow storm, you appreciate why big gas or diesel powered half tons are the popular choice.

ELECTRIC CARS IN PERSPECTIVE— A TALE TOLD BY THE NUMBERS

To test the Smart Prosperity and Analytica claims on electric vehicles - one can refer to the statistics published by the International Organization of Motor Vehicle Manufacturers (OICA). On its website OICA publishes a wide range of data, including those showing the trends over the past ten-year period for which full information is available (2005 to 2014) on vehicle use and sales.

OICA does not report on vehicle sales to distinguish sales of internal combustion engines from all-electric or hybrid vehicles. Most online sources of statistics on EV sales focus on monthly changes, especially in the U.S. and European markets, so it is difficult to get an accurate sense of global EV sales. The Statistics Portal is one source that provides data on the worldwide number of electric vehicles since 2011 when EVs began to be sold in large numbers. The global totals this source quotes are 100,000 in 2012, 200,000 in 2013, 405,000 in 2014 and 740,000 in 2015.

Probably the best source of free data is available online through Clean Technica. Clean Technica reports that global annual sales of plug-in electric vehicles were 206,000 in 2013, 307,000 in 2014 and 430,000 (forecast) in 2015. Only in six countries (Norway, the Netherlands, Iceland, Estonia, Sweden and Japan) do all-electric vehicles have more than 1% of market share.

This extremely rapid growth in sales from small beginnings has been **aided by generous taxpayer subsidies** in North America and Europe, including U.S. $7,500 per vehicle in the United States, up to CDN $14,000 in Canada, and up to 5,000 pounds in the United Kingdom. The duration of those subsidies is increasingly in question, partly because of taxpayer resistance in European countries and because of the new Trump Administration in the United States.

What can one make of the available statistics on sales of internal combustion vs. all-electric vehicles?

- *Of 907 million personal vehicles on the road worldwide in 2014, 405,000 were EV's. EVs constituted 0.04 % of the PVs on the road globally.*
- *Sales of all-electric trucks and buses are negligible.*
- *Of 88 million new vehicle sales in the world in 2014, 307,000 were EVs. That is, the EV share of new vehicle sales was 0.35%. In 2015, that probably rose to one half of one percent.*
- *To reach 60% of present PV sales by 2040, EV sales would have to increase to 120 times today's level.*
- *The potential growth in total vehicle sales globally is immense, especially in Asia, the Middle East and Africa.*
- *The likelihood that EV sales will constitute 60% of the much-increased sales of all vehicles by 2040 approaches zero.*
- *Internal combustion engines, powered by petroleum fuels, will be the dominant source of motive power for a very long time.*

Excerpt of: https://friendsofsciencecalgary.wordpress.com/2016/12/11/a-tale-told-by-numbers-world-vehicle-trends/

CLIMATE CHANGE POLICY=SMOG IN EU

Ironically, it is the EU focus on reduction of carbon dioxide which has led to a proliferation of diesel vehicles and air pollution. While diesel uses less fuel and produces less carbon dioxide, it creates much more smog-producing nitrogen oxide and black carbon soot (particulate matter less than 2.5 microns - PM2.5). Due to government incentives for diesel in the EU and France, this has led to over 80% of vehicles cars being diesel with the result that Paris, a modern city of some 2.2 million, frequently has worse air quality than Beijing, a city of 21.5 million in a developing nation.

Smog is more prevalent in low-lying coastal regions when humidity rises, trapping ground level exhaust.

These are air quality factors for Norway which electric vehicles like Tesla can address. As noted on the previous page, Norway's vast hydro resources and hundreds of billions of dollars to spend on 5 million people are ***quite unique in the world.*** This does not translate to benefits for Canada.

NO CANADIAN SOVEREIGN WEALTH FUND

The closest that Canada comes to having a sovereign wealth fund is that of Alberta's Heritage Trust Fund, established in 1976, reportedly at $13.1 billion, handled via Alberta Investment Management Corporation (AIMCo) with more than $90 billion Cdn in assets under management. Alarm has recently been raised with regard to the Alberta NDP government tinkering with the at-arm's-length status of AIMCo which manages the Heritage Trust Fund and some 26 public pensions in Alberta.

Otherwise, Canada has no national wealth fund for the benefit of **all citizens.** It does have massive pension funds representing powerful unions and constituents comprised of large influential voting blocks which often seem to be working at odds with national interests.

The Canadian Union of Public Employees (CUPE) is a large constituency of some 600,000 voters and has signed on to the utopian LEAP Manifesto which calls for no pipelines, the phasing out of oil sands and fossil fuels in general and a demand for: "*Canada to get 100% of its electricity from renewable resources within two decades; by 2050 we could have a 100% clean economy."*

Expert evaluation of such goals shows that the world runs on 81% fossil fuels and all renewable devices are made by fossil fuels. So, the CUPE/LEAP goals work against Canada's interests as a resource exporting nation and a country requiring prime power to deal with long, cold winters, deep snow and short daylight hours. A peer-reviewed assessment of 24 different 100% renewable plans show these are technically infeasible and if they were implemented, would put the national grid at risk of blackout.

> From **"Facts and Fallacies on World Fossil Fuel Use vs Renewables"** In 2014, the shares of primary energy supply by energy source were: oil, 31.3%; coal, 28.8%; natural gas, 21.0 %; biofuels and waste, 10.3%; nuclear, 4.8%; hydro, 2.4%; and "other", including all renewables energy sources, 1.4%.
>
> *Message: Fossil fuels now account for 81% of the world's energy supply and renewables just over one per cent. That situation will not change soon, easily or cheaply.*

A REVIEW OF DIVERSE FACTORS THAT GIVE FIDS A COMPETITIVE EDGE

A Discussion of Canadian Opportunities and Limitations

Finland, Israel, Denmark and Sweden (FIDS) and the USA are all cited as leading examples of 'cleantech' wins, but let us examine the similarities and differences.

CLUSTERS AND SUPERCLUSTERS

In Michael Porter's 1998 book "The Competitive Advantage of Nations," he develops the concept of the 'cluster' which is now in vogue with the Canadian federal government, but larger—as "Supercluster." The authors of Smart Prosperity's ***"Accelerating Clean Innovation in Canada"*** refer to the countries named above as cleantech successes, but with no reference to the unique advantages or circumstances these countries have as drivers of their success in commercialization and deployment, areas that Smart Prosperity reports Canada is lacking.

COMMON SUCCESS FACTORS FOR FIDS

- Finland, Israel, Denmark and Sweden (FIDS) are tiny countries—the geography creates an inherently a clustered business circumstance. Nordic languages are commonly understood by the trio of northern countries. Hebrew 'ulpan' (immersion schools) unify the people of Israel with a common language.
- FIDS have cohesive cultures, deep historic roots, strong national identities, strongly socialist bent, strong militaries with mandatory service.
- Nordic states have strong regional networks—Finland building ships/engines, Denmark shipping magnate, Sweden providing nuclear power, Norway providing hydro.
- FIDS all feature numerous world-class ports with major industries at port-side and they have or are linked to superior merchant marine fleets, (sea freight the cheapest transport) providing global delivery of high volume goods from low-cost production markets to Western markets with disposable incomes (i.e. IKEA).
- The USA is a massive country with many resources, and large, well-established ports, inland waterways, surrounded by various 'clusters' - some states have stimulated economic clusters with inland free trade or low tax/no tax incentives or labour incentives.
- By contrast, Canada is a vast, sparsely populated nation, fraught with linguistic and cultural divides, far from markets, with onerous regulations and the military are largely ignored as a resource or lever to innovation.
- Except for the under-utilized Prince Rupert port, Canadian ports are at high capacity. Exports of Canadian natural resources (oil, LNG plants and coal shipments) are blocked

by a green trade war fronted by Canadian activists, working against their own country's interests.

Photo credit: **By user:Nico-dk / Nils Jepsen - Own work (own photo), CC BY-SA 2.5, https://commons.wikimedia.org/w/index.php?curid=1146162**

EMMA Maersk

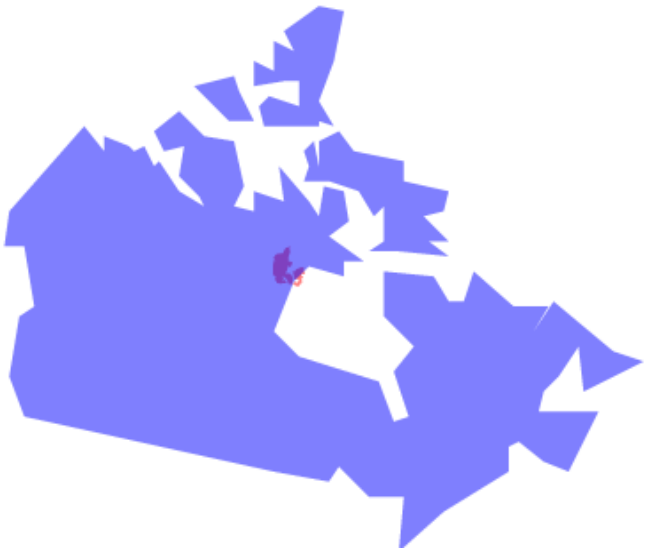
The world's largest container ship built by one of the world's smallest countries.

AP Moller-Maersk Group is the largest container ship operator and supply vessel operator in the world and has been since 1996. (Wikipedia)

Tiny Denmark has virtually conquered the world through this shipping empire.

Below:

How Denmark fits into Canada.



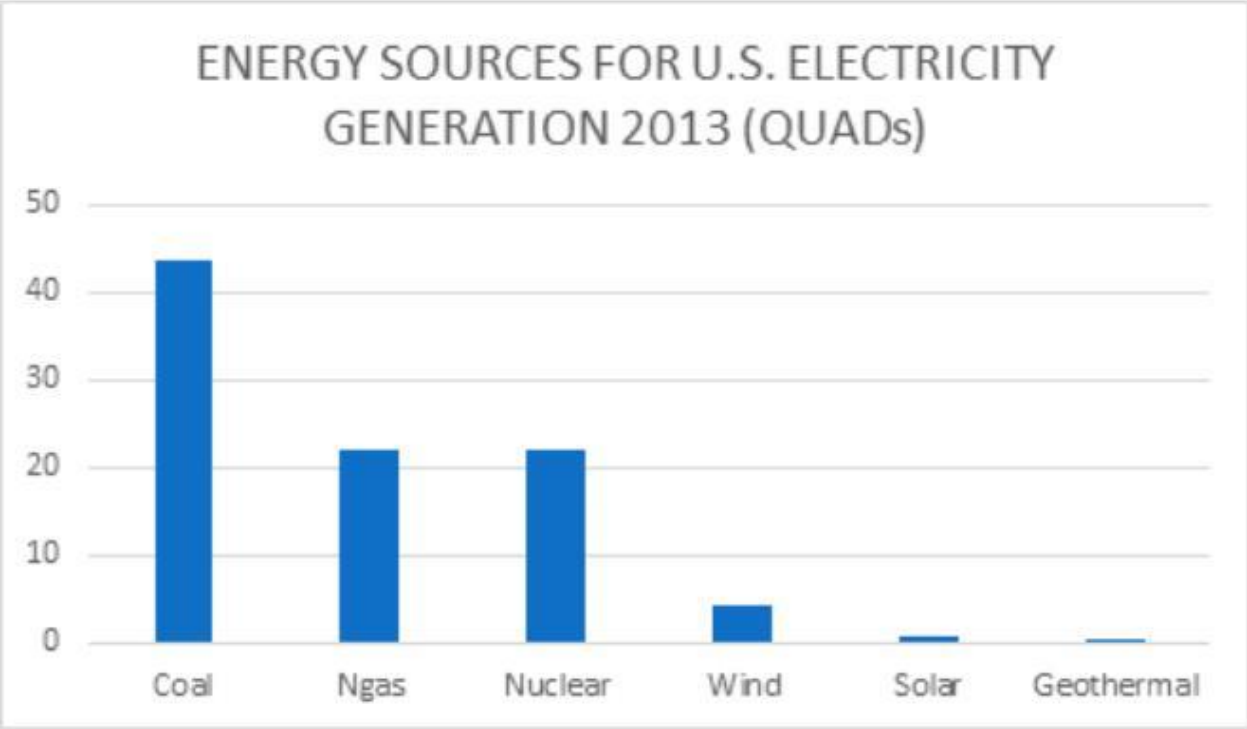
Massive ships like the Emma Maersk are not made from intermittent wind power. Coal, natural gas, hydro, and nuclear energy power the cleantech cluster countries.

	Total Generation	Nuclear	Coal	Natural gas	Hydro	Wind	Geo thermal	Solar	Biomass /fuel/ wasteheat	Oil	Exports/ Imports
Finland	70 TWh/yr	40%	15 TWh		50% (seasonal Variance)						
Israel	60 billion kWhr		2/3	1/5th				Passive residential water heaters			4.2 billion kWh Ex
Denmark*	32.2 TWh	See imports from Sweden	11.1 TWh	2.1 TWh	See imports from Norway	13.1 TWh			5.0 TWh		9.84 TWh Ex/ 12.7 TWh Im Net Im- 2.7 TWh from Norway 1.0 TWh from Sweden
Sweden	153.7 TWh	64.9 TWh (42%)	2 TWh		63.9 TWh (42%)	11 TWh			12 TWh		**
USA	4079 TWh	805 TWh (19.7%) ***	1240 TWh (30%)	1380 TWh (34%)	266 TWh	226 TWh	117 TWh				
Canada	632 TWh	104 TWh 16%	54 TWh	52 TWh	379 TWh 60%		0				60 TWh (to USA)

Data Source: World Nuclear Association (note, figures may vary from 2014-2016; check original reports by country at: http://www.world-nuclear.org/)

*These figures however may be misleading since Denmark is neither unified electrically nor isolated – East Denmark (Zeeland) and West Denmark (Jutland & Funen) are connected[a] only by a 500 MWe link and each is part of a major grid system. East Denmark is part of the Nordic grid and is not synchronized with the main continental zone.

**Electricity imports and exports vary according to season, with Finland, Norway and Denmark providing the main traffic. In 2005 net exports were 7.4 TWh. In 2006 (a dry year), net imports were 6 TWh, in 2007 1.3 TWh, in 2009 4.7 TWh, and in 2010 2.0 TWh. In 2008 net exports were 2.0 TWh, in 2011, 7.2 TWh, in 2012, 19.6 TWh, in 2013, 10 TWh and in 2014, 15.6 TWh (predominantly to Finland).



By percentage

Despite wind and solar reportedly rising in power contribution worldwide and Smart Prosperity claiming wind and solar employ more people than oil and gas, a glimpse of the sectoral ratio in the US shows how little power renewables like wind and solar 'cleantech' provide overall. Neither can increase their market share without an exponential rise in natural gas to balance the intermittency of wind and solar.

FIDS—ELEMENTS OF SUCCESS

Mandatory Military Service Leads to Unified National Vision, Language, Culture and Tech Transfer

While this is not meant to be a detailed demographic or cultural review, there are some surprising characteristics of the small FIDS countries that Canada should consider. Some of their reputation for cleantech success appears to be related to the tech transfer from the military, and the nation's internal sense of unity spawning nationalistic value added retail sales (IKEA for Sweden; Danish furniture/design; LEGO). In other cases, Denmark's 'green' reputation for wind power is offset by its massive carbon footprint via its shipping network, something rarely talked about by 'green' advocates.

	Military Service	Notes:	Active and Reserves
Finland	1 year mandatory military or civilian service (i.e. coast guard) for men; voluntary for women	Refusal - 173 days in prison 2011 fig show some 80% of men under 30 had served	22,000 345,000
Israel	2 yr 8 mo for men over 18 for Jews, Druze, Circassians; Arabs are not required to serve but may volunteer to. Bedouins volunteer; often employed as trackers. 2 yr for women. Military or national social service.	Offers elite academic programs, particularly in the sciences, physics and math.	176,500 465,000
Denmark	Mandatory conscription for all men over 18. Service may be 4-12 months. Women may volunteer.	Conscription dates back to Viking era.	17,000 53,500
Sweden	Sweden had mandatory conscription between 1901-2010. Gender-neutral conscription to be reintroduced in 2018.	During height of Cold War, 85% of men were enlisted.	15,300 0
USA	“The Draft” was in place during 4 conflicts – American Civil War, WWI, WWII, and Cold War (inc Korean and Vietnam)	All men over the age of 18 must register with Selective Service System so they could be called up if needed.	1,492,200 843,750
Canada	Voluntary service.		66,000 30,950

FIDS and the USA have more competitive trading networks. The FIDS have sea freight access; the USA has 12,000 miles of cost-efficient inland waterways. Geographically smaller with population densely gathered on coastal plains, the FIDS are natural industrial clusters with milder winters, making them more competitive than Canada. Milder weather and concentrated population means reduced overhead and GHGs for transportation, heating, light, industrial power generation, road clearing, infrastructure maintenance.

	Summer	Winter
Finland - Helsinki	17°C (62°F) July	-6°C (22°F) (Feb)
Israel – Tel Aviv	26°C (79°F) July	13°C (55°F) (Jan)
Denmark	17°C (63°F) July	0°C (32°F) (Jan)
Sweden - Stockholm	18°C (64°F July	-3°C (27°F) (Jan)
USA	State-wide averages of annual temperatures range from a high of 70.7 degrees Fahrenheit (21.5 degrees Celsius) in Florida to a low of 26.6 °F (-3.0°C) in Alaska.	
Canada		
Ottawa	10.9 C	-15.3 C
Toronto	12.5 C	-10.5 C
Winnipeg	8.3 C	-22.8 C

Canadians bear a disproportionate cost for weather related disasters due to our sparse population and vast geography.

New Brunswick—winter 2017 Quebec ice storm—1998 Fort McMurray wildfire—2016

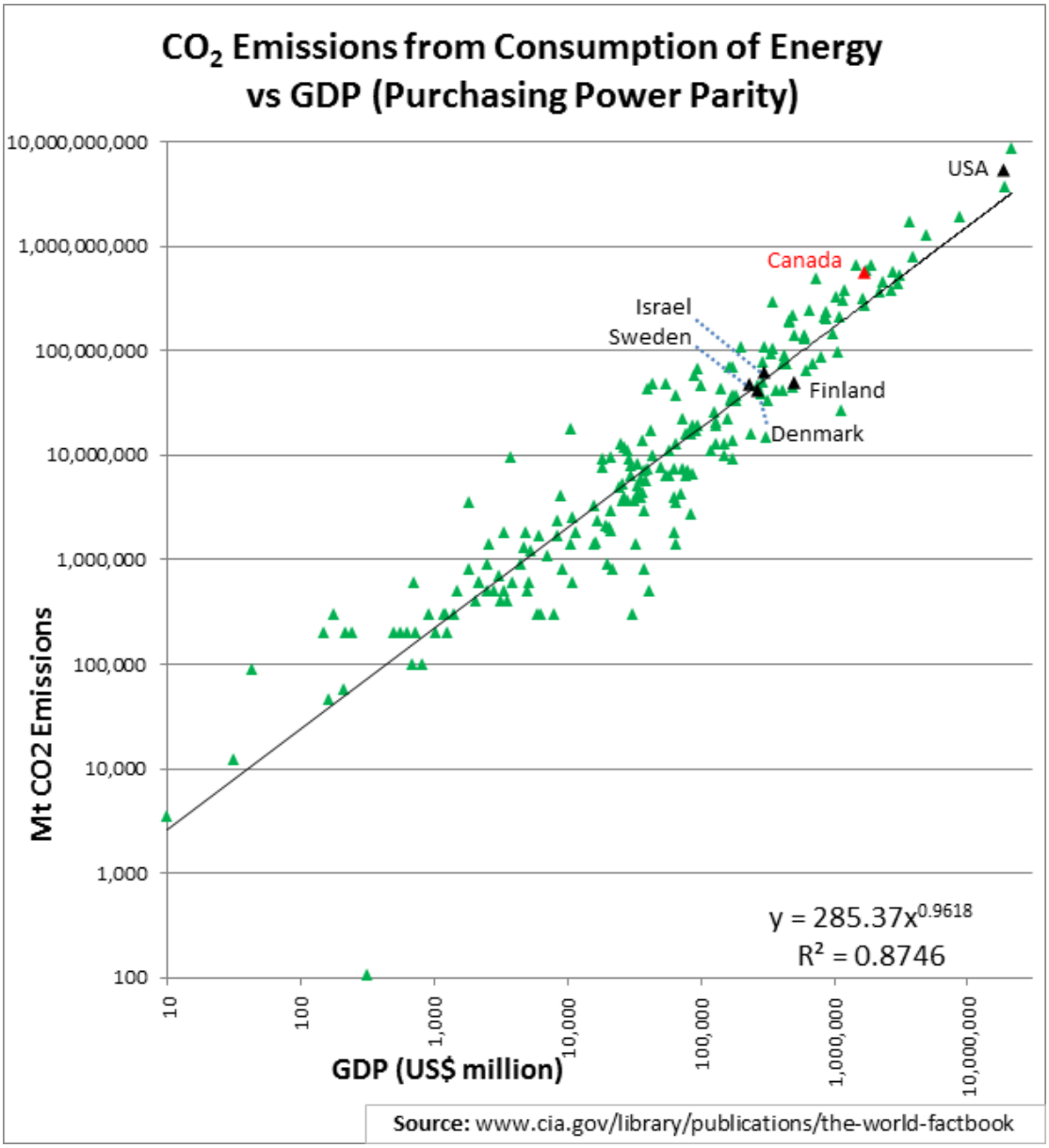
CANADA'S EMISSIONS IN CONTEXT

Canada is often denigrated as a large emitter, and this often forms the rationale for a push for 'cleantech' industries and carbon taxes. Let us examine Canada in context, and remembering Canada's vast geography, long, dark winters, often with periods of extreme cold and deep snow, and the fact that we are an exporter of all resources to the world. It appears that many tiny islands are much larger emitters of GHGs than Canada on a GDP per capita basis.

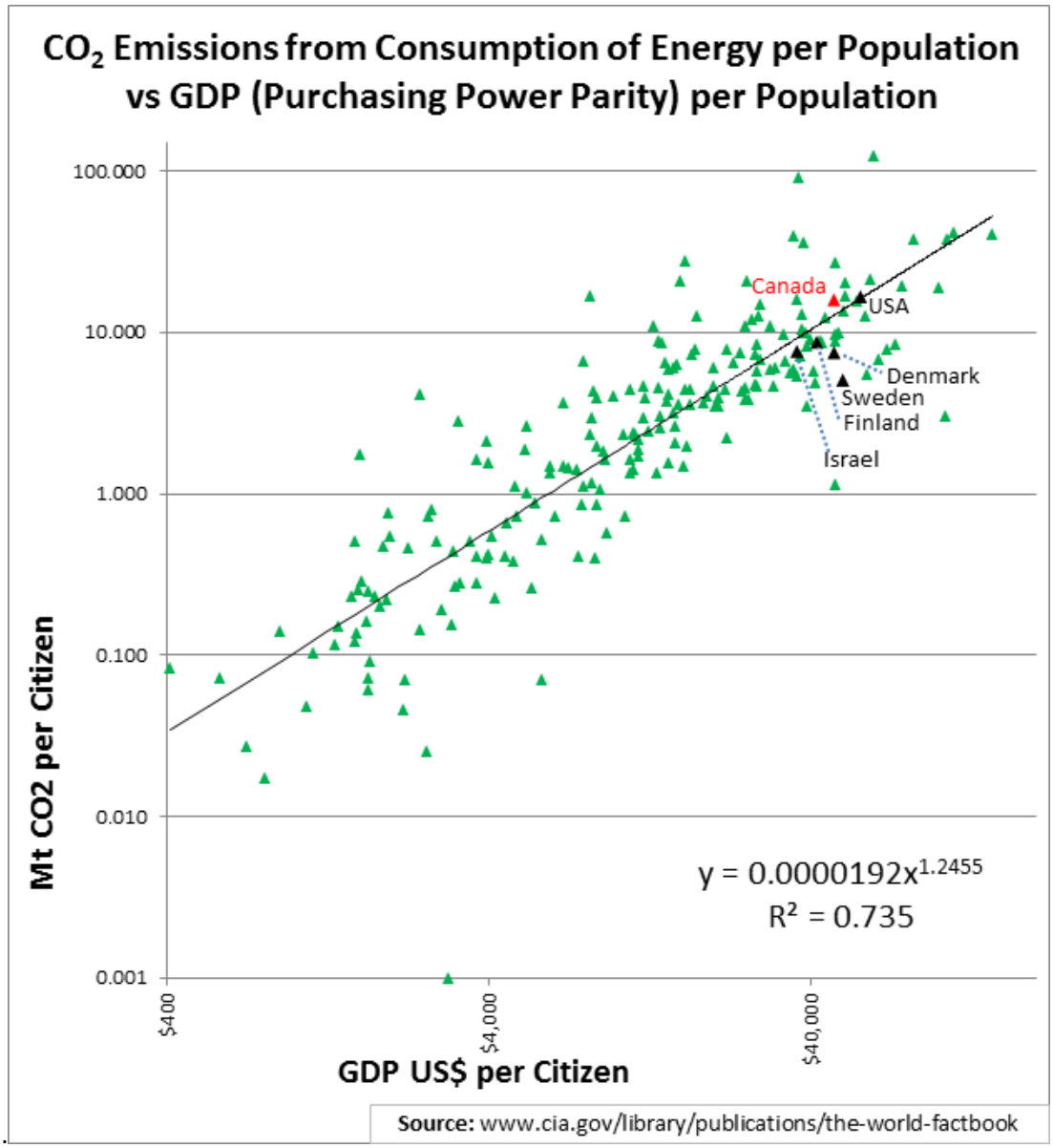
	GDP US$ per Citizen	Mt CO_2 Emissions	Mt CO_2 per Citizen
Gibraltar	$63,080	3,600,000	122.75
Virgin Islands	$36,833	9,400,000	91.31
United Arab Emirates	$112,560	245,000,000	41.33
Qatar	$148,121	92,000,000	40.74
Trinidad and Tobago	$35,699	48,000,000	39.33
Kuwait	$106,291	107,000,000	37.77
Singapore	$84,214	216,000,000	37.36
Saint Pierre and Miquelon	$38,481	200,000	35.75
Montenegro	$16,460	18,000,000	27.93
Bahrain	$48,132	37,000,000	26.83
Saudi Arabia	$61,470	594,000,000	21.09
Cook Islands	$25,544	200,000	20.93
Nauru	$15,723	200,000	20.85
Oman	$51,591	69,000,000	20.56
Brunei	$77,253	8,400,000	19.24
Luxembourg	$100,877	11,000,000	18.89
Australia	$51,712	385,000,000	16.74
Montserrat	$8,312	88,010	16.71
United States	$57,285	5,402,000,000	16.67
Canada	**$47,338**	**564,000,000**	**15.95**
Faroe Islands	$36,289	800,000	15.86
Falkland Islands	$56,124	45,570	15.55
Seychelles	$27,987	1,400,000	15.02

Source data: CIA Factbook

The following chart shows that CO_2 emissions have an 87% correlation to the GDP of a nation. The more money a country makes the more emissions. The equation is the "model" one can use to predict the emissions of a country if you know the GDP. Like all models the flaw is that you cannot use this to predict the future, a country can become poorer and still increase its emissions.



Then we have CO_2 emissions/population vs GDP/population. The interesting thing here is that some places with relatively low emissions pop up to the top and huge emitters like China drop below Canada (due to their billion-person population base).



Clearly, the cleantech success stories are also substantial users of energy and proportionately have high emissions.

SOCIAL COHESION

Unlike the FIDS which share common linguistic roots and cultures, or Israel where historic Judaism and Jewish identity are strong unifying drivers, or the USA's great melting pot, Canada is a mosaic. This offers strengths and weaknesses. In addition to the segments below, Canada has more than 600 First Nations. In British Columbia, some ~200 distinct First Nations claim territorial rights to more than 135% of the land.

Country	Religions	Population
Finland (2014 est.)	Lutheran 73.8%, Orthodox 1.1%, other or none 25.1%	5,498,211
Israel (2015 est.)	Jewish 74.8%, Muslim 17.6%, Christian 2%, Druze 1.6%, other 4%	8,174,527
Denmark (2012 est.)	Evangelical Lutheran (official) 80%, Muslim 4%, other (denominations of less than 1% each, includes Roman Catholic, Jehovah's Witness, Serbian Orthodox Christian, Jewish, Baptist,Buddhist) 16%	5,593,785
Sweden	Lutheran 87%, other (includes Roman Catholic, Orthodox, Baptist, Muslim, Jewish, and Buddhist) 13%	9,880,604
USA (2014 est.)	Protestant 46.5%, Roman Catholic 20.8%, Mormon 1.6%, Jehovah's Witness 0.8%, other Christian 0.9%, Jewish 1.9%, Muslim 0.9%, Buddhist 0.7%, Hindu 0.7%, other 1.8%, unaffiliated 22.8%, don't know/refused 0.6%	323,995,528
Canada (2011 est.)	Catholic 39% (includes Roman Catholic 38.8%, other Catholic .2%), Protestant 20.3% (includes United Church 6.1%, Anglican 5%, Baptist 1.9%, Lutheran 1.5%, Pentecostal 1.5%, Presbyterian 1.4%, other Protestant 2.9%), Orthodox 1.6%, other Christian 6.3%, Muslim 3.2%, Hindu 1.5%, Sikh 1.4%, Buddhist 1.1%, Jewish 1%, other 0.6%, none 23.9%	35,362,905

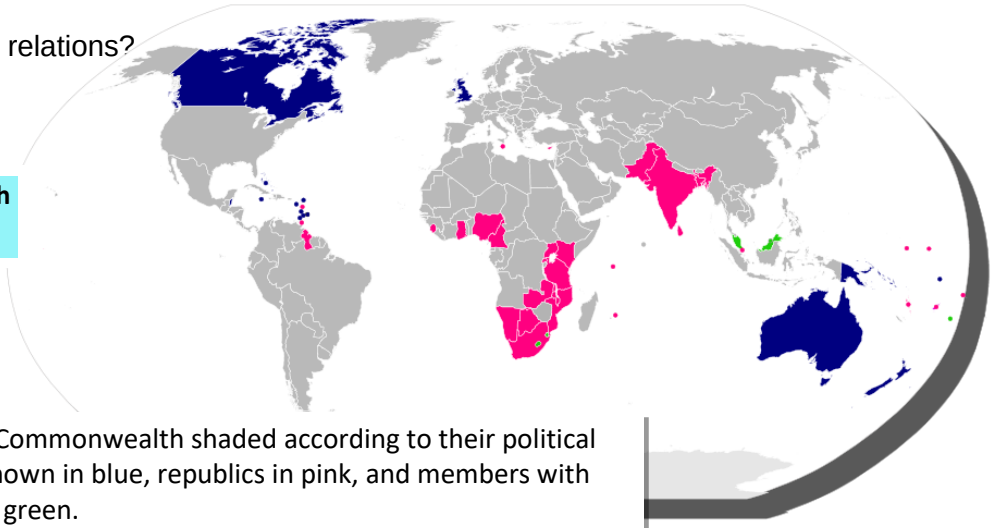
CANADA – THE COMMONWEALTH AND LA FRANCOPHONIE

Canada is a member of the British Commonwealth and *'la francophonie'* - rooted in colonial empires. Are there competing interests? For instance, Quebec and New Brunswick have full voting status in *la francophonie*, equal to Canada. The Cooperative Bank of the UK Commonwealth has reportedly funded First Nations groups to campaign against the oil sands.

How are we leveraging these relations?

Do they conflict?

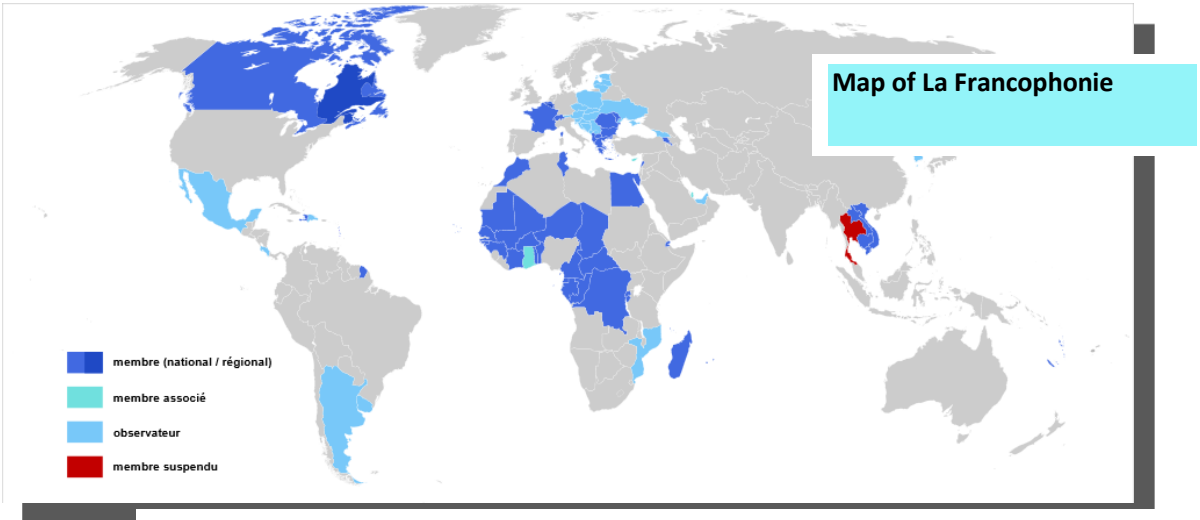
Map of British Commonwealth



52 Member States. Members of the Commonwealth shaded according to their political status. Commonwealth realms are shown in blue, republics in pink, and members with their own monarchy are displayed in green.

By Commonwealth_realms_map.svg: ApplysenseCommonwealth_republics.PNG: Original uploader was Lholden at en.wikipediaLater version(s) were uploaded by Hoshie at en.wikipedia.derivative work: Begoon - This file was derived from:Commonwealth realms map.svg:Commonwealth republics.PNG:and per this request at en.wp Map workshop:http://en.wikipedia.org/w/index.php?title=Wikipedia:Graphics_Lab/Map_workshop&diff=569823681&oldid=569688435#Commonwealth_of_Nations_member_status (permalink...), CC BY-SA 3.0, https://commons.wikimedia.org/w/index.php?curid=27843754

Map of La Francophonie



By Bourrichon - Mise à jour de Image:Map-Francophonie organisation 2005.png (Yug) sur le fond File:BlankMap-World6, compact.svg (domaine public), Public Domain, https://commons.wikimedia.org/w/index.php?curid=5046582

IN SUMMARY

In responding to Smart Prosperity's "Accelerating Clean Innovation in Canada" we have tried to present some of the crucial factors that differentiate the competitive advantages of the referenced tiny 'cleantech' national success stories in the FIDS, with some of the challenges faced by Canada.

Based on the historic, often spectacular failure of cleantech, particularly in the America where 'go big or go home' combined with wishful thinking seems to inspire large subsidies, and catastrophic outcomes, **we cannot recommend an acceleration in clean innovation.**

Rather, if Canada is to succeed, we must focus on opening access to world markets for products from our existing **Supercluster of oil/gas/oil sands**, the known product that is in demand now and will be for the foreseeable future.

We must leverage our historic connections.

It seems we should focus on upgrading our military and encouraging our youth to join so as to enhance a sense of unity and develop means of leading edge tech transfer.

Clearly our ports are a crucial factor in global success. Prince Rupert is an uncut jewel hampered by regulation and activists.

As evidenced by the adjacent list of subsidized cleantech failures in the sidebar *"Low-Carbon Catastrophes"* and in Appendix III we do not need to further subsidize ideas. In Appendix II, we offer a review of Israel's cleantech success.

As Joseph Dear, past CIO of CalPERS said: ***"Just because it's a good idea doesn't mean it's a good investment."***

It is our opinion that Smart Prosperity Institute's brief was not based on adequate market information and would be misleading to the public, investors and policymakers. We have tried to present a more comprehensive context in this brief response.

Low-Carbon Catastrophes

Evergreen Solar ($25 million)*
SpectraWatt ($500,000)*
Solyndra ($535 million)*
Beacon Power ($43 million)*
Nevada Geothermal ($98.5 million)
SunPower ($1.2 billion)
First Solar ($1.46 billion)
Babcock and Brown ($178 million)
EnerDel's subsidiary Ener1 ($118.5 million)*
Amonix ($5.9 million)
Fisker Automotive ($529 million)
Abound Solar ($400 million)*
A123 Systems ($279 million)*
Willard and Kelsey Solar Group ($700,981)*
Johnson Controls ($299 million)
Brightsource ($1.6 billion)
ECOtality ($126.2 million)
Raser Technologies ($33 million)*
Energy Conversion Devices ($13.3 million)*
Mountain Plaza, Inc. ($2 million)*
Olsen's Crop Service and Olsen's Mills Acquisition Company ($10 million)*
Range Fuels ($80 million)*
Thompson River Power ($6.5 million)*
Stirling Energy Systems ($7 million)*
Azure Dynamics ($5.4 million)*
GreenVolts ($500,000)
Vestas ($50 million)
LG Chem's subsidiary Compact Power ($151 million)
Nordic Windpower ($16 million)*
Navistar ($39 million)
Satcon ($3 million)*
Konarka Technologies Inc. ($20 million)*
Mascoma Corp. ($100 million)
*Denotes companies that have filed for bankruptcy. *Amounts shown are monies offered, not what was received or spent. Does not include state, local or federal tax credits or subsidies, which would make the sums higher.*
http://dailysignal.com/2012/10/18/president-obamas-taxpayer-backed-green-energy-failures/

APPENDIX I – OAK FOUNDATION

Carbon trading to reduce global CO^2 emissions

If the world's current greenhouse gas (GHG) emissions and growth trends continue, the planet could warm by between 4°C and 6°C by 2100. Scientists agree that this could have devastating impacts: the inundation of coastal cities, massive crop failures, droughts and heat waves.

Market mechanisms that encourage fewer GHG emissions are proving successful at reducing global warming pollution. For example, a "cap and trade" system imposes a cap, or limit, on the total carbon dioxide emissions a region or country can produce each year. Permits allowing for the production of GHG emissions can be traded within the system, so that those who find it easy to reduce their emissions can sell excess permits to those who find it more difficult or expensive to cut back. In this way, global warming pollution is reduced while economic growth is generated. This rewards industries or sectors that pollute less, and penalises those that pollute more.

Oak Foundation has supported the work of many groups in North America and Europe to establish two cap and trade systems, which have seen varying degrees of success. The European Trading System (ETS), the cornerstone of the EU's efforts to combat climate change, regulates emissions from power plants, energy-intensive industries and commercial airlines – altogether amounting to about 45 per cent of Europe's GHG emissions. However, the system is currently selling too many permits, so emissions are not falling fast enough, and the price of each tonne of pollution is too low. There are efforts underway to reform this – if successful, the ETS will reduce European emissions to about 20 per cent below 2005 levels by 2020.

In 2009 the US Northeastern States passed the Regional Greenhouse Gas Initiative (RGGI). Unlike the ETS, the RGGI only regulates emissions from the power sector. Sales of permits have generated USD 1.35 billion; this money has been reinvested in renewable energy, in energy efficiency and in helping low-income consumers pay their energy bills. The RGGI has also been successful in terms of reducing GHG emissions – overall, emissions fell from 188 million tonnes of global warming pollution in 2005 to 92 million tonnes in 2012. On top of this, RGGI has helped the region move away from coal and oil to natural gas and renewable energy and to focus on increasing the efficiency of buildings and transportation.

 http://www.oakfnd.org/node/1293

As article originally appeared on Oak Foundation website.

APPENDIX II- ISRAEL: CASE STUDY OF THE "START-UP NATION"

Israel is an astonishing success model in terms of all technologies, but particularly many 'cleantech' applications. The source of these comes surprisingly from the lack of natural resources. Israeli ingenuity has turned its 'have not' status of minerals, fresh water, geography and battered global reputation into the opposite. Some examples include:

- Leader in water desalination, drip irrigation technology, effluent management
- Leader in hi-tech – "Silicon Wadi" (several)
- Leader in industrial milling blades and gas/chemical couplers
- Leader in tech transfer from university academia
- Leader in dairy farm operations, especially in hot, arid locations
- Leader in biotech and pharmaceuticals
- Leader in aerospace and satellite communications technology
- Israel works a 5 ½-6 day week and starts the week on Sunday

Israel is a tiny country with a bustling population of some ~8 million people, that would fit into Alberta about 34 times. The distance of the country top to bottom is about the same as the distance between Edmonton and Calgary in Alberta. Most of the south half of the country is sparsely populated desert, meaning there is a dense population cluster in the northern half along a narrow geographic strip of land on the coastal plain. Though traffic congestion is a problem, public transit is excellent in urban centers. The train and express bus between the business center of Tel Aviv and Haifa is about 1 hour by train, a bit longer by bus.

Hi-tech clusters – known as "Silicon Wadi" (wadi=valley) exist in Ra'anana (just north of Tel Aviv), Haifa "MATAM", Yokneam, Nazareth, Jerusalem and more. Motorola was the first US company to set up in Israel and Intel followed. Ironically, the embargos against Israel forced it to develop its own resources and strengths, ultimately turning blockades into economic drivers of innovation.

Israel's official languages are Hebrew and Arabic but business is done in English, or any of many dozens of languages spoken by residents. The country's technological and medical prowess skyrocketed in the years following the immigration of 100,000 Soviet Jews, most of whom held high degrees in physics, engineering and medicine.

Many hi-tech innovations have been developed on kibbutz. The kibbutz is a communal structure that dates back to the origins of modern day Israel where small groups of plucky pioneers set-up cooperative faming operations. Over the years, most kibbutzim have developed from agricultural enterprises to hi-tech operations like Kibbutz Merom Golan's Bental Industries,

designer of high-precision brush and brushless motors, Arkal Spin-Kleen irrigation drip technology of Kibbutz Amiad, to name a few. Hi-tech was integrated into traditional dairy farming, moving Israel into the position of world leader for dairy herd management, especially in arid lands.

Unique Cultural Aspects of Israel

There is a strong unifying common sense of purpose in the Israeli population, an inherent optimism and a willingness to argue (an anathema in Canada). Israelis are exceptionally blunt and direct – political correctness does not cloud business decision making for the most part.

Israelis are inherently entrepreneurial. Rather than trying to create 'the whole' of something, an Israeli entrepreneur will often look for a suitable joint venture or strategic alliance with 'the other part' so as to get to market as quickly as possible.

Some brilliant biotech innovations have also come from the military – such as ultrasound innovations that transfer the precision targeting of jet fighters to precision targeting of ultrasound or lasers for brain surgery or other medical applications.

The Chief Scientist office has established several business incubators where promising ideas of qualified entrepreneurs/scientists are given a fixed budget, a small work bay and relevant equipment for prototype development. The entrepreneur is paired with a project manager who analyzes and prepares a business plan for market.

But 'ordinary' people are deeply engaged in innovation with no government support as well.

Universities have actively engaged in marketing research findings, employing marketing people or application engineers to assess suitable markets, and then actively presenting the ideas to potential buyers/licensees/investors.

Despite linguistic and cultural differences, the Israeli Arab population has been integral to mainstream society since modern Israel's inception with judges, doctors, nurses, lawyers, politicians and diplomats all playing key roles in Israeli culture. More recently there has been a push to give a hand up to the burgeoning Israeli Arab hi-tech sectors and youth with mentoring by elite computer programmers and technicians. https://www.israel21c.org/high-tech-elites-to-nurture-arab-israeli-startups/

Unique Benefits of Kibbutz Industries

As a collective, the Kibbutz provides modest housing and food services for all members. Many members are employed in the on-kibbutz factory. This means employees can walk, bike or take a golf cart to work in minutes. Wages have been lower than private industry, though this is changing. Israel has some 360 days of sun per year so there are nominal heating costs, though

summer cooling costs can be high. Lunch is provided onsite at the kibbutz dining hall at a reasonable price.

Non-Kibbutz Employment

People who work at regular companies not on kibbutz may be part of the company transit fleet that picks up and delivers employees near their home every day. This is partly to reduce congestion and also to benefit the employees with lower costs for travel. It is uncommon that an Israeli company would hire people who live outside a 40-km radius of the workplace. Israelis work hard through a 6-day week, starting their new work week on Sunday, after the Jewish Shabbat (larger corporations work ½ day Friday). Though hours are long, the community purpose is strong and employees will leave during work hours for important family events like Brit Milah or burials, no questions asked. The sense of community at work is strong and in most medium and large companies the firm is expected to treat all employees to special event weekends or week long travel as a group (most prevalent on kibbutz but also part of many corporations).

Many Israeli Jews have immigrated from other countries and speak two or three languages. These language skills are put to good use in business.

Ports

Like other small countries noted by Smart Prosperity as cleantech leaders, Israel has three world-class sea ports – Eilat in the south, Ashdod, just south of Tel Aviv and Haifa in the north.

Space exploration is expensive, so Israel developed two cost-effective nano-satellites, **each the size of a milk carton**, just launched on Feb. 15, 2017. One of the research labs on board will be controlled by researchers' smart phones.

http://www.israelnationalnews.com/News/News.aspx/225027

Israel launches nano-satellite research unit 10x10x30 centimeters (4x4x12 inches)

This first-hand anecdotal account provided by Friends of Science Society's Communications Manager, Michelle Stirling, who worked in Israel in marcom for a decade. "Start-up Nation" *is worth a read.*

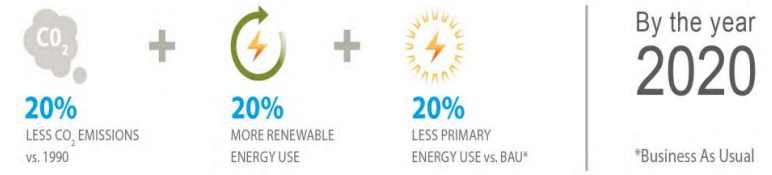
APPENDIX III -CASE STUDIES in Climate Change Policy Failures

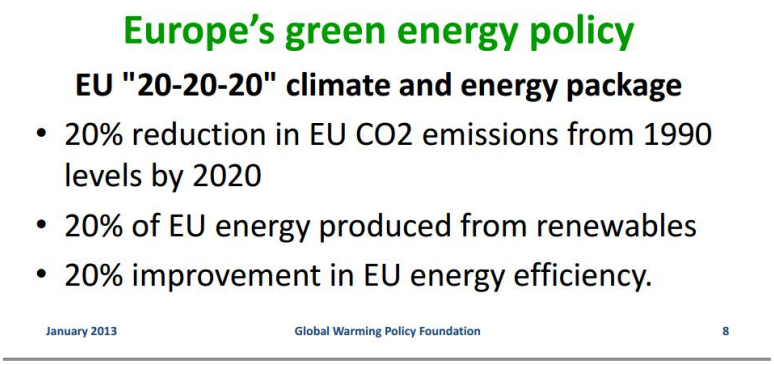
Excerpts of our previous report "Reality vs Climate Change Uncertainties"

Dr. Benny Peiser on "To Heat or Eat: Europe's Failed Climate Policy"

Dr. Peiser is a social anthropologist and head of the Global Warming Policy Foundation of the UK. In May 2013, he was guest speaker at Friends of Science 11th Annual Luncheon. http://www.friendsofscience.org/index.php?id=653

Dr. Peiser explained that in 2000 the EU had committed itself to the Lisbon Accord and stringent climate change reduction policies. Dr. Peiser told how Europe's policies to promote inefficient wind and solar power, and impose carbon taxes and emissions trading have caused soaring energy prices, economic decline and plunged millions of families into fuel poverty.





Far from sparking prosperity and innovation, these policies (even prior to the 2008 recession) led to widespread unemployment. As of 2013, some 26.5 million men and women were unemployed in the EU-27. Millions of vulnerable people were forced into 'heat-or-eat' poverty. During the winter of 2013 thousands died due to sudden cold snaps. The UK was almost left entirely without power and heat as wind turbine farms produced nothing on very cold days; only a last-minute arrival of LNG tankers from the Gulf saved the grid. A retired coal-fired power plant had to be restarted.

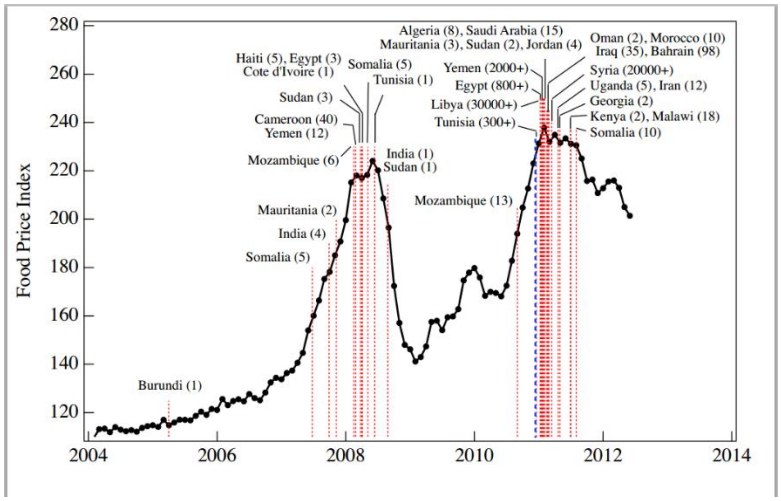
The following table assesses whether the objective of the program and related principles were met and outlines unintended consequences.

Europe's Green Policy			
Principles	Objective met? Yes.	Objective not met. No.	Comment
Environmentally effective		X	No environmental benefits. Industry outsourced emissions to countries with less stringent regulations, lower power prices, or better tax advantages. This led to more unemployment
Cost-effective		X	Phenomenally expensive. Polluter did not really pay – it was all passed on to consumers.
Administratively feasible	X		Complex set-up; now very difficult to disentangle or dismantle.
Equitable		X	The poor and middle class were pushed into heat-or-eat poverty; rich speculators on the carbon trail got much richer. Shareholders in conventional power lost value.
Politically feasible	X		People were afraid of global warming; speculators capitalized on benefits/incentives to renewable providers.

US EPA Food-to-Fuel Policy

According to a recent study by New England Complex Systems Institute (NECSI) one of the main drivers of global unrest is attributed to the US EPA food-to-fuel ethanol policies that have removed massive food corn stocks from global food/cattle feed/food additive markets. NECsi.edu/publications/food/

This has been exacerbated by commodities speculators.



The NECSI report, predicting imminent, catastrophic, civil unrest was delivered to the US government just 4 days before Mohamed Bouazizi immolated himself in Tunisia, and set off civil revolt across the Middle East. Based on calculations of the Food Price Index vis a vis local economies, NECSI could accurately chart upcoming revolts. For people living on a $1 a day in countries with ~40% unemployment – even an incremental price rise is a problem; prices skyrocketed.

It was not an "Arab Spring" but rather an "American Climate Policy Genocide."

Meanwhile in the US, corn production to ethanol does not result in any net energy, uses water and has been accused of contaminating river ways with over-use of agricultural chemicals. In one YouTube interview, the US Corn Lobby is described as being so powerful that "even Big Oil runs" when they enter the room. Noted food security expert Peter Timmer says the combined ethanol/commodities trading policies will be difficult or impossible to untangle as so many vested interests are now tied up in it and so much money.

The EPA is not required to consider any implications of its policies outside the USA.

The following table assesses whether the objective of the program and related principles were met and outlines unintended consequences.

US EPA Food-to-fuel Policy			
Principle	Objective met? Yes.	Objective not met. No.	Comment
Environmentally effective		X	Ethanol production is wasting valuable food crop land, water and agrichemicals while diverting megatons of food from a hungry world for **no net energy benefit**, and much land/water damage. Likewise, ethanol is damaging to car motors, meaning they must be replaced sooner or the car junk – more wasted resources.
Cost-effective		X	US taxpayers are subsidizing corn producers; the world is paying for civil unrest world-wide, much of it related to these policies. The EU is facing a crisis of unheard of proportion as asylum seekers flood southern Europe.
Administratively feasible	X		Apparently.
Equitable		X	No. The poorest and most vulnerable are being decimated and killed. Western soldiers are being sent into conflict.
Politically feasible	X		Powerful lobbies are driving the continuation of this failed and tragic climate change policy.

EU Carbon Trading Market

The European Union Emissions Trading System (EU ETS)[2] began in 2005. This is a cap-and-trade system wherein: *"the EU ETS covers more than 11,000 power stations and industrial plants in 31 countries, as well as airlines."*

"A 'cap', or limit, is set on the total amount of certain greenhouse gases that can be emitted by the factories, power plants and other installations in the system. The cap is reduced over time so that total emissions fall.

In 2020, emissions from sectors covered by the EU ETS will be 21% lower than in 2005. By 2030, the Commission proposes, they would be 43% lower.

Within the cap, companies receive or buy emission allowances which they can trade with one another as needed. They can also buy limited amounts of international credits from emission-saving projects around the world. The limit on the total number of allowances available ensures that they have a value.

After each year a company must surrender enough allowances to cover all its emissions, otherwise heavy fines are imposed.

The price of carbon trades reached an all-time high in 2008 of 34.90 euro, but collapsed to 3.00 euro and remains about 7.00 euro per tonne CO2e (Carbon dioxide equivalent). During the peak period of trading, Interpol had to shut down the EU ETS several times for fraud and corruption.

INTERPOL'S "Guide to Carbon Trading Crime"[3] outlines how the intangible nature of carbon makes it an ideal market for criminal activity. As Mark Schapiro described carbon trading in Harper's Magazine Feb. 2010 as *"…the absence of delivery of an invisible substance to no one."*

The lucrative nature of this elusive 'commodity' in a global market that is valued at USD 176 Billion (Interpol 2013) had led to diverse criminal acts such as computer hacking, theft of certificates and resale (leading to VAT losses to countries and low income taxpayers), laundering organized crime money. REDD Monitor reports various illegal activities related to forests and carbon trading.[4] "Reducing Emissions from Deforestation and Forest Degradation (REDD) is an effort to create a financial value for the carbon stored in forests, offering incentives for developing countries to reduce emissions from forested lands and invest in low-carbon paths to sustainable development."[5]

[2] http://ec.europa.eu/clima/policies/ets/index_en.htm
[3] http://www.interpol.int/en/News-and-media/News/2013/PR090/
[4] http://www.redd-monitor.org/2011/10/05/forest-carbon-cash-and-crime-new-report-from-global-witness/
[5] http://www.un-redd.org/aboutredd

The following table assesses whether the objective of the program and related principles were met and outlines unintended consequences.

EU Carbon Trading Market			
Principle	Objective met? Yes.	Objective not met. No.	Comment
Environmentally effective		X	INTERPOL has found that sometimes emissions were increased in order to make more money. Forests have been subject to illegal harvesting while also part of a carbon trade. At current rates, this carbon price is not a deterrent to a 'polluter.'
Cost-effective		X	USD 176 Billion in capital is presently diverted into trading on the lack of delivery of an invisible substance to no one. This could probably be put to more practical purposes in the tangible, value-added world.
Administratively feasible	X		Possibly created jobs in a non-valued added field.
Equitable		X	Consumers end up carrying the burden of 'polluter pays' carbon and cap-and-trade. This has led to widespread heat-or-eat poverty in the EU.
Politically feasible	X		The EU wanted to be a 'world leader' in climate change policy – instead this has been a fiasco where speculators and organized crime have prospered at the expense of taxpayers.

Ontario Coal Phase-out

In 2004, with much urging from a number of ENGOs and well-known eco-activists like David Suzuki, Ontario began an early phase-out of coal-fired power plants, while instituting a massive wind and solar regime.

The premise was that coal-fired power plants were causing fine particulate matter air pollution, responsible for asthma, other respiratory ailments and premature deaths. This was based on an Illness Cost of Air Pollution model which was tested using known health data and then the model was run in reverse (hind-casting) to see how closely it matched reality. The model greatly exaggerated results, ending up predicting that more people would die of air pollution related causes than died in total.

None-the-less, green ideology gripped Ontario and the plan proceeded.

Today, Ontario has the 'greenest' grid in Canada, partly due to its hydro and nuclear facilities. All coal-fired power plants have been phased-out. Power prices are rising and industrial power prices are the highest in North America.

The Ontario public are burdened with debt for their power system. Economist Ross McKitrick reviewed the Green Energy Act in a report for the Fraser Institute[6] and found that power prices are 10 times that of what they would have been had coal-fired power plants simply been better outfitted with emissions scrubbers; according to that study if the GEA proceeds as plans, prices will skyrocket 70 times over the simpler refit plan.

Wind power is often generated at night when there is little demand, but due to the power arrangements with wind producers, Ontarians pay wind producers for power that is sent outside of the province. "The Auditor General of Ontario estimates that the province has already lost close to $2 billion on surplus wind exports, and figures from the electricity grid operator show the ongoing losses are $200 million annually."

Thousands of rural residents have had their pastoral views ruined – and many have lost their health and property values due to wind turbines on or near their property. Numerous scandals have been exposed related to gas plant construction and cancellation deals.

The following table assesses whether the objective of the program and related principles were met and outlines unintended consequences.

Ontario Coal Phase-out			
Principle	Objective met? Yes.	Objective not met. No.	Comment
Environmentally effective		X	Asthma rates had been dropping for years; the Ontario Ministry of Environment said the smog was related to US pollution; Ministry of Health reports that asthma is more a socio-economic issue. There has been no benefit to the environment since natural gas peaking plants must ramp up to meet demand. The footings of cement and rebar for wind power are CO2 intensive. There is no net Return on Energy Investment from wind farms.
Cost-effective		X	
Administratively feasible	X		
Equitable		X	Thousands of people's lives have been ruined by turbines on or near their property; consumers are burdened with high power prices; future generations are saddled with debt.
Politically feasible	X		A combination of ENGO public campaigns to demarket coal based on health claims and climate-obsessed unions drove public agreement.

[6] http://www.fraserinstitute.org/research-news/news/display.aspx?id=19538

German Transition to Renewables

Germany, bastion of Stichtung Greenpeace, boldly took the global lead on green energy and soon found itself a leader in renewable power from wind and solar – but at what price?

German consumer power rates are now the highest in Europe.[7] Many industries have installed their own power generators rather than be subject to an unreliable power source on the grid that has cost some industries a fortune in damages to high precision equipment. Major industries have threatened to move offshore, taking jobs with them, so Germany has provided subsidies to them (which fall on consumers). Conventional power producer markets have been hit hard and many want to shut-down but because conventional thermal (coal/natural gas) power is required to back-up renewables, they have been ordered to remain in operation. Subsidies have been provided.

These cascading subsidies fall on the taxpayer.

Initially carbon prices were at 34.90 euro, but since this has fallen to about 7.00 euro, and since more thermal power is required to back-up the growing wind turbine farms, some 20+ new coal-fired power plants are being built in Germany.

The following table assesses whether the objective of the program and related principles were met and outlines unintended consequences.

German Transition to Renewables			
Principle	Objective met? Yes.	Objective not met. No.	Comment
Environmentally effective		X	When you add more wind and solar to a conventional grid, you need equivalent thermal back-up to manage the sudden variability of wind/solar supply. There has been no net benefit to the environment.
Cost-effective		X	Costs of this transition to renewables are pegged at $600 billion euro.
Administratively feasible	X		There are some 4000 different subsidies in place.
Equitable		X	The poor are especially disadvantaged, but all aspects of the socio-economic and industrial spectrum have been hit hard by these policies.
Politically feasible	X		Germany's powerful green movement made a significant push for these policies and had the political clout at the time to do it.

[7] http://www.spiegel.de/international/germany/high-costs-and-errors-of-german-transition-to-renewable-energy-a-920288.html

About

Friends of Science Society is an independent group of earth, atmospheric and solar scientists, professional engineers, professional geoscientists, economists and citizens who are celebrating its 15th year of offering climate science insights to the public and policy-makers.

After 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_2).

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