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Federal Council
Chancellerie fédérale
Palais fédéral
3003 Berne

Kintnersville, 7 November 2008

Concerns: request for a moratorium on new power plants without capture and sequestration

Dear President and members of Federal Council,

Your leadership, and continued leadership by Switzerland, is needed on the matter of climate change, a matter with ramifications for life on our planet, including all species. Prospects for today's children, the world's poor, and nature itself, hinge upon success in stabilizing climate.

For the sake of identification, I am a United States citizen, director of the NASA Goddard Institute for Space Studies and Adjunct Professor at the Columbia University Earth Institute. I am a member of our National Academy of Sciences, have testified before our Senate and House of Representatives on many occasions, have advised our Vice President and Cabinet members on climate change and its relation to energy requirements, and have received numerous awards including the World Wildlife Fund's Duke of Edinburgh Conservation Medal from Prince Philip. I write today, however, as a private citizen, a resident of Kintnersville, Pennsylvania, USA.

I recognize the leading role Switzerland has on the international discussion about climate change. Your country has been a strong supporter of actions to mitigate dangerous climate change, including the work of the Intergovernmental Panel on Climate Change (IPCC). Over thirty leading Swiss scientists were involved in preparing the IPCC 2007 reports, either as authors or experts. The nomination of Professor Thomas Stocker as co-chair of the forthcoming IPCC reports is a recognition of the work on climate change conducted in your country.

You are thus in a very good position to understand that global climate is near critical tipping points that could lead to loss of all summer sea ice in the Arctic with detrimental effects on wildlife, initiation of ice sheet disintegration in West Antarctica and Greenland with progressive, unstoppable global sea level rise, shifting of climatic zones with extermination of many animal and plant species, reduction of freshwater supplies for hundreds of millions of people, and a more intense hydrologic cycle with stronger droughts and forest fires, but also heavier rains and floods, and stronger storms driven by latent heat, including tropical storms, tornados and thunderstorms.

Feasible actions now could still point the world onto a course that minimizes climate change. Coal clearly emerges as central to the climate problem as I explain it below. Coal caused fully half of the fossil fuel increase of carbon dioxide (CO_2) in the air today, and on the long run coal has the potential to be an even greater source of CO_2. Due to the dominant role of coal, solution to global warming must include phase-out of coal except for uses where the CO_2 is captured and sequestered. Failing that, we cannot avoid large climate change, because a substantial fraction of the emitted CO_2 will stay in the air more than 1000 years.

Up to now, Switzerland has stayed away from coal emissions. You have the chance to produce your power entirely from non fossil fuels. Yet, I learned that at least nine public Swiss companies now want to start producing electricity from coal in Germany and Italy. This switch to coal would be a devastating symbolic turn from a country that has a strong reputation on ecological matters.

While I know that you have little authority to regulate this – for your information I have written to Chancellor Merkel – I ask you to do everything in your power to prevent Swiss companies to invest in coal power plants unless those plants are equipped with carbon capture and storage systems. I give you hereafter the reasons.

Climate Situation

Scientific data reveals that the safe level of atmospheric carbon dioxide (CO_2) is no more than 350 ppm (parts per million), and is likely less than that. Implications for energy policy are profound, as atmospheric CO_2 is already 385 ppm. A course that minimizes climate change is still feasible[1,2]. But basic fossil fuel facts must be acknowledged to define that course.

Coal slightly exceeds oil as a source of CO_2 emissions today (Figure 1a). Because of the long atmospheric lifetime of past emissions, fully half of the excess CO_2 in the air today (from fossil fuels), relative to pre-industrial times, is from coal[3] (Figure 1b). Moreover, coal use is now increasing, while oil production has stagnated. Oil production will peak and be constrained by available resources earlier than will coal production.

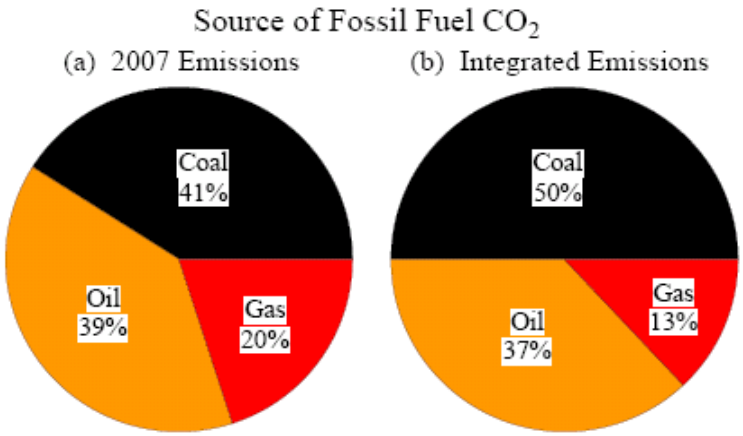


Figure 1. Contribution of each fossil fuel to 2007 CO_2 emissions (a) and to excess CO_2 in the air today (b) relative to pre-industrial CO_2 amount.

Coal is central to solution of the climate problem. Coal is not only the main cause of excess CO_2 in the air today; it has the greatest potential for future emissions (Fig. 2a). Due to coal's dominance, solution to global warming must include phase-out of coal use except where CO_2 is captured and sequestered. If coal is phased out uniformly between 2010 and 2030, except where CO_2 is captured, atmospheric CO_2 will peak at 400-425 ppm and then begin to decline (Fig. 2b). Maximum CO_2 depends upon whether EIA (Energy Information Administration) or IPCC oil and gas reserve estimates are more realistic.

Coal and oil differ fundamentally. Oil is used mainly in vehicles, where CO_2 cannot be captured. Extractable oil is nearly half gone. Most remaining oil, much of it in the Middle East, surely will be used with the CO_2 injected into the air. Limitations on drilling in the Arctic, off-shore areas, and public lands can help keep exploited reserves closer to the IPCC estimate than the larger EIA estimate, but most readily available oil will end up as CO_2 in the air. In contrast, scenarios that keep coal in the ground, or used only where the CO_2 is captured, are feasible.

The upshot is that large climate change, with consequences discussed above, can be avoided only if coal emissions (but not necessarily coal use) are identified for prompt phase-out. A corollary is

that a strategy based on 20%, 50%, or 80% CO_2 emission reduction without taking into account the origin of CO_2 is doomed to failure, because it would allow substantial coal emissions to continue indefinitely. Once CO_2 emissions are in the air, they cannot be retrieved. The only practical solution is to avoid coal emissions.

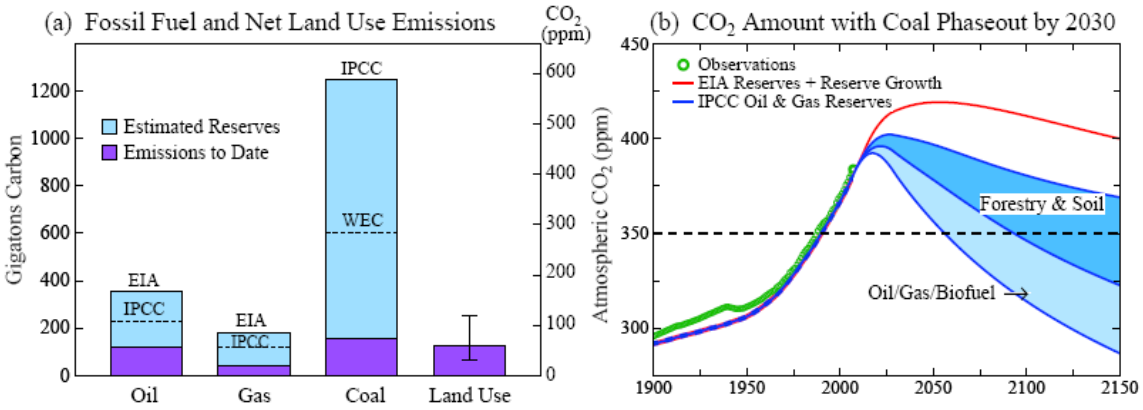


Fig. 2. (a) carbon sources, and (b) CO_2 scenarios if coal emissions are phased out linearly over 2010-2030 period; return below 350 ppm can be hastened via reforestation and carbon sequestration in soil, and further via capture of CO_2 at gas-fired power plants.

Real world trends present a sobering picture. Coal's relative contribution to CO_2 emissions is increasing almost worldwide in recent years. Moreover, there are plans for construction of new coal-fired power plants in many countries, plants with a lifetime of half a century or more.

Leadership in halting these plans is essential if we are to avoid handing our children a problem that is out of their control. Choices among alternative energy sources – renewable energies, energy efficiency, nuclear power, fossil fuels with carbon capture – these are national matters. But decision to phase out coal use unless the CO_2 is captured is a global imperative, if we are to preserve the wonders of nature, our coastlines, and our social and economic well being.

Strategic Approach

If developed nations had a moratorium on coal-fired power plants, and then phased out coal use by 2020 except where CO_2 is captured, and if developing countries followed a similar path with unsequestered coal use phased out by 2030, atmospheric CO_2 could follow the scenario shown in Fig. 2b. Maximum CO_2 would be 400-425 ppm, depending upon oil and gas reserves and the degree to which fossil fuels are extracted from public lands and off-shore areas.

This low (~400 ppm) limit depends upon one huge caveat, in addition to a prompt coal moratorium and phase-out of coal emissions: emissions from unconventional fossil fuels, such as tar shale and tar sands, must be kept small by either a carbon tax or requirement of CO_2 sequestration.

An appropriate carbon tax rate would obviate bizarre propositions such as cooking the Rocky Mountains to drip oil from tar shale. A reasonable growing carbon tax rate would hasten transformative changes needed for the clean post-fossil-fuel era, i.e., greater energy efficiency and carbon-free energies. The carbon tax should be accompanied by improved efficiency standards for appliances, lighting, vehicles and buildings, and altered utility profit motives. In hard economic times with high fuel costs the public will rebel against any carbon tax – unless 100% of the tax is returned immediately, monthly, to the public on a per capita basis[2,4].

Carbon taxes will drive energy innovations and the dividend will spur the economy. Taxes can be fruitfully initiated on a national basis; any trade disadvantage should be eliminated via an import duty on products produced in other countries that do not impose a comparable carbon tax, with 100% of the duty added to the per capita dividends.

CO_2 can be brought back to 350 ppm this century in the coal-phase-out scenario (Fig. 2b) via improved forestry and agricultural practices, including reforestation and use of biochar to enhance soil fertility and sequestration of carbon, which together realistically can reduce CO_2 by ~50 ppm. Faster return below 350 ppm can be obtained via CO_2 capture at gas-fired power plants and power plants burning bio-waste. Stabilization of climate would likely also require reduction of non-CO_2 climate forcings such as methane, tropospheric ozone and black soot[3].

Summary

There is urgent need for actions to stem climate change. The Earth's climate history and ongoing climate changes show that our climate today is approaching tipping points, which, if passed, could have devastating consequences.

Fundamental knowledge about fossil fuel carbon reservoirs reveals an imperative: coal use must be promptly phased out except where CO_2 is captured and sequestered. Yet building of new coal-fired power plants continues unabated. Leadership must not ignore fossil fuel facts. A strategy

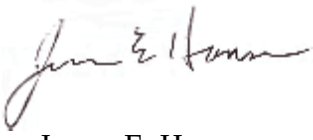
adopting CO_2 reduction targets, whether voluntary or mandatory, is doomed to failure unless it prohibits coal emissions. Fig. 4 illustrates the importance of coal even in the era of abundant oil. In the future, as oil use peaks, coal will be increasingly dominant in determining atmospheric CO_2 change.

The urgent stop-gap essential action to save the planet is a moratorium on new coal, as follows from the physics of the matter, explained above. By itself this action could cause energy shortages. Thus it must be accompanied by measures to spur energy efficiency, renewable energies, and other carbon-free energies. Federal Council, we cannot avert our eyes from the basic fossil fuel facts, or the consequences for life on our planet of ignoring these facts. If we continue to build coal-fired power plants without carbon capture, we will leave for our children a situation not of their making but out of their control, an impoverished future containing growing climate disasters associated with the passing of climate tipping points.

Dear President and members of Federal Council, I hope that you will look at the fossil fuel facts that I have presented above and consider the possibility for leadership in this topic, which will be so important for our children and all the inhabitants of our planet.

With all best wishes,

Yours sincerely,



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Copies: to concerned State Councils, Town Councils and power plant companies.

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1 Target atmospheric CO_2: where should humanity aim? J Hansen, M Sato, P Kharecha, D Beerling, R Berner, V Masson-Delmotte, M Raymo, D Royer, J Zachos, *The Open Atmos. Sci. J.*, 2008, **2**, 217-231

2 Global Warming Twenty Years Later: Tipping Points Near, J Hansen, http://www.columbia.edu/~jeh1/2008/TwentyYearsLater_20080623.pdf

3 Dangerous human-made interference with climate: a GISS modelE study, J Hansen et al http://pubs.giss.nasa.gov/docs/2007/2007_Hansen_etal_1.pdf

4 "Carbon Tax and 100% Dividend" is a derivative of the cap and dividend approach described by Peter Barnes in "Who Owns the Sky: Our Common Assets and the Future of Capitalism", Island Press, Washington, D.C., 2001 (http://www.ppionline.org/ppi_ci.cfm?knlgAreaID=116&subsecID=149&contentID=3867).