

Dear Servaas (if I may call you by your given name),

I'm very pleased that you've asked my opinion on this matter of such great consequence. The question is rarely asked so clearly, and I'll do my best to answer it. I admit to a background that is heavily in science and technology, not in economics and policy, but I follow the issues.

My summary answer is that there is one overwhelming challenge in reaching a deal on the transfer of green technology: each party (nation) will find it extremely difficult to come to its own coherent policy and thus to speak with one voice. The difficulty will be amplified by the need to adjust one's policy as negotiations proceed. I think of my own nation, the US, having to coordinate the presidential staff, the State Department, the Department of Commerce, the Environmental Protection Agency, a range of business groups and NGOs, and more. These groups already have some open fights.

1) It's not just about conflicting goals among the partners on one side (in one nation); it's also a matter of "language" differences among the groups. Let me offer an example from my own experience. From 1991-94, I had a research grant from the National Oceanic and Atmospheric Administration (NOAA). I visited my program officer one day and he told me a story about a meeting that he organized to bring together atmospheric scientists and climate modellers - two groups that are very close in the questions they ask and the methods they use. However, it took the entire first half-day for them to realize that what one group called a model (a coherent set of concepts and embodying equations) was what the other group called a parametrization (setting a few numbers within a model). If they are so close scientifically but had this much trouble communicating, think of the difficulty of getting economists to talk to climate modellers, security policy experts to talk to financial experts or environmental regulators, and so on.

I won't expand on the topic of conflicting goals among the partners within a nation, since they are rife and many are well-known (e.g., security experts arguing against technology exporting, while business groups argue for export sales).

2) The range of disciplines needed in a negotiating team is unprecedentedly large. Green technology alone embraces primary energy technology (liquid fuel and electric power production), but also industrial process technology, building technology, and water supply technology. Primary energy technology alone itself mixes in many issues (I made a quick outline of the issues to be addressed, which I appended after this text so as not to break the flow of the ideas; I hope there is a flow here!). There are a few polymaths who grasp a number of disciplines that address issues to be negotiated - perhaps one finds a nuclear engineer who has also a real grasp of finance, negotiating protocols, and the history of technology. They are few, in any nation. They are also unable to cover even a modest fraction of the range of disciplines needed. . As a result, there is no one that a lead negotiator can turn to on the spur of the moment (or even with a willingness to wait a day or a week) and ask for a summary, across all the issues, of the net impact of a given point of negotiation.

3) Related to the breadth of the issues, but a challenge in itself, is the unprecedented magnitude of the task. We are not asking for a cross-Atlantic agreement, or a Pan-Pacific agreement, or an agreement among industrial nations. We are asking for a set of agreements that must be worldwide and that requires each nation to remake its policies on primary energy (extraction, generation, use), finance, and environment. Compared to this, past international

collaborations such as Bretton Woods, ASEAN, OPEC, or the Marshall Plan look like child's play.

How can we overcome this difficulty in the transfer of green energy? I think we need a few "honest brokers" - and multi-competent brokers - from a few major blocs, which include the industrial nations, the developing giants China and India, Southeast Asia, and the tropical nations that are mostly poor but much affected by climate change. One nation from each bloc can be crucial. We've had Montreal, Kyoto, and Bali to get used to the "dance." I think it the emergence of such useful brokers will take about two more conferences beyond COP and 4 to 5 years. The pressures within each bloc and nation to drive such consensus and faith in the brokers will build in different fashions in each bloc and nation. For example, the US is still experiencing little that its citizens regard as direct impacts of climate change but worries about the economics of the energy trade. China sees water and air pollution (read: "coal," but also irrigation water) and some climate effects on crops as real worries. It will take those 4 to 5 years for these concerns to merge into action. I'd like to be more sanguine, but I'm sadly realistic.

Sincerely,
Vince

Appendix, of sorts: issues in green energy technology transfer

Intellectual property rights & past R&D investment - developers of the new technologies such as modern wind turbines (Germany, the Netherlands) or solar panels (China, Taiwan, Korea) will often take the attitude that "we're owed the lead"

Economics

Financial meltdown - not the biggest problem; probably only 2-5 years for recovery, while green technology development is a 30+ - year project

More, mode of recovery from it - financiers are prone to pursue business as usual and most will view the technologies as just another investment, rather than a fundamental reworking of both finance and energy

Costs, internally

Life-cycle costing - what is the real cost, capital + operational+maintenance? The methods are now well developed to do such cost analysis, and there are mandates in legislation, even in the US. Application is being distorted by special interests on both sides (old and new technology providers)

Incl. subsidies - what is the true long-term value of subsidies to advance the learning curve that reduces the costs of the new technologies

Balance of trade - nations do not agree on the proper (im)balance of trade

External costs - as of pollution during manufacturing. Even semiconductor manufacture, such as for solar photovoltaic cells, is more or less messy, with groundwater pollution from the use of etchants (NF₃) and solvents for cleaning (chlorinated organics). External costs will have to be subsumed into new technologies - and old technologies, too! We need to charge coal production and use for stream pollution, CO₂ emission, mercury emissions, and more. Industries naturally fight this, so that national mandates are absolutely essential.

Technology

Are the technologies "ripe" and do they have acceptable life-cycle costs and savings in the medium term of, say, 10-30 years? Does any nation, investing in R&D, want to pick the winners in advance? The US has been is now being smart in this area, at least. The Department of Energy is being carefully technology-neutral. Nations with a greater degree of central planning, such as China, are more prone to pick the winners. This may constrain future development of the best systems, though I think the effect is not major.

Integration into existing infrastructure. Contrast the electricity grids in the US and Spain, for example. The US grid is old, failing, and managed poorly (piecemeal automatic responses to outages, for one). Spain's grid is modern; it could absorb a huge influx of wind power recently. One energy expert recently said that the US grid is obsolete, because "we didn't bomb our own grid as we did in other countries." Not only is the grid old; it is in the wrong place to accept renewable energy inputs. Wind, solar energy, and crop areas are far from major cities; major transmission lines don't even pass near the production areas. Most other nations, being smaller, have a far smaller problem with this.

Policy

Does a given nation admit to its quantitative role in global warming and greenhouse gas emission?

Economic policy

Money supply, national debt management - new technologies will incur debt obligations on national scales

Currency valuation - a bone of contention between China and the West, for one. China keeps the renminbi low to drive exports and keep down the level of R&D work that is worthwhile in other nations competing to develop, say, solar cells

Strategic policy - there are defense and resource vulnerabilities in both forgoing and adopting the new technologies. E.g., rare earth supplies for magnets in electric drives of new vehicles are predominantly in China, which has just embargoed their export. They are the new OPEC of rare earths. Most nations have very high reliance on other nations for a number of strategic materials and materials that are destined to become strategic (e.g., lithium for batteries in a billion vehicles)

Sovereignty - this issue is raised with appalling frequency, esp. by the US, whenever international treaties are proposed, such as for CO₂ cap-and-trade. The major nations have to all agree to give up some sovereignty. The US will be the last to do it.

Vested interests - primarily the current purveyors of old energy and resource technologies, such as Exxon Mobil as a notorious case. I don't know the quantitative figures, but I suspect that the US legislative system is the most open to corruption by lobbyists, and we are the biggest player in GHG emissions.

Environmental impacts - acknowledged and not acknowledged

Land use and water use - solar power uses a great deal of land area, and biofuels use unconscionable amounts of water for irrigation. Wind power uses land area and kills bats and birds. Our old technologies were relatively benign in both of these regards (see my writeup at http://gcconsortium.com/academic_page/Water-energy.html), but we have to give them up for their adverse and soon-irreversible effects on climate. We have to accept some new unpleasanties, and this will take public education on a massive scale.

Virtual water (biofuels) - a nation can buy biofuels made in another nation, with the water costs borne in that other nation. This is termed virtual water use, in the current food system. There is very little "freeboard" to do this with biofuels on any practical scale.

True GHG accounting (again, biofuels) - many studies have come out on this, esp. from the BP-funded energy institutes at the University of Illinois and the University of California, Berkeley. Land clearance for biofuel crops can generate the emission of as much CO₂ as up to 95 years of biofuel production. True accounting for GHG effects over the whole life cycle of a new energy technology is rarely mandated by laws in any nation.

Protocol - manner of negotiating differs among nations. There are stereotypes about Western vs. Eastern manners of negotiating. There are large measures of truth in these. I think all the participants at Copenhagen are aware of these differences, though in the haste to close in 2 weeks there may be some failings to use appropriate protocols.

Equity/ responsibility for current state - esp., who put all that CO₂ up there already? India and Southeast Asian countries object to per-capita emissions curbs and other systems that count everybody as equally responsible now. Negotiating the obligation that the US, Canada, and Europe have for their past emissions will be among the most challenging points. This burden has to be translated into how much money these big past emitters have to put up to help less-developed nations.