Calculating the real cost of ENERGY

We all love what **energy** brings to our life.

Light	Comfort	Power
Allowing for activities, night and the night.	Cool houses in summer, warm houses in winter.	Powering factories that make the goods we use.

Energy has **environmental and health costs** that are not calculated into what you pay at the pump or your utility bills. Costs like these are called **externalities**. Some of these externalities include:

So, how much does:

a litre of gasoline, a cubic metre of natural gas or a kilowatt of electricity

truly cost?

Here are recent examples of efforts to calculate externality costs. Keep in mind these following costs don't look at climate change impact and other environmental costs.

Health Costs

The Canadian Medical Association's 2008 study found health care costs resulting from exposure to air pollution released in:

$438 million in 2008

92,000 Emergency Visits

11,000 Hospital Admissions

21,000 Premature Deaths

152,000 Projection for 2031

18,000 Projection for 2031

38,000 Projection for 2031

While the health care costs due to air pollution are high, the total economic costs are an order of greater magnitude.

Total economic costs include:

- lost productivity
- health care costs
- quality of life
- loss of life.

These costs are expected to climb from

$8,000,000,000 in 2008

to

$250,000,000,000 by 2021

Motor Vehicle Costs

Transportation, which today relies almost exclusively on oil, accounts for **one-fifth** of Canadian energy demand.

Damages per vehicle-mile-traveled were remarkably similar among various transport modes (cars and buses/trucks). The cost ranges were:

1.2 cents to 1.7 cents/mile traveled

Transport Canada (1998) conducted a full cost investigation of transportation in Canada. For the base year (1996), they estimated the accumulated costs to be **$198 billion to $233 billion**.

Accidents	Air Pollution	Congestion	Noise
$32 billion - $35 billion	$14 billion - $112 billion	$8 billion - $28 billion	$3 billion - $39.5 billion

In terms of relative importance, the five largest social costs were:

Calculating Social Costs of Carbon

In 2010, a U.S. government working group estimated the global damages associated with the release of a tonne of CO_2 into the atmosphere, calling their estimate the Social Cost of Carbon (SCC). The group concluded that the contemporary SCC is roughly:

$21 per tonne of CO_2 emissions

At this cost, [illegible] global damages by country equaled:

United States	$120,000,000,000
Canada	$14,700,000,000

Based on this analysis the carbon costs of coal is more than double the private costs.

	Social Cost	Private Cost
Existing coal plants	8.8¢	3.2¢
New conventional coal plants	11.5¢	6.2¢

The analysis also suggests that between now and 2050 the global benefits of the emissions reductions would far outweigh the costs of a cap and trade system.

Costs vs Benefits of a cap-and-trade bill

Costs	$600 billion to $2 billion
Benefits	$5.1 billion to $7.7 billion

0 — 0.5 — 1 — 2 — 3

Levelized and Externality costs

Generation Type	Levelized Average Cost (2009 CAD$)	Average Externality Cost (2009 CAD$)	Total
Conventional Coal	9.48	8.54	18.02
Natural Gas Conventional Combustion Turbine	12.45	3.51	15.96
Nuclear	11.39	1.08	12.47
Hydro	8.64	0.43	9.07
Solar	21.07	1.02	22.09
Wind (onshore)	9.77	0.43	10.13
Biomass	11.25	3.59	14.84

It is important to note that these costs do not include carbon emissions costs, climate change impacts, decommissioning, waste disposal costs. If those costs were also considered then the relative costs of all electricity from renewable sources would be even stronger.

Total Costs Comparison of Energy

Total external costs externality costs on a comparable basis

Oil	$8.54/kWh
Coal	$12.19/kWh
Natural Gas	$3.51/kWh
Nuclear	$1.08/kWh
Hydro	$0.43/kWh
Wind	$0.43/kWh
Solar	$1.02/kWh
Biomass	$3.59/kWh

Calculating Subsidy Costs

A subsidy is usually defined as financial assistance granted by a government (aka the tax payers) to an enterprise regarded as being in the public interest.

Energy subsidies are provided by the government in order to:

- lower the cost of energy production;
- raise the price received by energy producers; or
- lower the price paid by energy consumers.

Fossil Fuel Subsidies

In Canada federal and provincial subsidies amount to

$2,800,000,000

per year to the fossil fuel sectors in:

Alberta

Newfoundland & Labrador

Saskatchewan

Of the $2,800,000,000...

49% is from federal subsidies = **$1.38 Billion**

73% Alberta specifically receives the majority of federal and provincial subsidies.

Of the total $2.8 billion in annual subsidies in the three provinces, the largest share is provided by the federal government ($1.38 billion in 2008) and the provincial government ($1.04 billion), while Saskatchewan provides $327 million and the governments of Newfoundland and Labrador provide $82 million each year.

It is estimated that by removing these subsidies there could be up to a

13% decline in CO2 emissions

Nuclear Subsidies in Canada

Between 1950 and 2000, Atomic Energy of Canada Limited received $16.6 billion in subsidies.

Nuclear reactor costs estimated at:

$4,000 per kilowatt

(does not include costs of accidents, clean up, waste disposal or plant decommissioning)

Compare that to...

Large scale wind	$1,200	per kilowatt
Natural gas plants	$1,000	per kilowatt

- Cost overruns for nuclear plants average 2.5 the budgeted amount.
- The Darlington plant in Ontario was budgeted at 3.4 billion. Cost 15 billion when it was completed in the 1980s.

Renewable Subsidies in Ontario

The Ontario FIT program sets a subsidized kWh price (between 7.7 for landfill gas; 11.5 for wind; solar non-rooftop 34.8 – 39.1 and solar rooftop 32.9 - 39.6, all in cents/kWh).

If these project run over budget or underperform, no additional public funds are provided.

7.5¢ – 13.5¢

+ price the consumer pays [illegible]

Ontario Renewable Energy Costs

Renewable Fuel	Project Size Transfer*	FIT Price (cents/kWh)
Solar (PV) (Rooftop)	≤ 10 kW	39.6
	>10 ≤ 100 kW	34.5
	>100 kW	32.9
Solar (PV) (Non-Rooftop)	≤ 10 kW	29.1
	>10 kW	28.8
On-Shore Wind	All sizes	11.5
Waterpower	All sizes	14.8
Renewable Biomass	All sizes	15.6
On-Farm Biogas	≤ 100 kW	26.5
	100 ≤ 250 kW	21
Biogas	All sizes	16.4
Landfill Gas	All sizes	7.7

Notes:
*http://fit.powerauthority.on.ca/fit-program/fit-program-pricing/fit-price-schedule
**Visit www.climatechangehub.org to access the Two Cents of Energy Research for more information and sources for the charts.

By accounting for the full social and environmental costs of energy, and identifying the numerous subsidies available to different energy providers, we get a clearer picture of the true costs of energy.

This allows for a more meaningful comparison of options, it also sets the stage for a discussion around energy subsidy reform.

As our long-term energy plans are currently being developed, the time to act is now to ensure all the necessary information on the total costs are factored into any decision making in order to ensure that the choices made by the public and governments are the most cost efficient and rational options available to present and future generation of Canadians.