

"WE MUST LEAVE GROWTH BEHIND"

To ensure the habitability of the biosphere

Speaking as an old-fashioned scientist, I think my message is kind of a primitive and, again, old-fashioned message: in order to "ensure the habitability of the biosphere," we must at the very least move away from prioritizing growth and perhaps abandon it entirely. **The long-term survival of our civilization cannot be assured without setting limits on the planetary scale.**

This is a finite planet. There is a finite amount of energy. There is finite efficiency of converting it by animals and crops. And there are certain sensitivities in terms of biogeochemical cycles, which will tolerate only that much. I mean, that should be obvious to anybody who's ever taken some kind of kindergarten biology.

Unfortunately, this is a society where nobody's taking kindergarten biology because everybody's studying what's communications, writing in code, economics, business administration, liaising the state office, and things like that. **This is a new civilization we have. People are totally detached from reality. If you are attached, at least a bit, to reality, all of this is common sense.**

If you look at the fundamentals of human existence, the yield of crops, the energy which we save by making materials, the energy we save by making better converters, no matter if it's turbines, or cars, all these things which run our economy are basically improving at a rate of one, or two, or at best about 3 percent a year. There is no 30 percent or 40 percent gross there, really.

It's actually becoming more and more difficult to wring out even those 3 percents, because we are approaching thermodynamic or straight pneumatic limits with many of these things. This idea of dematerialization, decreasing the energy intensity - fine, you can keep doing it, but you cannot do it forever. If I built a house, I can make it lighter, but I will still need some steel, some lumber, some tiles, some glass. I cannot make it not using material. **This is another kind of false god - dematerialization and decrease of energy efficiency. Energy efficiency is helpful, it's happening all the time, but it has its own thermodynamic and material limits.**

Even the progress in transistors, which I think has been the sort of conceptual model that so many optimists are basing their faith in - even that progress is slowing down considerably. Technically speaking, we are nearly at the limit. Everything simply has their limits. The American way is to have the whole pie and eat it at the same time: we are going to have SUVs everywhere and raspberries from Nicaragua in Europe in January. And transport it by airplane even, and do all these things as we have been doing. In fact, we do even more because now Chinese will copy us. Mark my words, there'll be no massive sequestration of carbon. There hasn't been any, and there'll not be any next year, or 2025, or 2030.

It's the scale. We now make about 37 billion tons of carbon dioxide. Ten percent of that is 3.7 billion tons. Say 4 billion tons of CO₂, just to control 10 percent of the problem. This is almost exactly the amount of crude oil we produce. It took us 100-plus years to develop an industry, which is taking 4 billion tons out of the ground and with the gradient, and then taking it up and refining and using it. Now we would have to develop a new industry, which would take 4 billion tons, and store it, push it against the gradient into the ground, and guarantee that it will stay there forever. Something like this cannot be done in five, or 10, or 15 years. And this is 10 percent. So, simply on the matter of scale, carbon sequestration is just simply dead on arrival

We have to do something else. There's this hope, this great hope of this technical fix. We'll have the raspberries, and we'll have the SUVs, but also the carbon will be dealt with. My favorite choice would be not with raspberries in January, and not with SUVs.

To draw down on consumption, in other words. This is what I call the slack in the system, and most people are not even aware, because they haven't studied the systems closely enough, what tremendous slack in the system you have. There's lots of waste before we produce food, but even after we produce it, 40 percent of our harvest is wasted. You cannot eliminate all this, but you could eliminate probably like two-thirds of it easily.

Whatever the goal is we certainly are well on track to go past that actually. There is no doubt about that. Well, we could change course. **I could design you the global system today without any horrible loss of standard of living all around the world. Consuming 30, 40, 50 percent less of everything that we are consuming.**

Be it water, or steel, or energy, but we are not willing to go down that route. Technically, it doesn't require any new inventions, nothing, and it will actually save us money in many ways.

But the expectations are just crazy, they're just so crazy. Food waste, for instance, is just amazing. We grow all that stuff, we dump all those fossil fuels, all this liquid used, diesel and gasoline, and electricity, and metals, and ammonia, fertilizers. And we waste 40 percent of everything they grow. Because the expectation is what? That everybody should have strawberries in December, everywhere? No matter if it's northern Japan or northern Finland, really, right? The expectations are quite ridiculous because we don't need raspberries or strawberries in December. The amount of vitamin C is as good in any apple which could be stored over winter.

My favorite example is this creation of SUVs. We could have saved billions upon billions of cumulative tons of carbon since 1985 by not having SUVs. Which are now the dominant mode of transportation in the western world. Even in Europe now, they are operating everywhere.

When I started to buy Hondas, my Honda Accord was 900 kg. Now Honda Civic is 30 percent bigger, heavier than my original Honda Accord was. How easy would it be just simply to produce one Accord and one Civic, and no SUVs? **We don't have to invent anything new. And the same goes about food, and same goes about building, and same goes about material consumption.**



Because materials are very highly energy intensive, really. So, even without inventing anything, just simply reshuffling the system, they can cut the slack.

No culture or country in the world is moving in that direction, nobody. This whole debate about global warming, to me, it is so annoying. We knew, we got an inkling of it with Joseph Fourier in 1828. We were on pretty solid ground understanding the physics of it by the 1860s. And by the time we got to Svante Arrhenius in 1895, he did the calculations, which are almost perfectly the same ones as we do now with these massive machines and 200,000 lines of code.

I wrote my first paper about global warming in 1972. Then 20 years later, I made a decision never, never to write explicitly about global warming again, because it became just a total political football. People aren't even aware how long we've known all these basic things. And most of the people who are talking about it, they've never taken a course in atmospheric physics, or atmospheric chemistry. They have no idea what methane is, or NO₂. They have no idea what Global Warming Potential (GWP) is.

Partially there is a "hope" I would say in the sense that we are dying out. I'm sure you are aware that essentially every western country, every affluent country has now started to fall below the replacement level of reproduction - 2.1.. The non-developed nations want to consume like us, and they are increasing at a rapid rate. Even if they adapted a different consumption pattern, it would still be a couple of generations of increasing consumption of everything in Africa. Everything, water, cement, fuels, you name it.

Our problem is that we are dying out but still consuming like crazy. If you don't have raspberries in January, then, of course, people in Mexico and Nicaragua are losing jobs. Truckers and shippers who are moving them to the U.S. or Canada are losing jobs.

So these lowered expectations have to result in some improvements in employment and in some good economic growth, but of course, they will result in some losses. The same as with beef.

As you know, people aren't crazy about beef right now. Beef is killing the planet and whatever. "Let's get totally out of beef." People don't even realize how beef is penetrating the U.S. economy. We are talking about millions of jobs. Not just the farmers themselves, but shipping it, cutting it, retailing it, exporting it. Millions of jobs hang on beef. So you become virtuous, you decrease your methane footprint, you get rid of beef, millions of jobs on the plate right now.

Look at how hard it's been to move away from coal in the U.S., which only employs tens of thousands. It cannot be simply done without wrenchingly, massively centering our economy. Let's say if you want to get rid of coal, right? We are mining now more than 7 billion tons of coal. So, you want to lower the coal consumption by half, you have to cut down close to 4 billion tons of coal. More than 4 billion tons of oil. You want to get rid of oil and replace it with natural gas? Fine and dandy, but you have to get rid of more than 2 billion tons of oil. These are transformations on a billion-ton scale, globally: (A) They cannot be done alone by next Monday; (B) They will be wrenching with huge economic consequences; and (C) What we can do, and the Chinese can do, the Indians can not. The Indians published a new paper a few months ago saying, "Coal will be our No. 1 fuel until 2047."

As I always say, there is no economy, there is only energy conversion.

Money is only a very imperfect way to measure how energy flows in society. So what happens is we got this supercheap energy - both the fuel, and electricity, and the food energy.

When I was a kid growing in Europe, right after the Second World War, England had rationing. Even in England, a so-called victorious country after the war, England had rationing until 1953, 1954. Many European countries rationed food, and a typical spending for an average family in Europe in the 1950s was 60 percent of disposable income, went to food. Sixty percent, right? Now, in Europe, it's 18 percent, and in the U.S., it's about 8 percent or 9 percent. Food is more expensive in Europe, but it's still so much less expensive than ever it has been. So people have this enormous disposable income, and they travel, and they buy electronic junk, and they do all sorts of crazy stuff. Expectations have grown as a result of cheap energy, and cheap food, and energy.

Again, the truer, or closer real cost of food and energy should reflect the cost of all our waste - which we don't even incinerate or landfill - or we just simply dump into the ocean or on the ground. We are not even trying to come close to the real cost of our economy, which is so much higher than we pay for.

It's certainly not 8 percent of energy, or 8 percent of food, or 9 as it is in the U.S. now. It's vastly higher.

You go to Amsterdam or Copenhagen, and every bus has a big sign on the side of the bus: Amsterdam to Cyprus, 30 euros. First, they went down to Spain or whatever - to Majorca maybe. Now, they go to Mauritius all the time. As I say, for 30 euros. These are the new expectations, Europeans travel like crazy. There are tens of millions of Europeans flying every week. Thirty years ago, hardly anybody was flying in Europe, really. Until three years ago, 82 million Germans spent more money on foreign travel than 320 million Americans. Thirty years ago, no German, even businessmen, would fly - they would take a train from Berlin to Munich. Now, everybody is flying everywhere for 20 euros.

And it's hard to imagine that stopping.

**Quoted from
Vaclav Smil**

Thanks to David Wallace-Wells who extracted this material for the New York Magazine's Intelligencer from conversation with Vaclav Smil, often called the person who understands energy transitions better than anyone else in the world.