

Testimony
John Gilleland, Chief Technical Officer, TerraPower,
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THE STATUS OF ADVANCED NUCLEAR TECHNOLOGIES

Good morning. My name is John Gilleland. I am Chief Technical Officer of TerraPower, a nuclear design company based in Bellevue, Washington. I would like to thank Chairman Murkowski and the members of this committee for the invitation to testify here today and to extend my particular thanks to our home state Senator, Maria Cantwell, who is such as a strong supporter of our operations.

TerraPower's goal is to bring our technologies to markets globally as sources of clean, non-emitting, affordable base load electricity. TerraPower is the developer of the Traveling Wave Reactor (TWR), a full size, sodium cooled, Generation IV fast reactor. We are also working with Southern Company, Oak Ridge National Lab and the Electric Power Research Institute in the early R&D phase of an additional Generation IV reactor technology that received a DOE Advanced Reactor Concept award in January.

Today I will talk about the traveling wave reactor because we have come a long way and we would like to convey the lessons we have learned over the last ten years.

In 2006, Bill Gates, our chairman, convened a group of colleagues from the world of science and technology to address two issues: energy poverty and pollution.

Many inhabitants of developing countries have little access to affordable base load electricity. Power outages and load shedding cripple manufacturing and extractive industries. Hospitals cannot function without access to reliable power. A child cannot do homework without light to read. As President Obama recognized in his "Power Africa" initiative, the road to economic and human development is blocked if affordable, dependable power is unavailable. It has been known for a long time that access to electrical energy is essential to human development.

But the global consensus of scientists is that climate change requires us to radically reduce carbon emissions. Since developed countries and now developing countries are meeting the populations' demand for base load power by burning large amounts of fossil fuels, the resulting emissions are locking us into a deteriorating spiral of climate change and damage to our environment.

Bill Gates and his colleagues looked at the entire menu of low carbon energy solutions. They concluded that nuclear power is an essential element of any credible low carbon emissions solution. For the right uses in the right venues, wind and solar can play valuable roles, but nuclear is the only known technology that can provide the needed huge amounts of energy with a minimum impact on our land use and thus on the natural world.

Nuclear power has already demonstrated its ability to generate large scale, dependable electricity without emissions at affordable prices. And the new nuclear plants now being constructed are setting new standards for accident prevention.

But we can use 21st century technologies to do even better much better. Even greater safety improvements, significantly reduced waste production, great extension of fuel supplies, reduction in weapons and terrorist risks and last but not least, lower cost of carbon-free electricity are all possible.

Our flagship technology, the traveling wave reactor, or TWR, offers improvements in all those areas. Its use of a sodium coolant at atmospheric pressure combined with innovative new fuel designs enables operation with far greater safety margins while producing much less waste. It produces only one-fifth of that produced by existing plants. This amount would fill only one and a half rail cars over the plant's 60-year lifetime. The energy value of each pound of mined uranium is increased by more than an order of magnitude and the need for enrichment facilities is greatly reduced.

I would like to conclude with two remarks. The private sector must, and is, stepping forward to develop a new generation of commercially viable plants.

TerraPower is already using federal facilities such as the Idaho National Laboratory. Like other companies, TerraPower pays to access the government's highly qualified, skilled researchers and advanced equipment. Ours is an example of public-private partnership. The bulk of our funds, all from private visionary investors, have gone to universities, businesses and national laboratories. This is in the spirit of the recent Paris meetings and the Breakthrough Energy Coalition's mission innovation goals.

The recent White House summit on nuclear energy endorsed this approach. The "Gateway for Accelerated Innovation in Nuclear" or GAIN, aims to integrate the capabilities of the private sector, universities and laboratories. If Congress provides the labs and universities with the resources, the labs and industry can grow together. We believe this is essential to leverage our strengths and make Gen IV a reality.

Second, the government needs to supplement private sector efforts with a solid oversight function. Already, TerraPower coordinates our international activities regularly with the Department of Energy's National Nuclear Security Administration and the Department of State. Similarly, we consult with the Nuclear Regulatory Commission. We urge Congress to ensure that the NRC has sufficient know-how and funding to license this country's next generation of nuclear plants.

Our efforts on the TWR and the MCFR are two designs. We encourage exploration of other innovations as well. It is only by working together that we will achieve the breakthroughs we need to make advanced reactors and a better world a reality.

Thank you for your time.