Nuclear Power: The Last Best Option

I never thought I’d favor nuclear power. But here it is: I believe nuclear energy is our last best chance to stem the tide of climate change. Time is running out for reversing greenhouse gas emissions and transitioning from the fossil fuel age. Nuclear power must occupy a larger share of our energy mix and replace coal-fired power plants. For energy policy, I think “near-term” decisions should still favor: (1) energy efficiency; (2) big wind; and (3) small solar. But nuclear power is going to be needed, too.

What convinces me? Answer: The figure below (from Climate Action Tracker, Climate Analytics/Ecofys/PIK) which shows our burgeoning global greenhouse gas emissions despite 20 years of international treaty negotiations and little progress. Basically, we are following “Business-as-Usual”, and even with the current “Pledges” of all countries under the United Nations Framework Convention on Climate Change, we fail to level-off our emissions. Yet, an 80% cut is needed to stabilize the atmosphere at 450 ppm CO2 and to keep global warming less than 2 °C. Without drastic intervention soon, we are doomed to endure a 3–4 °C warmer world in this century—a climate so different than the Holocene period with which we evolved, as to be unimaginable. And after this 21st century warming, temperatures and extremes would continue to increase uninterrupted unless (and until) we can turn this curve upside-down to near zero fossil fuel emissions (~10 GtCO2 eq/yr).

After all, the oldest constitution in the world is that of the United States, and it is only 223 years old.

Keeping nuclear waste stable and dry for 40 000 years is also quite a challenge. Forty thousand years ago, much of North America was glaciated with extensive ice cover and meltwater ran from the edges. How would one mark a site and keep it dry for such a long time? And what written language should one use to warn of a hazard for so long? Forty millennia ago, the English language was nowhere spoken. In fact, the origins of old English date to only 450 A.D. We surmised that modern languages would be extinct in 40 millennia, and one should employ a kind-of hieroglyphics to mark these sites—symbols such as “Pac Man” eating radioactive waste with a big red line drawn diagonally through the image (Message: Do not eat)!

One must truly think “out-of-the-box” to wrap your brain around husbandry of any kind for 40 000 years.

And then there is the problem of nuclear proliferation and the vulnerability to terrorists when wastes are transported nationwide to central locations. Think “dirty bomb”. To expand nuclear power, nations must have a plan for safely reprocessing spent nuclear fuel and an acceptable (retrievable) nuclear waste repository somewhere. These are not small caveats.

Still, I conclude that the alternative of rampant climate change is even more risky. Thus, low carbon energy sources are desperately needed. Nuclear power in the 21st century promises to be more modular and much safer than existing nuclear plants. And I must concede that the existing nuclear power industry has established a good safety record (Chernobyl and Fukushima notwithstanding), especially when compared to the coal-mining industry.

For these reasons, I hold my nose and respectfully (sustainably) endorse nuclear power as an important part of our energy future.

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Notes
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