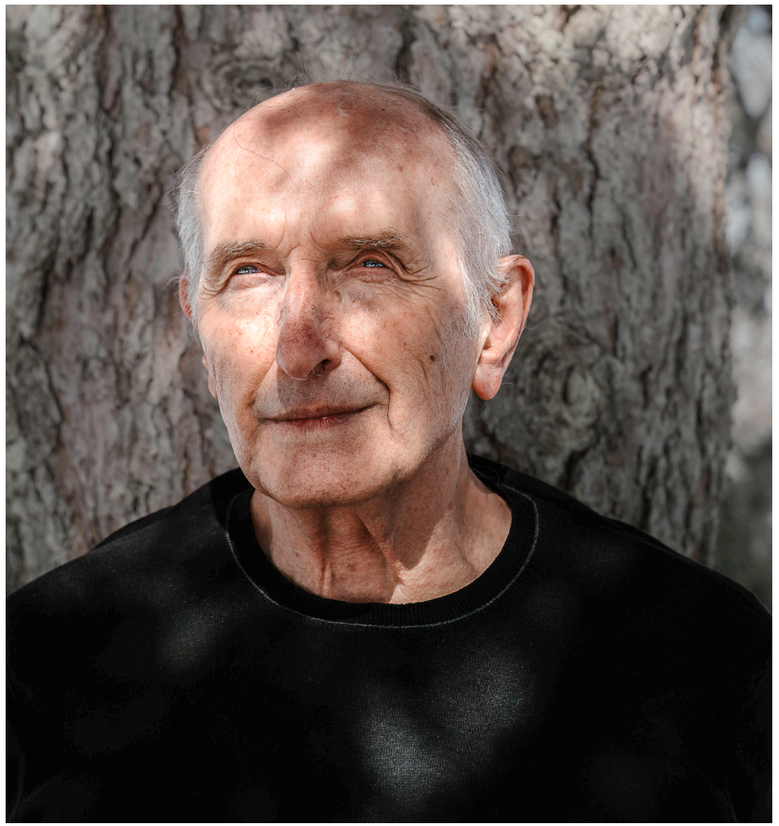
VACLAV SMIL

Vaclav Smil on overhyped inventions, category errors and missed opportunities



A Distinguished Professor Emeritus at the University of Manitoba, Vaclav has built his considerable reputation on always cleaving to facts in the face of hype and hysteria. Here, he pours cold water on some of the more excitable predictions about the climate crisis and shares his thoughts on where real impact can be made.

Your latest book, *Invention and Innovation: A Brief History of Hype and Failure*, takes aim at the mainstream media and particularly popular science, technology and environment writers who make sweeping and unfounded claims. What damage do you believe this does?

In a world that runs on extremely truncated attention spans of 140 characters and constant scrolling, reporting like this simply shouts: "no need to worry." Brilliant technical *dei ex machina* will always come to our rescue. There's no need for rational behaviour or thinking about minimised impacts and maximised efficiencies. There's no need either to promote the ethos of restraint and responsibility. Just consume as much as possible. It will get fixed...

What are some examples of the most "overhyped" inventions we've seen in recent years, perhaps specifically in the climate and energy space?

That could be a long list. I'll limit it to just three prominent items.

Nuclear fusion: in 2022, after some important experimental progress that still left the technique decades from any profitable commercial deployment, we were once again told (quite mistakenly) how close we are to this ultimate energy solution.

Small modular nuclear reactors: I heard Alvin Weinberg, who was involved in the Manhattan Project as a young man and later became director of the Oak Ridge National Laboratory, talk about them for the first time in 1982. If we had a small commercial reactor for every mention of their imminent arrival during the past four decades, the world would not know what to do with all that power.

CO_2 sequestration by exposed mantle rocks (in Oman and elsewhere): in theory such rocks could store hundreds of years of anthropogenic carbon emissions; in practice, though, I wouldn't add this to your pension portfolio. How could it be done on the requisite scale?

From what you've said in the past, you are sceptical about the potential of carbon sequestration. Why is that? And why do you think it has been overhyped as a possible solution?

The appeal is obvious: it's a classic tailpipe solution. Rather than replace the offending process, we continue business as usual but then capture its undesirable by-products – in this case CO_2 released by burning fossil fuels – and bury them out of sight. But mass balances and cost considerations are enormously challenging. To sequester just 10% of all CO_2 emitted from fossil fuel combustion, we would have to develop a new global industry that could handle the same mass of CO_2 annually as the global mass of crude oil production. And the process would have to work in the opposite direction by spending huge amounts of money and energy to force billons of tons of supercritical CO_2 fluid underground rather than bringing highly profitable oil above ground.

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One of your arguments seems to be that we're putting too much emphasis on new inventions that hold the vague promise of overhauling everything. In your opinion, what would be a better course of action for us to take?

Most people don't seem to realise the extent of the inefficiencies and waste defining our actions, especially as applied to energies embedded in the supply of existential necessities. Here are just three notable examples:

We pump, treat (or desalinate) and distribute drinking water, but frequently lose 30–40% of it through leaky pipes and defective plumbing.

We synthesise and distribute nitrogen fertilisers (at very high energy costs) and then often lose 50–70% of the nitrogen after the fertilisers are applied.

And we extract, process and distribute natural gas to heat homes and then lose a large part of that heat through single-pane windows and poorly insulated walls. I could go on and on.

A rational society would first try to mend its grossly inefficient ways rather than bring in new energy sources to perpetuate the existing inefficiencies.

You've written in the past that hydroelectric power deserves to be shown more love by people who are serious about the energy transition. You've said something similar about nuclear power. Is there a danger that we ignore these solutions in favour of the latest "shiny" invention?

Hydrogeneration was the original green solution. The first small hydro plant began working in 1882, the same year Edison built his first coal-fired station, and it remained a great favourite for a century. Then attitudes shifted, hydro became an environmental problem and eventually the World Bank stopped financing any new projects in low-income countries with large remaining hydro capacities. This is most unfortunate because the world – both rich and poor – still abounds in opportunities to build lots of small hydro stations whose combined capacities would be a welcome adjunct to intermittent electricity supplies. China, of course, has kept on building on a gargantuan scale as hydro became a critical part of their generation. Why should Africa, with its large hydro potential, be deprived of the same chance?

In our eagerness to make the climate crisis feel more manageable, we make category mistakes – such as comparing the energy transition to the Apollo missions. What effect do you think these category mistakes have on public perception of the energy transition, for example?

The fundamental error is to see global decarbonisation as just another discrete event that could be solved by targeted technical solutions, like switching from a landline to a mobile phone, or replacing a gas furnace by a heat pump. In reality, global decarbonisation amounts to a fundamental restructuring of the world's most essential and complex activity – its energy supply and use. It's therefore a much more complicated and much more expensive proposition that has to tackle everything from fertilisers to jetliners, from steel to plastics, and from grain harvests to intercontinental container shipping. And then there is the sheer scale of it all. Dealing with billions of tons and trillions of cubic metres and kilowatt-hours will need gradual advances extending across decades. The process can be accelerated but it cannot be accomplished using arbitrary scenarios devised by office-bound bureaucrats in Paris or Brussels by years ending in 5 or 0.

You've shown in your books that global energy systems are vast and complex. Many people feel powerless in the face of systems they cannot truly fathom, which is perhaps why they find themselves captivated by category mistakes. What would you say to people who might feel powerless in the face of the vast scale and huge complexity of the system?

That, of course, is just a small part of a much larger fundamental reality. Nuclear weapons introduced the risk of a truly global instant catastrophe, a reality that triggered the ultimate sense of worldwide powerlessness. Global environmental change is a gradual process but its unevenly distributed impacts could also eventually be catastrophic for hundreds of millions of people who will have no say about its ultimate extent. And unlike in the case of nuclear war, where prevention has always relied on tacit or explicit agreements of two large adversaries, global environmental change presents us with an unprecedented challenge: preventing the worst outcome will require highly effective, decades-long cooperation of at least 20 of the world's largest economies. Let's not forget that, for example, 100 million Vietnamese produce annually less than 0.5% of the world's and less than 2% of China's annual greenhouse gas emissions. Even if the Vietnamese were to switch rapidly and become completely emissions-free, their sacrifice would still be equal to a mere rounding error of the global total. And as the effect of greenhouse gases depends on their absolute atmospheric concentration, and not on any relative measure, all smaller emitters are, as nations and not just as individuals, powerless in the absence of any effective global compact. The likelihood of reaching the latter is best appreciated by imagining China and the US agreeing on shared sacrifices sometime soon.

We exist in a capitalist system that demands constant growth and constant increased consumption. Can you see any future in which this system is altered? Can you imagine a world in which a majority of business owners and shareholders sought not to grow?

Perhaps the shortest way to answer this question is to pose a counter-question. What evidence do we have that even the world's richest countries, where people enjoy very high standards of living and where populations have stopped growing or are declining, are inclined to advocate policies that would end any further growth and aim not to reduce but rationally maintain these high levels, rather than targeting further growth? None, of course, and setting this non-example has profound global consequences.

In a talk once, while discussing how toothless global climate targets are, you said: "When the rubber meets the road, everyone is a nationalist." Do you believe there is anything that might forge a path towards deeper and more lasting cooperation between states and governments?

You've seen this once again and on a grand scale with the latest US rules and subsidies for the development of a domestic "green" economy. Instead of belabouring any chances of "more lasting cooperation between states and governments", I will just ask the simplest question limited to state (or super-state) pairings: how soon do you expect to see the US and Russia, Russia and the EU, the US and China, China and India, etc., pulling with all their might in the same direction?

I know that in the past you've pushed back against your characterisation as a pessimist, arguing that it's about facts, rather than pessimism vs optimism. What are the facts that currently give you cause for hope for the future?

A rational extra-terrestrial visitor would wonder why the Earthlings insist on labelling facts as pessimism, but there's no mystery here. As TS Eliot put it, "humankind cannot bear very much reality." At the same time, we are unwilling to take simple steps to reduce consumption and lessen environmental impacts. If you insist on being "optimistic", then the enormous opportunities to take such steps would be the best justification.●

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