

***Electric
Power
for BC***

National Averages

(Watts per person)

Country	Avg Watts/person	Country	Avg Watts/person
Iceland	5777	China	309
Liechtenstein	4092	India	140
Norway	2740	Bangladesh	40
Kuwait	2176	Nigeria	14
Bahrain	2069	Ethiopia	7
UAE	1848	Rwanda	4
Canada	1704	Somalia	3
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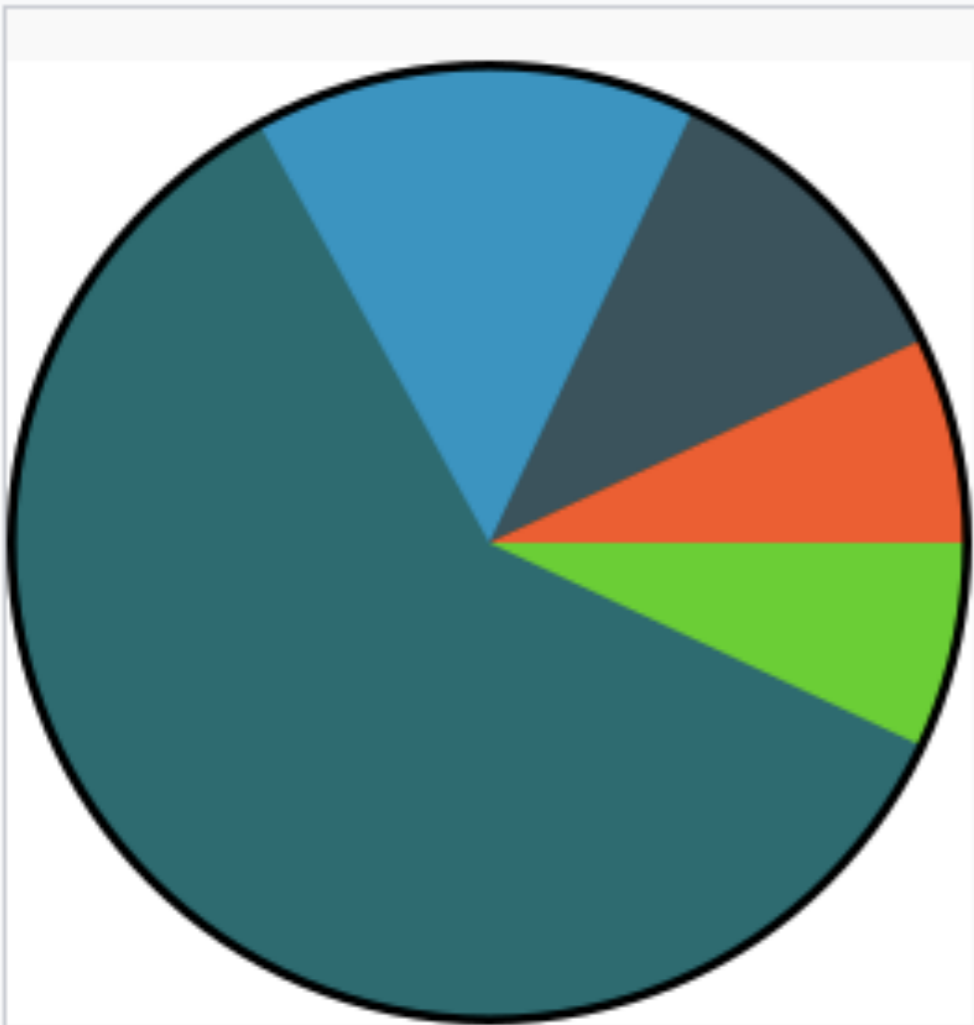
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⇒ **2.3 × 10¹² Watts** for 7.4 billion people

Canada

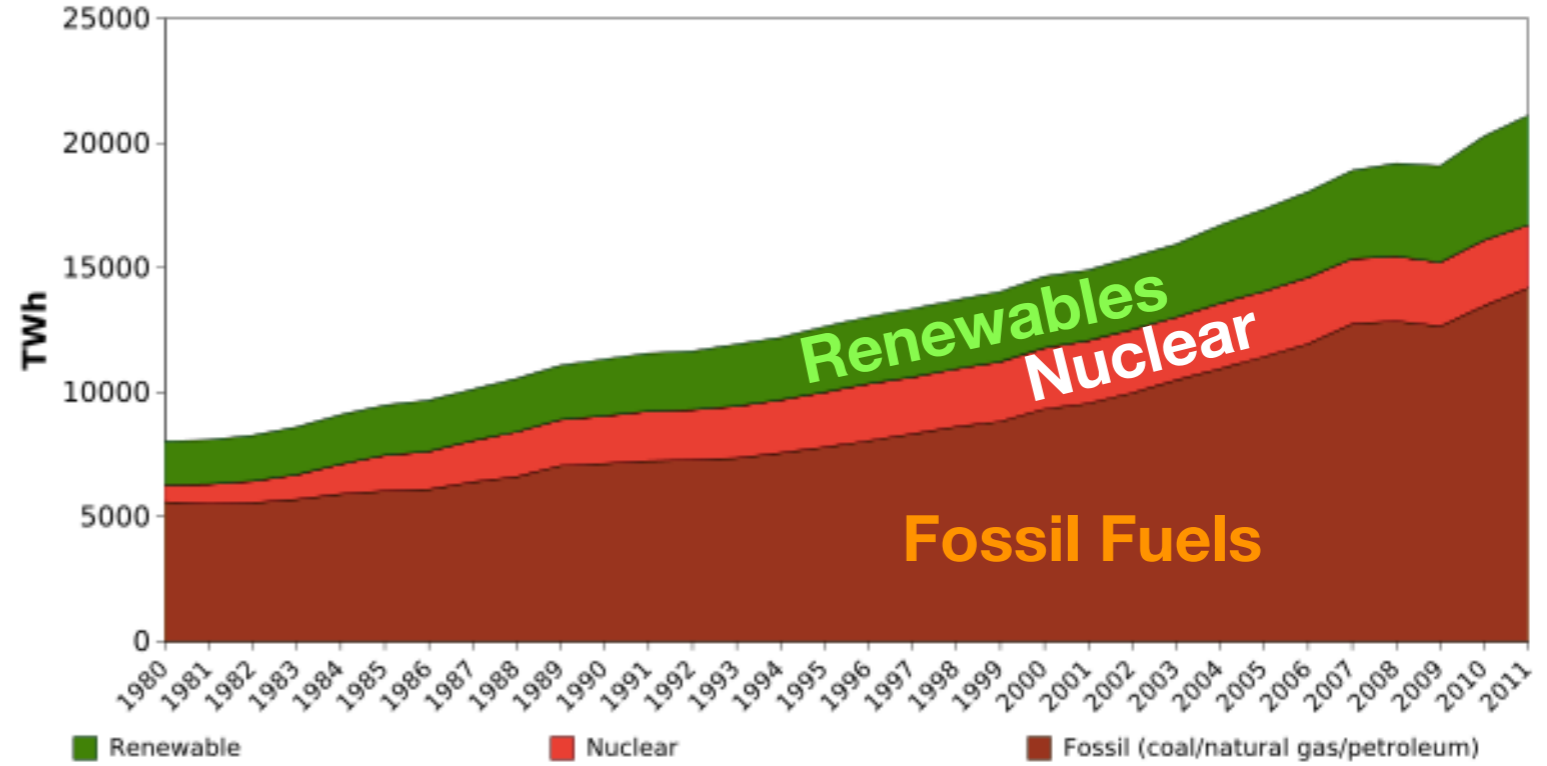
vs. World

Electricity generation by source in 2018^[1]



- Coal: 7 (7.0%)
- Natural gas, oil, and others: 11 (11.0%)
- Nuclear: 15 (15.0%)
- Hydro: 60 (60.0%)
- Non-hydro renewables: 7 (7.0%)

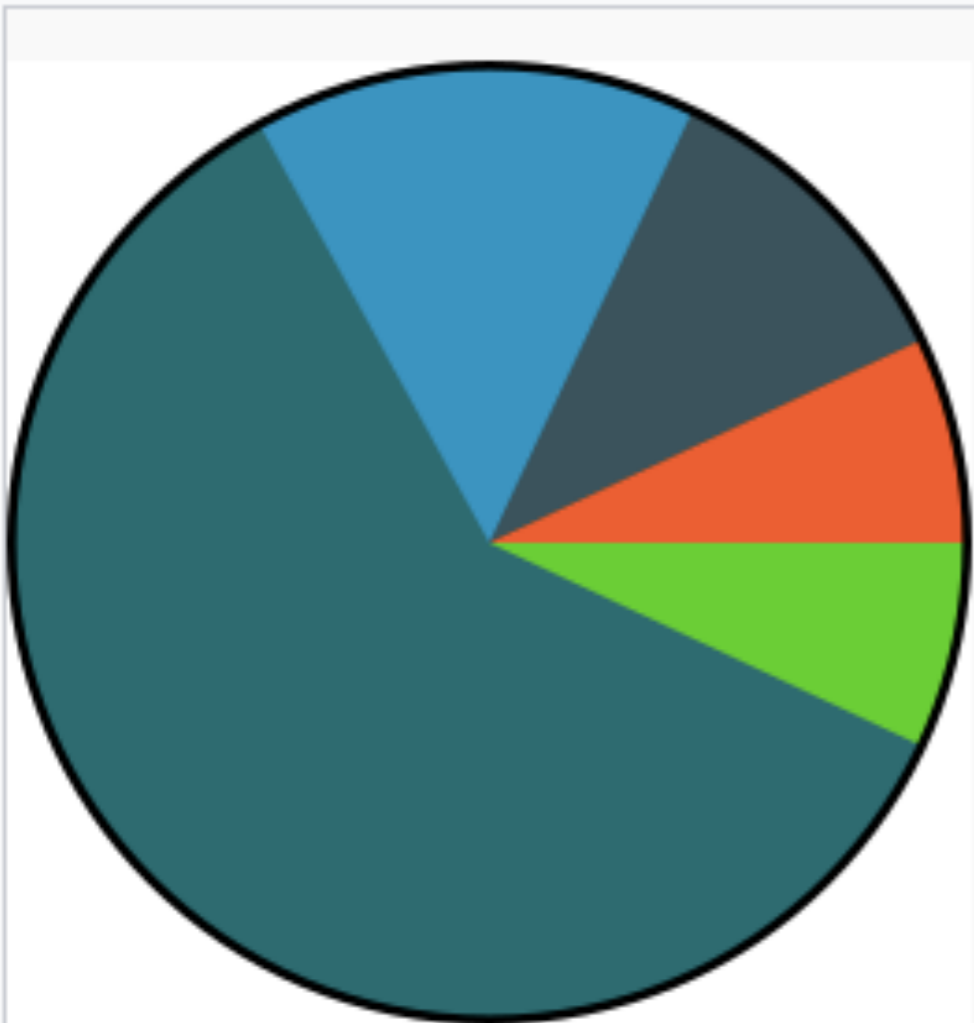
Annual Electricity Net Generation in the World



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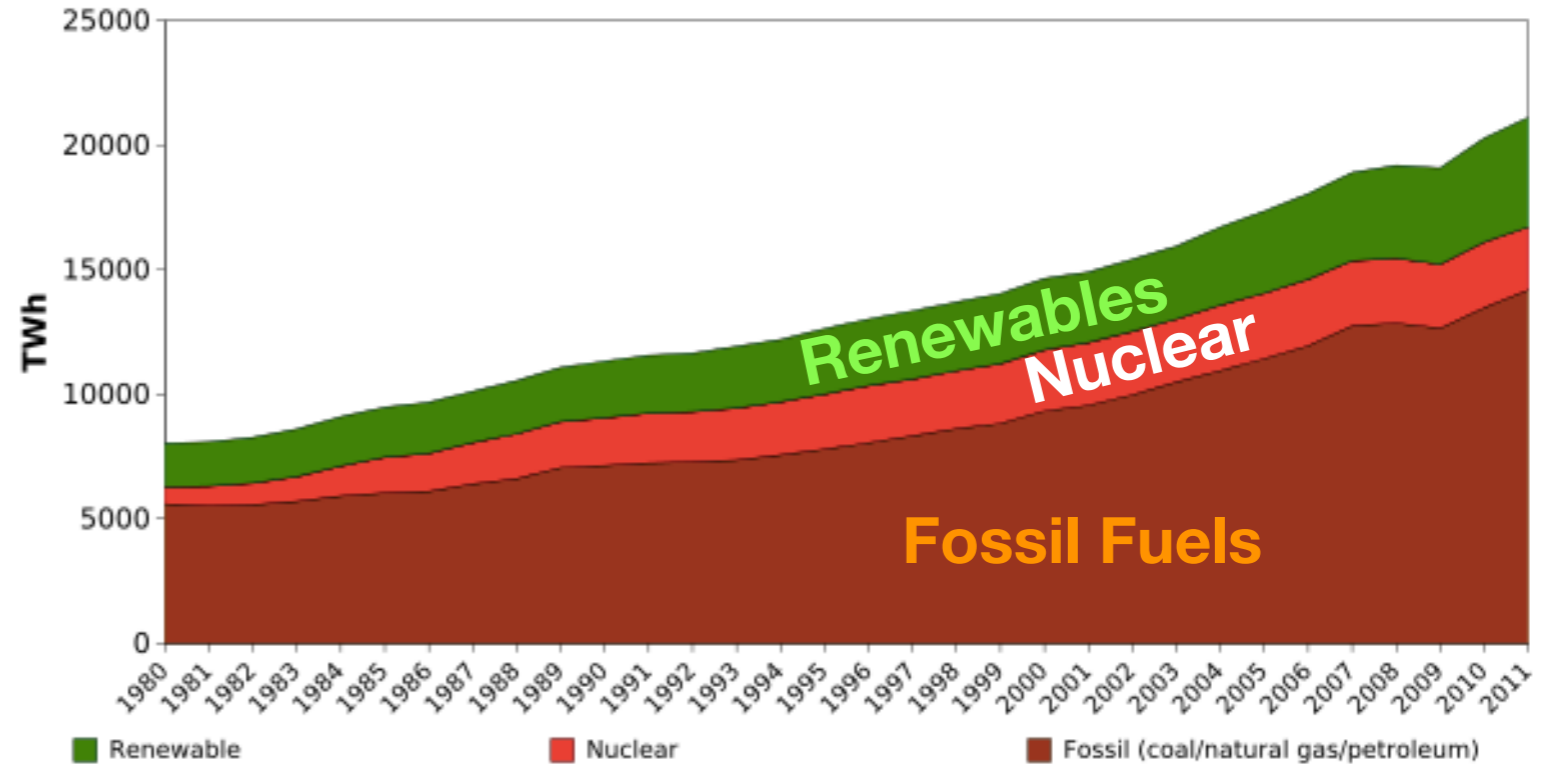
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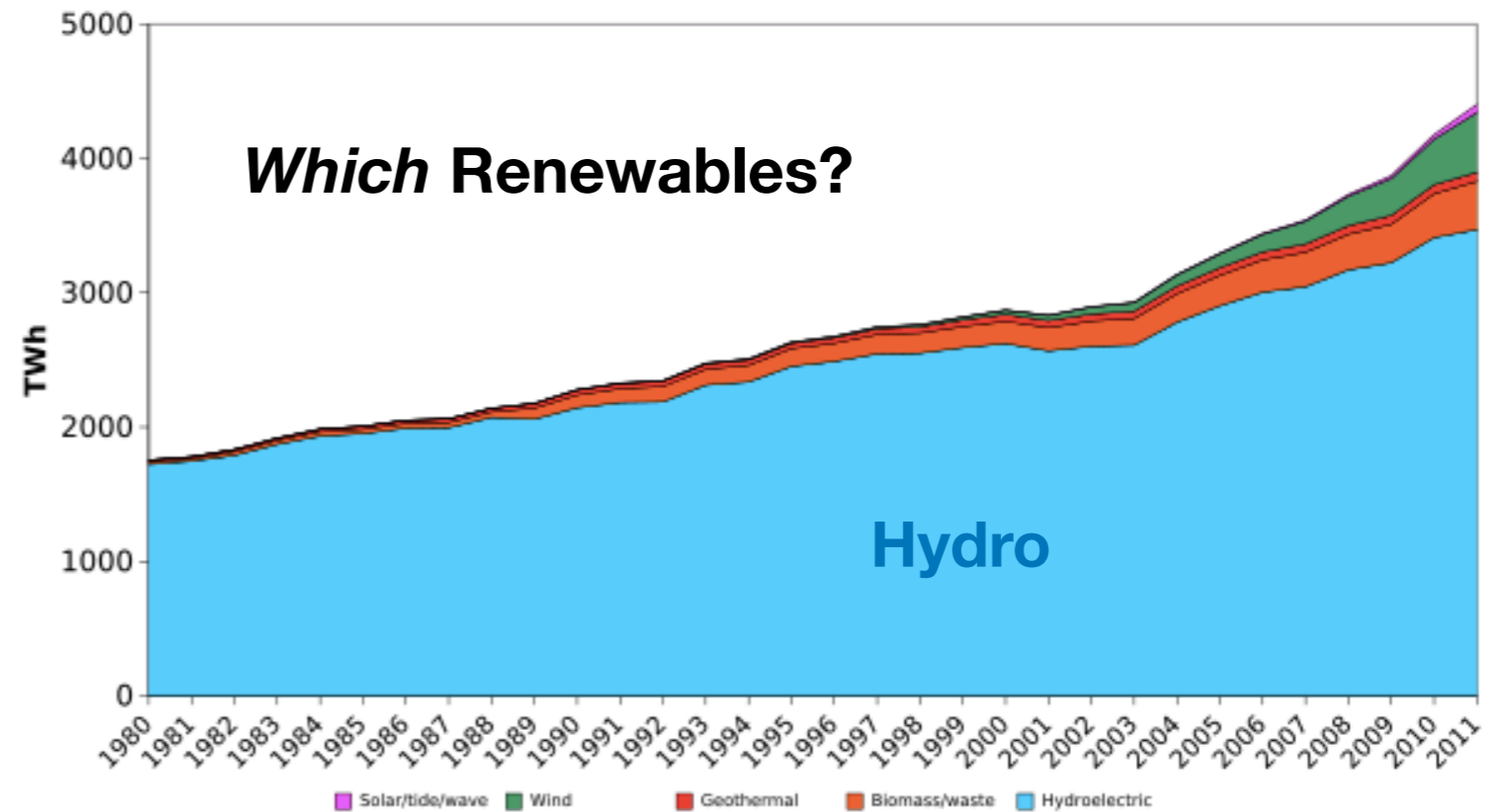


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Annual Electricity Net Generation from Renewable Energy in the World



Which Renewables?

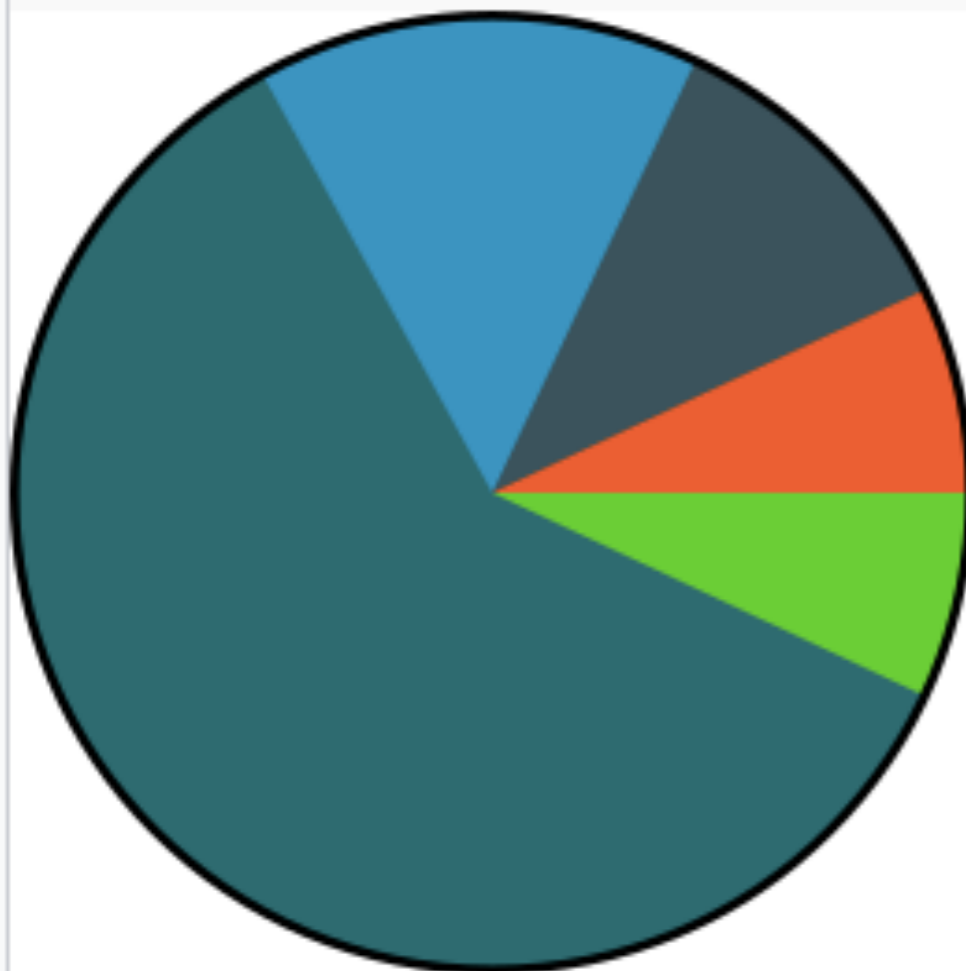
Hydro

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vs.

BC

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As might be expected, given the name of the company to whom we pay our power bills, the emphasis in BC is almost exclusively on hydroelectric power.

BC Government website: “British Columbia generates nearly all of its electricity by harnessing the power of flowing water, a clean and renewable source. The rest comes from forest biomass, wind, natural gas, solar, and landfill gas.”

Also “[Geothermal heat](#)—or energy that comes from heat deep under the ground—is also being explored in B.C.”

But the ***Cape Scott Wind Farm*** is not mentioned anywhere.

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- Ownership now: 30% North America, 30% Japan, 40% France.

Transmission Losses

From Website:

Losses are lower in **HVDC** than in **HVAC** over long distances:

- for a ± 800 kV line voltage, losses are about 3% per 1,000 km for an HVDC, while they are about 7% per 1,000 km for an HVAC line.
- For HVDC sea cables, losses are about the same, but can reach 60% per 100 km for a 750 kV HVAC sea cable.

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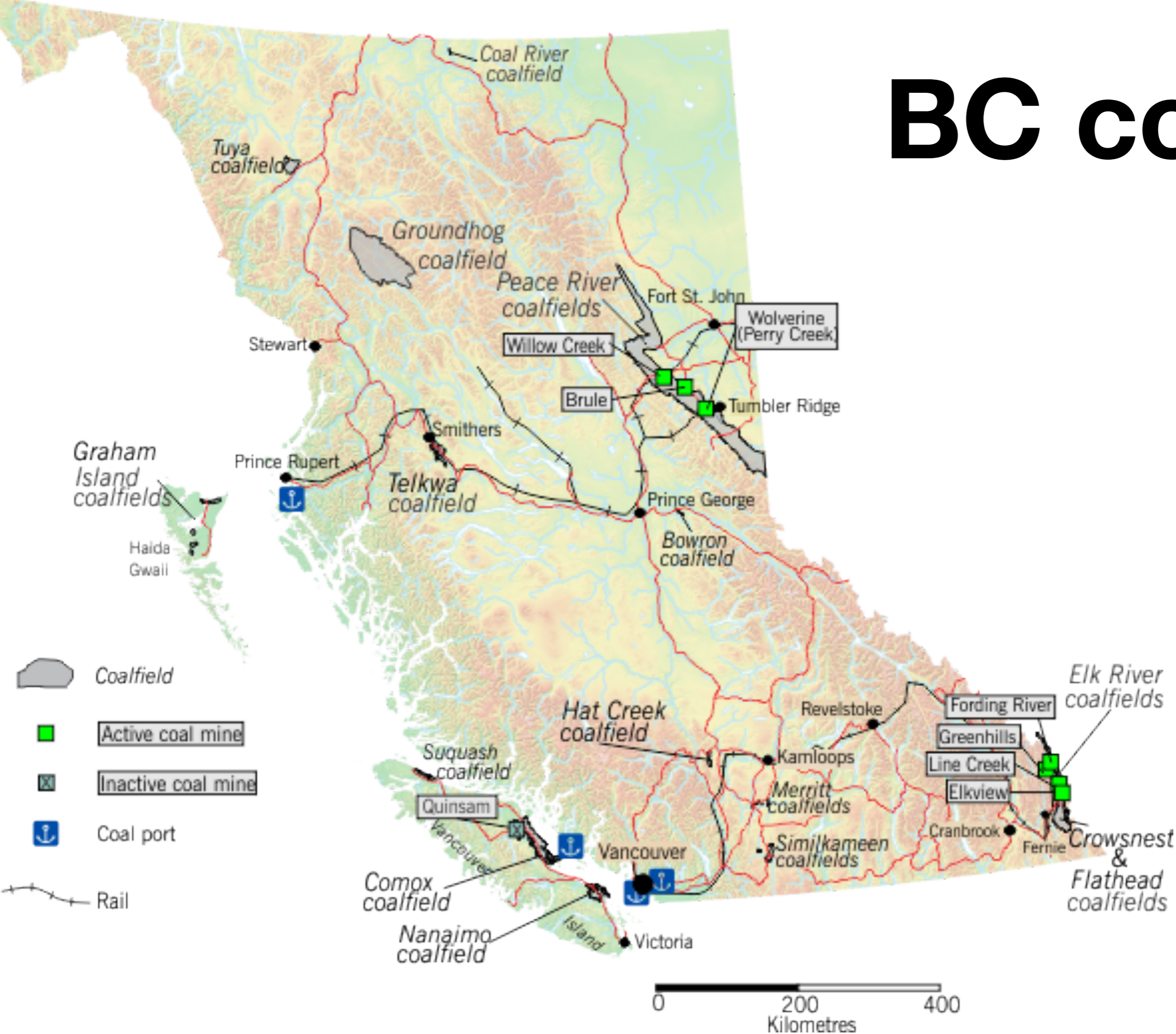
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Coal production currently represents over half of the total mineral production revenues in the province. Over 95 per cent of coal currently produced in BC is *metallurgical* coal, which is used in the production of steel from iron ore. BC has 3 of the 5 biggest coal mines in Canada. Just because we don't burn much at home doesn't mean we aren't a big contributor to pollution and global warming.

BC coal



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So self-righteous antinuclear activists bragging that BC “*gets all*” of its electricity from renewable sources, mostly **hydro**” don't know what they are talking about!

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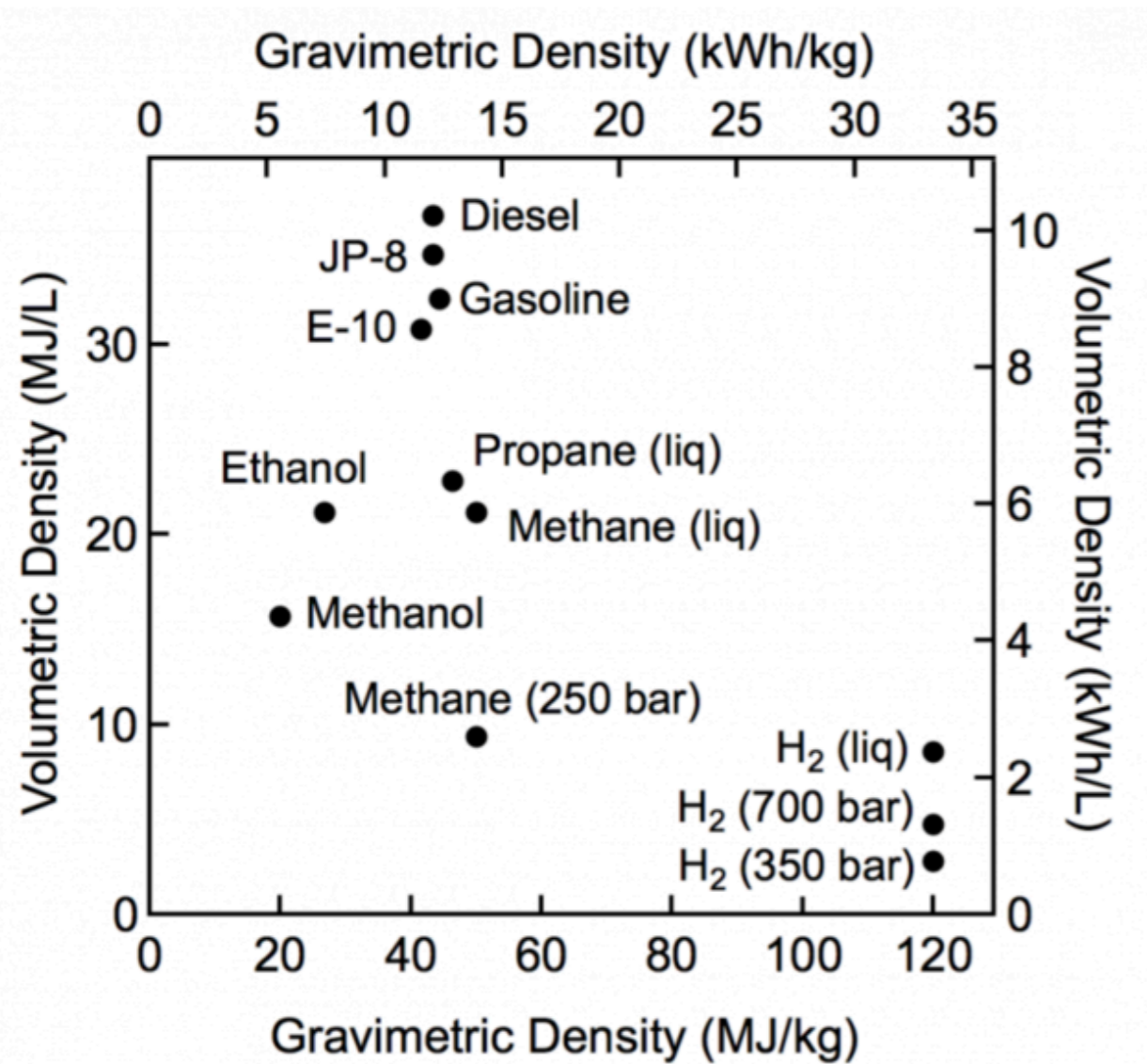
As usual, the answer is “YES!**”**

Stored *Chemical* Energy

- Some materials store more energy than others!

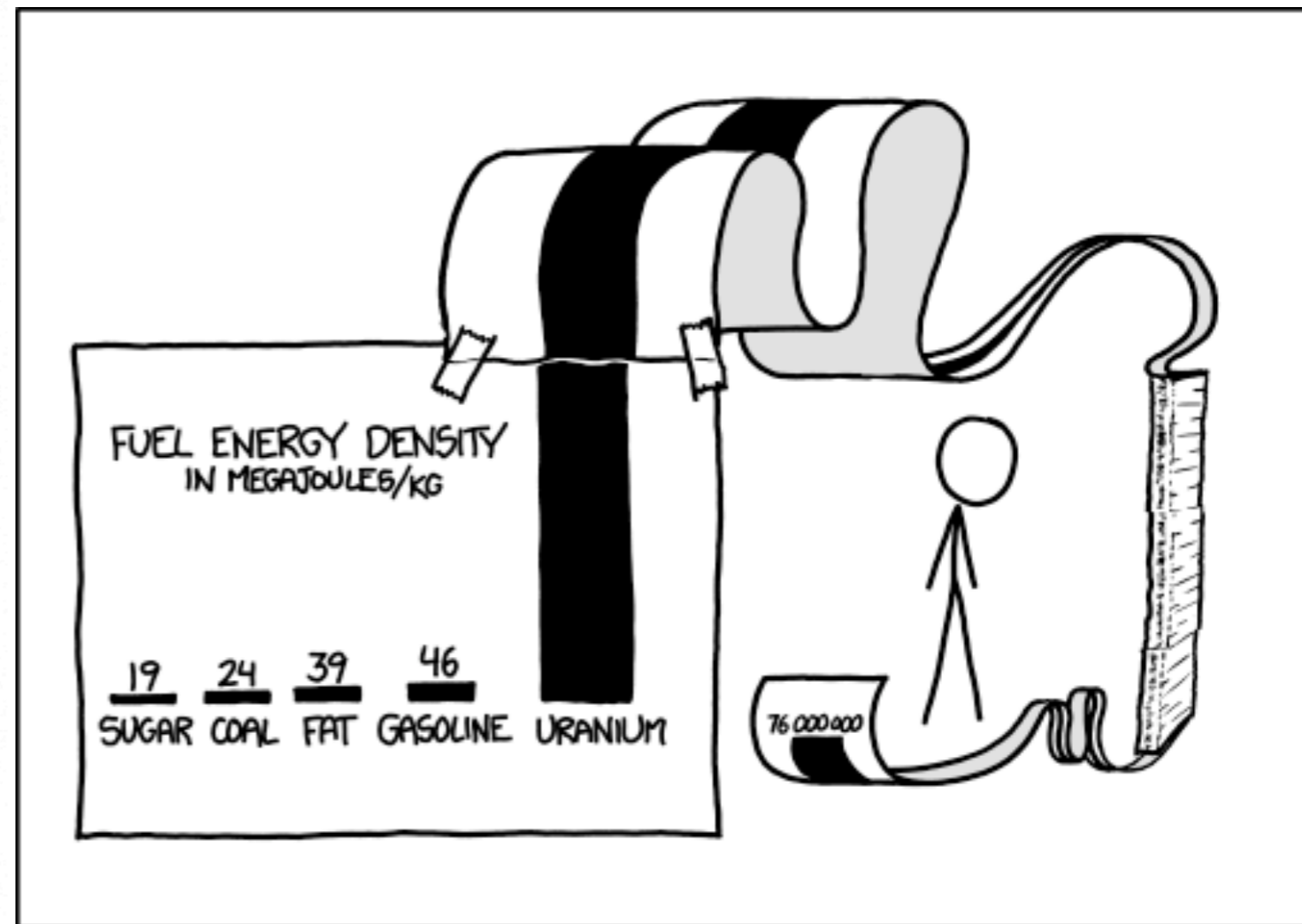
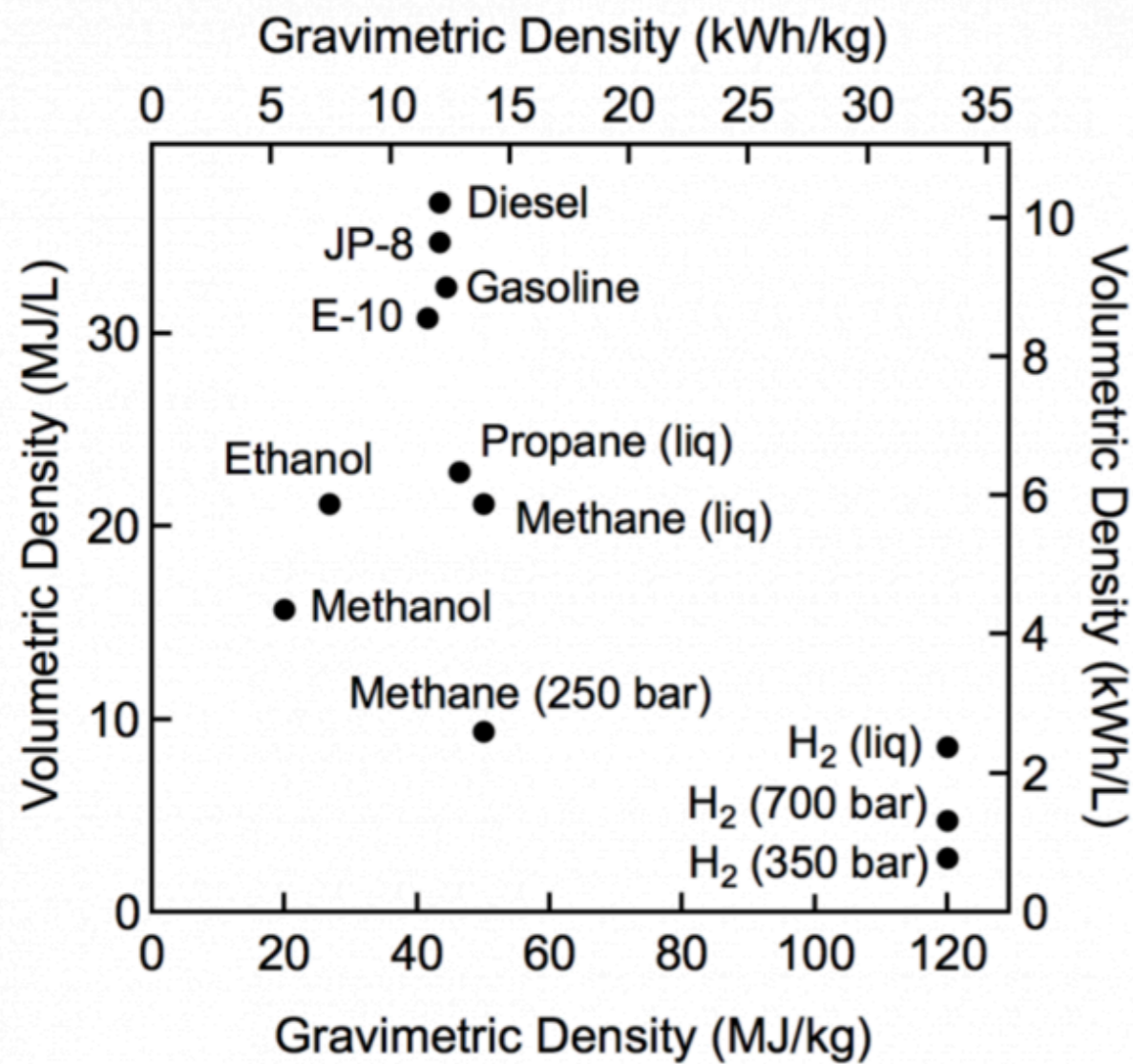
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SCIENCE TIP: LOG SCALES ARE FOR QUITTERS WHO CAN'T FIND ENOUGH PAPER TO MAKE THEIR POINT *PROPERLY*.

John Tosney's Notes

I said I would offer some thoughts in support of your work on the captioned topic. These are general in nature but indicative of what I think are the options for electrical power generation. For context Canada produces less than 2.0% of Greenhouse Gases* yet has the world's 10th largest economy and human development index and the 6th largest industrial output. We live in a large, cold, efficient and energy intensive country! A conversation looking at the pros and cons of the basic options could include the below. (cost estimates are leveled all in capital and operating in very general cents per kWh).

- **COAL** 9 ¢/kWh. Readily available, proven technology, moderate to license. Requires rigorous attention to mining safety and highest contribution to GHG.
- **GAS** 5 ¢/kWh. Readily available, proven technology, easy to license. Gas production safe. 2nd highest GHG emitter.
- **ADV NUCLEAR** 10 ¢/kWh. World focus on small modular reactors with enhanced fail safe design. Likely least contributor to GHG and cost competitive. Initial units subject to lengthy regulatory review including for waste management. (Canada 6-8 years, China 2-3 years?)
- **WIND on shore** 5 ¢/kWh. Competitive cost and very low GHG. Operates at say 55% availability. Requires backup capacity, has large footprint and aesthetically challenging. Kills migratory species. Moderate licensing.
- **WIND off shore** 14 ¢/kWh. As for on shore except costs and impact marine species.
- **SOLAR** 4 ¢/kWh Readily available, becoming more efficient with experience, easy to license and install. Operates at 45% availability Large footprint for industrial applications and sterilizes farm land; decommissioning and waste disposal issues.
- **BATTERY** 15 ¢/kWh. Temporary power storage only often in support of Wind and Solar. Continuously improving technology, significant GHG to produce units. Contains heavy/toxic metals, not all recyclable.
- **HYDRO** 6 ¢/kWh. Low cost, proven technology, very low GHG, recreational uses. Large footprint, land habitat loss, sedimentation and seismic vulnerability.

I have left out **Geothermal** and **Biomass** production although the former has successful application.