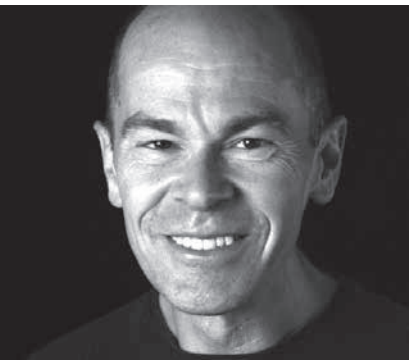
The nuclear option
The case for using nuclear power to combat climate change

By Robert Stone



Robert Stone is an Oscar-nominated, internationally acclaimed documentary film-maker. His most recent film, Pandora's Promise, chronicles the transition of several leading environmentalists from anti-nuclear to pro-nuclear in the face of climate change, and the promise of next-generation reactor technology. He recently co-founded the non-profit organization Energy for Humanity, a pro-nuclear environmental advocacy group based in London.

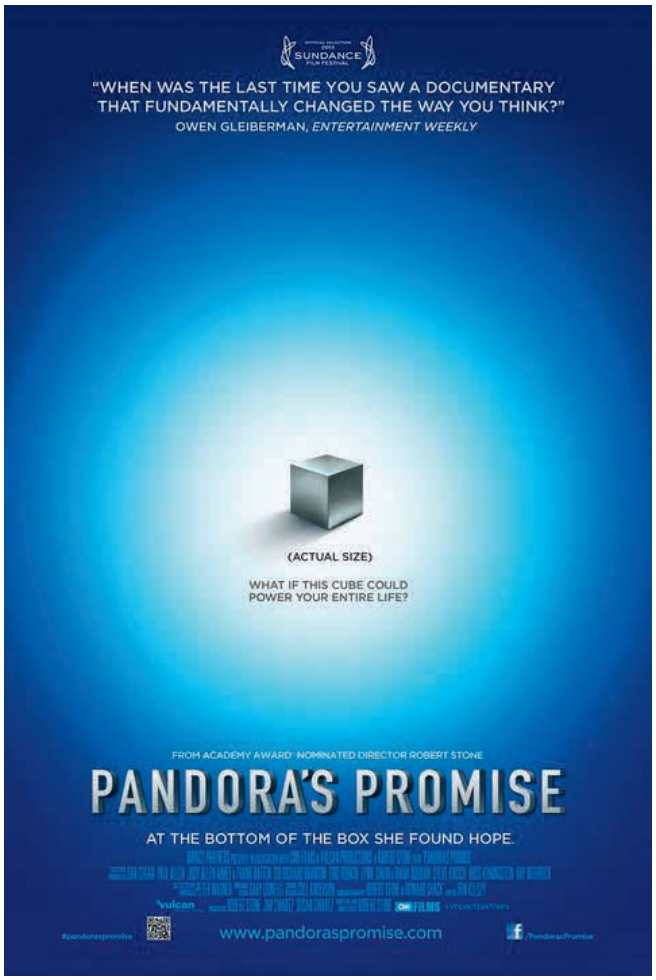
In December 2015, world leaders will gather in Paris to hammer out a global treaty designed to ratchet back emissions of CO_2 into the atmosphere caused by the burning of fossil fuels. I would urge each delegate, upon checking into his or her hotel room, to step out on to the balcony, take a deep breath, look out at the lights of nuclear-powered Paris and draw inspiration for what a clean energy future might look like. Thanks to France's decision to deploy nuclear power in a big way some 30 years ago, the country's electric grid is now almost entirely carbon free. What's even more remarkable is that the vast majority of that transition was carried out in just 11 years (1969–1980), using the technology of the time. France today enjoys almost zero air pollution from the production of electricity and the cheapest electricity rates in western Europe.

Will the climate activists and delegates take heed of what France has accomplished and look to it as a precursor of what might be possible globally? Preliminary negotiations in Lima in late 2014 have taken nuclear energy off the agenda of the climate talks. The world's leading environmental groups, which are largely driving the agenda, posit that nuclear energy is an unnecessary distraction on the road to a renewable energy future. In making their case they argue that humanity can reduce overall energy demand while simultaneously providing adequate energy to the 3 billion people who currently live with little or no electricity at all, and take care of the additional 3 billion people to be born between now and 2050. They argue that we are on track to being able to replace the entire existing fossil fuel infrastructure, abandon nuclear energy altogether, and meet all the world's energy needs by using renewable energy alone. And we've barely begun to talk about the additional energy that will be required to electrify the world's transportation sector and meet the growing demand for energy-intensive water desalination.

It's a wonderfully compelling vision that it is within our grasp to inhabit a world in which all of humanity could be supplied with unlimited clean energy from the wind and the sun. A great many environmental activists have devoted their lives to realizing this dream. The trouble is that there's little evidence to suggest that any of this is practically possible in the real world. There have been a few widely cited academic studies that demonstrate how with unlimited political will and unlimited resources, coupled with an assumed steep decline in global energy demand, there's at least a theoretical basis for imagining it could be carried out. Germany, which is abandoning nuclear energy, is widely believed among environmentalists to be an example of a nation well on its way towards being almost entirely powered by renewable energy. In fact, Germany gets 5% of its electricity from solar power and about 8% from wind (more than any other major industrial nation). This still leaves 87% of the country's electricity needs coming from other sources — including hydro and biomass, but mostly fossil fuels. Germany is also one of the only European nations that continues to build new coal plants.

There is no assurance that we'll be able to reverse the current trends that are hurtling us towards a potential climate catastrophe. But I believe we are irresponsibly diminishing, and very likely eliminating, our chances of success if we insist on trying to solve this problem without deploying nuclear energy in a big way. In a world that is adding the energy equivalent of another Brazil to the planet every year, and where coal remains not only the most widely used source of energy, but also the

fastest growing, nuclear energy has the potential to make a significant contribution to the type of clean energy mix that will be required if we are to seriously scale back on our dependence on fossil fuels globally. Nuclear is by no means the only solution to every locality or situation. Wind, solar, hydro, increased use of natural gas in the short term, and perhaps advances in carbon capture and storage technology, are all components of an overall transition to clean energy. But removing the unique potential of nuclear energy from the equation, as the climate activists set to gather in Paris seem determined to do, is to risk disaster.



Critics of nuclear energy point out that the current iteration of the large-scale light water reactor is constrained politically and economically as a sustainable and viable solution to our global energy challenges. What is often ignored, however, is the fact that many cutting-edge advanced reactor designs, the science for which has been developed over many decades, are nearly ready to be commercialized (and would be now had anti-nuclear groups not rallied to cut off research and development funding years ago). The next generation of nuclear plants have the ability to play a transformative role in providing clean energy on the massive scale that will be required to meet the new climate targets. Using today's nuclear waste for fuel, plus the ability to extract uranium from seawater or switching to an abundant thorium fuel cycle, assures a virtually inexhaustible supply of fissionable material to meet the electricity needs of everyone on the planet essentially forever, while virtually eliminating the accumulation of long-lived radioactive waste. Passively safe advanced designs, like molten salt reactors and small modular reactors, offer the promise of dramatically improved economics for nuclear energy by minimizing the need for the kinds of costly and complex safety systems required for today's nuclear power plants. Mass production of modular components on assembly lines, rather than on-site construction, can streamline the production process and allow for a rapid scaling of the technology at dramatically lower cost. The same manufacturing techniques used today to produce commercial jet aircraft — an even more complex, yet remarkably safe and reliable technology — could soon be turning out standardized, modular nuclear power plants at a rapid clip. It can be done.

To the delegates soon to gather in Paris, look out of your window when you get there, and take in the view. The proof-of-concept of a fully implemented, nation-scale transition from fossil fuels to clean energy is staring you in the face.