

WITH Dr. Vaclav Smil, Distinguished Professor of the Environment, University of Manitoba



VACLAV SMIL is a Distinguished Professor in the Faculty of Environment at the University of Manitoba. Born in Pilsen, Bohemia, he holds an RNDr from the Faculty of Natural Sciences at Carolinum University in Prague and a PhD from the College of Earth and Mineral Sciences at Pennsylvania State University. His many books include *Transforming the 20th Century, Energy: A Beginner's Guide* and the forthcoming *General Energetics: Energy in Nature and in Society* (2007). The author of more than 200 papers in about 80 different energy, environmental, Asian studies and general science periodicals, Dr. Smil's interdisciplinary research interests encompass the broad areas of energy, the environment, food, population, the economy and public policy. He was the first non-American to receive the American Association for the Advancement of Science Award for Public Understanding of Science and Technology. He has given briefings at the White House and the Canadian Department of Foreign Affairs, and has worked as a consultant for the American Academy of Arts and Sciences, the U.S. Agency for International Development and the World Resources Institute. He was interviewed following a Frontier luncheon speech on November 29, 2006.

Frontier Centre: What do you regard as the most encouraging prospect for Canada's energy outlook?

Vaclav Smil: I would have to say high prices. As long as the situation in the Middle East is unsettled, prices will be high and money will be flowing into Alberta and Saskatchewan.

FC: What is the most discouraging prospect?

VS: What other people would consider an encouraging prospect, that the Middle East problem will get settled and that oil prices will collapse, along with the economy in Western Canada.

FC: You've said you think there are rational, long-term solutions for our energy needs. What do you think are the major ones?

VS: It's not what people think. It's not just more supply, because supply is endless. If you supply more energy, people will want more. This is a never-ending spiral. It's not just energy conservation, either, because when you start conserving, according to the rules of normal economics, that will make prices lower, which will boost demand. So it's two things. You actually have to increase supply to a certain extent, but at the same time you have to make sure that you put some limits on demand, because otherwise demand is eventually unlimited. If you let it go, people will just demand forever more. This is the story of Western civilization. We haven't come to the point where we say, "Oh, we already have enough energy."

FC: How low might oil prices go in the short term? Is it possible we'll see \$35 oil?

VS: Absolutely. We've seen it before. These gyrations in the market are massive. It's contingent also on developments in Russia and the Middle East. It's not only possible, but it's possible that it will go even lower. Nobody can exclude the possibility of prices even lower than \$30. But neither can anybody exclude the possibility of prices higher than \$100. The volatility and the range of possibilities are really extreme.

FC: What role should ethanol play in our energy future?

VS: None at all, because it is a disaster on all fronts, environmental, financial and with regard to subsidies. None.

FC: Do you think that biomass will be an important future energy replacement for fossil fuels?

VS: It depends how it's done. If it's through waste biomass, above what we use or need, perhaps. Let's say you have lots

of cheap residues from lumber operations, then it's excellent. But if you remove straw from Manitoba or Saskatchewan fields and thereby open them to wind and water erosion, then it is a terrible idea. So it depends on what biomass, how it is used and to what level. On the other hand, if you have eight tonnes of crop residue from Iowa corn, you can take out four tonnes and leave four tonnes in place for soil protection. So it depends where you are doing it and how you are doing it. But you cannot say biomass is inherently good or inherently bad. You have to study local environmental situations from place to place and see if it fits or it doesn't fit.

FC: What alternative energy sources do you think show the best prospects?

VS: In the long-term prospect, no doubt about it, photovoltaic conversion of solar energy, because it is an unlimited source and you convert solar radiation directly into electricity. There are more places around the world which are sunny, even in high latitudes, than ones that are windy or have geothermal energy. When you look at geothermal, tidal or wind, the total amount of resources and their locations around the planet, the energy available is not as abundant as direct solar radiation. We should be pouring more of our money into research into high-efficiency photovoltaic electricity conversion.

FC: You also cite the tar sands as a great energy resource in Canada, but worry that we are burning plenty of valuable natural gas to extract the oil. Can you comment?

VS: If it were the only way the world could get energy, then it would be fine, but we have other, cheaper ways. That money would be better invested in geophysical exploration for conventional oil elsewhere around the world, because there is still plenty to be discovered, offshore, in Africa and in Asia. Only when we run out of conventional oil should we take this serious step into non-conventional oil.

FC: Nuclear energy is touted as an option to help extract the energy resource in the oil sands. Your thoughts?

VS: Nuclear is a great source of energy, it's proven to be reasonably commercial, it works, and it could be made safe. But there are fundamental problems with it. First is the problem of uranium resources. Current nuclear reactors cannot operate without basically exhausting the least expensive uranium resources in a matter of a few decades. We need fast breeder reactors, which create more fuel than they consume, but we don't have them ready yet. The second major problem

is that no nation has closed the nuclear cycle. We do not have a final disposal method in place for highly radioactive waste. So we need to solve these two problems. Then it will be a viable energy source that should be supported. We should have no ideological prescriptions that say it's necessarily a bad thing. But it has its internal problems.

FC: What about using it, though, to assist the oil sands?

VS: This is an absolutely crazy idea because of the cost of building these plants and the cost of operating them. This is an unfair exchange of one form of energy for another, especially considering what we eventually get out of it will end up in very inefficient vehicles. It's an energy exchange that doesn't make sense and in the long term it doesn't have any reasonable energy return. It wastes energy. Why spend billions of dollars to end up with less than I invested? As a whole system, it is not persuasive.

FC: What is your opinion of the long debate between Julian Simon and Paul Ehrlich about resource sustainability? Do you believe as Simon did that markets can resolve scarcity issues or do you think like Ehrlich that the world faces long-term resource troubles?

VS: Neither is right and both are right, in this sense. Ehrlich under-estimated our inventiveness and our ability to discover and use lower level oils, for example. But on the other hand, Simon was naïve because he staked everything on discoverability and our ability to produce more. We may discover and produce, but we may cause so much environmental damage that we create other problems. We have billions of tons of coal, there's no shortage. But if we burn it all, we'll generate so much carbon dioxide that nobody will doubt that we are in trouble. So Simon's argument that prices alone will solve the problem of energy is not enough, because we can create tremendous environmental consequences. But on the other hand Ehrlich was wrong, because clearly we can find resources which we couldn't even dream of using 50 years ago, like drilling offshore in deep water, horizontal drilling, exploiting low-quality mineral ores. So both were right and both were wrong.

FC: Some economists believe that we will never run out of fossil fuels and that higher prices will mean more discoveries. Do you agree?

VS: We will never run out of fossil fuels because, as I mentioned, there's so much coal. But we will never touch most of it. There are billions of tons of coal underlying most of England, but England is not mining any coal. We will never touch it because it is simply too expensive to produce, and even if it weren't, the environmental impacts in sulphur dioxide, acid rain and carbon dioxide are just simply too much. In the long run, on this limited planet our resource problem is the environmental impact, not the problem with having stuff in the ground. There's plenty of stuff in the ground.

FC: Let's switch to hydro-electricity in Manitoba. Why is electricity the most valuable form of energy?

VS: Because it's so flexible. You can do everything with it except fly big planes. You can light with it, heat with it, do chemical processing and run trains. There's almost nothing you can't do with electricity and it's all at the flip of a switch.

FC: Why is Manitoba's hydro-electricity in particular more valuable?

VS: Basically because it is eternal. In many other parts of the world, when you build a dam, it starts silting in almost

immediately. Our dams don't silt in much at all. Most of the silt transported by the Red River is deposited in Lake Winnipeg, and the Nelson River watershed is basically forest all around, so there is no erosion. These are eternal dams of high value.

FC: What do you think of the present policy of pricing electricity at cost? Does it not discourage other energy development and also waste revenue that might be used to lower taxes?

VS: Well of course you know electricity is not the only thing that's underpriced. We are paying less than we should be for so many other things and people don't even realize how many hidden subsidies and how many fake and artificial costs there are. Yes, of course, we should be paying the real price for most of these things.

FC: The political culture is not ready for this but what is your view of privatizing hydro and then having it buy out power companies in the mid-west US and then develop more dams for its southern markets? Would this not result in a larger headquarter presence here and deal with the issue of transmission access to southern markets?

VS: I don't know about headquarters, but I never understood why government should be generating electricity of drilling for oil or doing any of these things. Basically I am very much for privatizing all these things. But one problem that we might have is that we are not Québec. Québec still has lots of undeveloped capacity. We, on the other hand, on the Nelson River have only very limited opportunities, maybe two more large plants and that's it. So we don't have much more room for such goals.

FC: What balance should our government strike between the regulatory approach to environmental issues and the use of markets to resolve them?

VS: That depends, there is no blanket answer. In a few cases, it could be totally left to the market. In most cases, a strong government intervention is needed because there are transnational and transprovincial boundary issues. A specific answer would have to be given case by case.

FC: What is your view of the science underlying the Kyoto Protocol?

VS: The protocol itself does not depend on any hard environmental science: It was basically an imperfect attempt to make an initial agreement that would do something. But it turned out that in practice it did very little. It wasn't driven so much by science as by the need to put some action in place. But, as we see, some key countries that signed the Protocol will not be able to fulfill them and, of course, the U.S., the largest emitter, is not a party to them. Even by the most generous judgement, it is failing.

FC: Is climate change a fixable problem?

VS: It is, but with great difficulty. The magnitude of potential energy demand out there in China, India and Africa is so immense that any techniques or steps we take in the near term will be totally swamped by increased consumption in these modernizing countries.

FC: Some of the excessive language about climate change is very discouraging to those who believe in a rational approach to public policy problems. Why have so many otherwise sensible scientists gone wacky about this?

VS: It's a question of what scenario you are going to paint for yourself. It's something like what I mentioned with oil prices. The range is huge; we could have \$30 oil, we could have \$100

oil. Given the uncertainties of scientific understanding, over the next century we could have warming which would be about 2° Celsius. This would have a variety of environmental effects but almost anybody could cope with it. On the other hand, we could have warming which is 5°, which everybody would notice, or in the extreme – although it's very unlikely, maybe a five percent probability – we could have warming which is close to 10°. If it's close to 10° on a global average, it would be 15° to 20° in some places, which would be totally intolerable. It's uncertainty which drives all this. If you could narrow the scope and say that we will get something between 2° and 4°, we could do some planning. But it could be 2°, it could be 4°, it could be 7°, it could be 8°. This is why many people when they paint this extreme scenario say it is so terrifying and we should act accordingly.

FC: Because it produces no greenhouse gases, have the prospects for nuclear power improved in recent years?

VS: Yes and no. People have been touting this “no carbon dioxide” thing for the past 20 years, yet nobody is rushing to build. The only people building on a large scale are the Japanese and the Chinese. But they are not doing it because of carbon dioxide, they are doing it because Japan has to import all of its energy and China is running out of oil and gas. Russia decided to go into it again in a big way so they could export all their oil and gas. Whatever the developments there, they are not driven by the fact that nuclear does not produce greenhouse gases. They are driven by domestic considerations.

FC: Do you think there's an acceptable solution for the problem of disposing of nuclear waste?

VS: Yes there is, because the total volume is not large and we definitely have methods now to dispose of it safely and carefully. But public acceptance, though, is a different matter.

FC: Another barrier to the pursuit of nuclear energy is the cost of an accidental meltdown, the prospect of which would deter any rational company from providing insurance. Does it matter that governments must allow them without such hedges?

VS: That's not true any more. It was for the first generation of reactors, where governments granted the insurance in case of accidents. But what we call the second, and now the third, and the coming fourth generation of nuclear reactors are inherently safe. With these new designs, these meltdowns really couldn't happen. When we start building these reactors again, this should be a moot problem. The techniques are advanced and we should not fear these things any more in the future.

FC: Why were the former Soviets considered the least environmentally responsible countries? What feature of central planning leads such regimes down environmentally destructive paths?

VS: They had excellent norms everywhere. The old Soviet hygienic rules and restrictions on water and air pollution were actually outstanding. But they had no enforcement and no incentives for enforcement. There were no teeth to all this. You ended up with states with some of the most progressive environmental laws on the books and absolutely no enforcement of them at all.

FC: You mentioned a few simple ideas to improve energy efficiency today.

VS. They run into dozens but, as far as households are concerned, they are very simple, especially in cold climates but similarly in very warm climates as well. Super-insulate your house, not only the walls but of course the windows, with things like 2” by 6” construction, triple glazed windows and insulation under your roof. Don't have things like fireplaces. And people don't realize that most of the electrical appliances today have what we call the phantom loads; they are on even when they are off. So many of the VCRs, televisions, stereo systems, garage door openers and security systems – all of these things are constantly on. Some of them carry dead loads of only one watt per appliance; some of them have thirty watts. So many people leave their houses and still have scores, even hundreds of watts of electricity going out because of the phantom loads of these appliances. You can acquire some education and do some homework. You have to buy a television whose dead load is only five watts instead of thirty. You have to inform yourself. So many of these things are easy to do, but people won't do them because they find them onerous and tricky to do. We could be a lot farther ahead than we are if people exercised better judgement.

FC: One of your policy subsets is China. What's your opinion of the future of that behemoth? Will political reform catch up with economic success?

VS: Not necessarily. That's what people have been saying for the past 30 years. I'm not saying forever but for a very long time yet, because in general, in spite of unrest here and there, the Chinese seem genuinely content with making as much money as they can. If the Communist Party runs the show, so be it.

FC: Would you say you are optimistic or pessimistic about the world's future approach to energy issues?

VS: Neither, because it's contingent. Our capacity to be eternally stupid is immense, but our capacity to adapt and change and pull ourselves out of deep crisis situations is equally amazing. At any given time, the cards seem to be stacked this way or that way. Right now, globally the cards are stacked in a catastrophic way. This is just the tenor of the times. The catastrophes are coming, no matter whether it's the Middle East or global warming or oil prices or the state of politics or democracy. Now we are in this deep, deep, pessimistic period. But this may change more rapidly than people think. These things never last forever.