

# We Have Met the Carbon Enemy and He is Us

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- December 3, 2018

**B**ack in 2007, the mighty iPhone came into being. That indispensable virtual super computer in your pocket and its host of imitators enabled enormous hydrocarbon-based energy demand growth – and will continue to. The virtual world showed a funny way of triggering real-world activity, nearly all of which requires energy – and in turn causes CO2 emissions.

To illustrate, consider the start-up of Airbnb. Not coincidentally, that too occurred in 2007, because it needed the power of the smart phone. In just one decade, Airbnb's empire has reached about five million rooms globally – more than the five largest hotel chains combined. Tie this to concurrent jet turbine improvements and discount airlines, which now represent 30 percent of global air travel, up from 19 percent of a smaller overall industry in 2007. Then picture a family in Asia who, thanks to their rising income and the falling cost of travel, can now afford to take an international trip together. And reflect upon two statistics. First, global air travel recently hit a record of approximately 202,000 planes airborne on a single day, enough to carry the entire population of Canada. Second, if the “airline industry” were a country, its annual increase in oil demand would rank it second globally, bested only by China. With a few taps on a smart phone, a trip can be arranged and purchased faster, easier and cheaper than at any time in history. Oh, and incidentally there is no electric-plane

solution pending – the power to weight ratio doesn't fly.

For most people, air travel only occurs a handful of times per year. But the same smart-phone-driven hydrocarbon demand occurs locally as well, thanks to the arrival of services like Uber and Amazon. Your phone can summon a driver 24 hours a day, generating new CO<sub>2</sub> emissions alongside all the benefits. And Uber isn't merely replacing taxi emissions. In New York City for example, Uber and Lyft have grown by approximately 480,000 trips per day while taxi trips have fallen by only about 150,000 trips per day. This has driven an astounding 62 percent increase in total taxi and ride-sharing trips (and associated air emissions) in that city in just three years.

This is not to say that the late, great Steve Jobs should be blamed for the creation of mass emissions. Only that seemingly innocuous technologies lacking the physicality of, say, heavy-duty diesel pickup trucks, play a far larger role than recognized in global energy consumption.

Jeff Bezos of Amazon is another prominent figure generating a pretty massive carbon footprint. Picture a university student bouncing out of bed on a Sunday morning and clicking the "Buy now with 1-Click" button before strolling off to a pipeline protest. This click likely prompts a coal-fired factory in China to manufacture the item (67 percent of China's electricity was generated from coal in 2017), which is then transported via diesel-powered truck or train to an air- or seaport, followed by an oil-fuelled ship or plane ride to North America, yet another leg by diesel-powered truck or train to a distribution centre and, ultimately, a gasoline-fuelled delivery truck doing the "last mile" run. The next day, while that student is in class, that truck drops off items to various students at the university – all one-off, instant-gratification purchases. There is, unsurprisingly, a direct and strong decade-long correlation between Amazon's revenue and total U.S. trucking miles, both of which continue to break annual records. Then tie that with a recent Amazon press release about the company ordering 20,000 Mercedes-Benz Sprinter vans for last mile delivery.

Environmental activists, the news media and millions of people are inclined to blame fossil fuel producers, auto manufacturers and drivers of oversized vehicles for so-called carbon “pollution”. But the real drivers of CO2 emissions growth are the billions of people in developing countries escaping poverty and the technology companies that provide us all with the joys of custom delivery and easy travel at best pricing. Then include the thousands of air-conditioned data centres that hold the terabytes of data needed to support these services. In 2017, data centres used about two percent of the world’s electricity – at a time when all sources of “renewable” energy combined produced only 8 percent of global electricity. And 90 percent of the data they housed had been generated within the prior two years – meaning there is much, much more to come. Consider a forecast that communications could use 20 percent of all the world’s electricity by 2025 and add to that a global population heading toward 9 billion by 2040. And think about all those self-driving cars barreling down the road towards us: replacing less than one percent of the existing U.S. car fleet with autonomous vehicles could within one year generate data roughly equivalent to the existing U.S. server farm storage capacity. For something that doesn’t physically exist, data is awfully energy hungry.

Maybe, then, mass hypocrisy on fossil fuels lies with consumers as well as the news media and politicians. Ask yourself, “How many climate change protesters, researchers and officials flew somewhere in the past year while ordering things online they didn’t need right away?” A curious observation was that at the 2015 Paris COP21 climate change conference, Canada sent 382 attendees versus host country France at 395 and the U.S. at 124. Had Canada matched delegates-per-capita attendance of France, it would have sent 222 people, or all of 14 had it matched the US.

This all comes before considering the well-documented tech-driven energy impact of Bitcoin mining, recently estimated at 0.5 percent of global electricity demand. The point, which needs to be belaboured, is

that CO2 emissions go far beyond people's desire to drive their own vehicles and heat their homes to a comfortable level; it is all of us and our lifestyles, most definitely including young hipsters on bicycles. This level of mass hypocrisy may be unprecedented in human history. Ridding the world of fossil fuels may be a noble idea, but it rests on a lack of understanding that credible alternatives have enormous challenges of scale and their own environmental costs, while the supercomputer in your pocket is adding to energy demand by the second. Hydrocarbons are indispensable not only to our standard of living but to the entire global economy and the aspirations of billions to no longer live in poverty. They are needed to support many of the things thought of as "green", such as manufacturing and off' times generating the power that runs electric vehicles. They're required to produce high-grade steel, cement and ammonia (a fertilizer constituent that helps feeds an estimated 50 percent of the planet). There are no rapidly scalable replacements pending for planes, trucks, ships or trains – nor recognition that, if there were, the transition will be slow, for existing fleets would be used until obsolete.

To illustrate the problem of scale, had we as a planet somehow managed to reduce our use of coal from 27 percent to just 22 percent of global primary energy demand in 2017, it would have required 1.5 times the entire output from existing renewable generation to replace it. Worldwide energy demand continues to increase, is universally forecast to continue doing so, and fossil fuels will continue to fulfill the majority of the need. Renewable energy output will grow significantly in percentage terms, but will not come close to handling the sheer volume of energy required for far, far longer than anticipated. Accordingly, like the growth of digital technology, even the switch-over to electric vehicles won't bring about a steep reduction in fossil fuel dependency, although it should have local benefits such as cleaner air and less noise.

Decreasing oil and gas investment amid growing global energy demand driven by population growth, coincidental with increasing

disposable income enabled by technology and industrialization in developing countries, has a real shot at spiking medium term oil and natural gas prices to previously unseen levels. Sadly for Canada, our collective response to this astounding global opportunity appears to be self-flagellation, continuous delay and an ever-increasing regulatory burden, rather than building great, well-thought-out projects, of which Canada could have many. It is no wonder the world's energy investors are uniformly looking elsewhere – and will continue to.

How best to help save the world from carbon while being honest with yourself? Begin by putting down your phone. Travel locally and walk or bike when you can. Deny yourself the instant gratification of online ordering and bundle your buying into a single trip to (gasp!) a traditional store to shed “last mile diesel”. Grow more unfertilized food yourself. Sounds a bit rough, doesn't it? For your remaining energy use, recognize that Canada is a global leader in environmental stewardship and support the energy companies of this country. They are competing internationally under significantly more stringent domestic rules and practices while ranking 2nd (behind Norway) on environmental and social performance against other energy-rich nations. The world is moving ahead on energy demand of all types, with or without Canada. We shouldn't impoverish ourselves to no purpose.

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