

**Questions for the Record**  
**Submitted by Senator Robert Menendez to**  
**Dr. James Hansen**  
**Senate Foreign Relations Committee Hearing**  
**Keystone XL and the National Interest Determination**  
**March 13, 2014**

**Menendez question #1:** Given that a new nuclear power plant would probably cost more than \$12 billion, it seems few companies are willing to take the risk to build new plants here. This reluctance occurs despite the fact that new nuclear plants receive a production tax credit, and that the federal government has agreed to foot some of the bill in the case of a catastrophic accident. What makes you so bullish on nuclear power when other technologies, with less carbon emissions, are attracting much more investment in the United States than nuclear power?

**Response #1:** Your question about cost requires addressing both the cost of current nuclear power and recognition of how we have reached the current high-cost situation.

Frankly, a clean energy future in the United States requires that the Democratic Party recognize that its position on nuclear power, ranging from neglect to outright hostility, is in part responsible for that situation and is a major threat to the well-being of young people and other life on our planet. My criticism of your party is constructive, and I hope you will take it that way.

Today global fossil fuel CO<sub>2</sub> emissions are accelerating rapidly, because the countries that need increased energy have no viable alternative to fossil fuels for base-load electric power. Their energy, to a large degree, is being used to make products for us, people in the West, as much manufacturing has moved to these developing countries.

Why was the world unprepared for carbon-free energy needs, when the threat of climate change has been known for decades? I am compelled to point out the truth of the situation, because I am committed to do as much as I can to minimize undesirable human-made climate change – and providing objective information is the best thing that I can offer. One of the principal reasons for the world’s unpreparedness concerns policies about nuclear power.

Most nuclear power plants operating today are of a technology now about 40-50 years old. Despite that, these power plants have saved an enormous number of lives and reduced carbon emissions to the atmosphere, as my colleague, Pushker Kharecha, and I have quantified.

However, research and development of nuclear power slowed to a crawl in the past few decades, in good part because of decisions made in the Carter and Clinton Administrations. Nevertheless, progress was not entirely prevented and it is still possible to minimize the damage that was done.

The enormous growth of coal use in countries such as China and India needs to be replaced with carbon-free energy. “Renewables” can help, but despite large subsidies and mandated use, they provide only a small fraction of energy use, and cannot even match the growth of global energy demand, let alone replace existing fossil fuel use, which is the requirement imposed by climate.

The United States should work together with China and India to develop the safest, most economical nuclear power that today’s technologies make possible. Indeed, we have an

obligation to do that, because we burned a large part of their carbon budget, and we are now all in the same climate boat. Furthermore, it is an opportunity for us, because these nations must build power plants on a large scale, which allows an opportunity to compare alternatives, gain experience, and produce a sufficient number of power plants to drive down the unit cost.

In this way it will be possible to address one of the two principal reasons that nuclear power plants are now expensive to construct in the United States. I refer to the fact that the time and cost required for construction of a nuclear power plant remains high if each new plant has a new design. In contrast, after the oil embargo of 1973 France made a policy decision to select one design from then-available technology to produce a fleet of reactors. They constructed these reactors in about 15 years. As a result their electricity prices are about half those in neighboring Germany. In addition, unlike Germany and several other European nations, they have much less concern about Russia's potentially fickle willingness to provide fossil fuels.

It is uncertain whether technical progress in nuclear technology resulting from extensive near-term experience in China can then circle back to the United States. If we allow the "anti-nuke" minority in the United States to dictate policies, there is a danger that the United States will become second rate technically, with substantial damage to our economic well-being. There is no fundamental reason that should happen. We still have the best university system in the world and potential innovation second to no other nation. However, we must foster those capabilities.

The second major reason that the cost of nuclear power plant construction in the United States is high concerns the Nuclear Regulatory Commission. As noted in my written testimony to your Committee, reforms of the NRC are badly needed. The NRC does a good job of regulating. They have capable technical staff, and their resident inspectors do a good job at nuclear plants, including reporting on incidents and keeping the nuclear plant operators on their toes.

In contrast, the nuclear reactor permitting process has become a lengthy bureaucratic lawyer-laden paperwork process that causes delays of years and cost growth of billions of dollars. NRC, industry and the public are not adversaries, yet the NRC often is, in effect, acting as such. We must fix the permitting process. This probably requires removing the permitting function from NRC, and starting over with a new organization that is given guidelines and procedures that better serve the nation's needs.

A sensible energy policy for the United States would not have us blowing through new-found gas resources in a few decades and moving to increasingly polluting and destructive mining. Instead we would honestly treat gas as a transition fuel to a clean energy future. That future would include the improved safe nuclear power that is possible with today's technology. With an effective energy policy the cost of a modern nuclear power plant could be driven down to a fraction of the cost that you quote.

Regarding your specific comment about costs and production tax credit, please note that nuclear power receives much less favorable treatment than renewable energy:

(1) Nuclear production tax credit (PTC) of 1.8 cents/kwhr is not indexed for inflation. PTCs for other low carbon energies are indexed. PTC for wind is 2.3 cents/kwhr.

(2) Nuclear PTC is limited to 8 years, and 6000 MWe capacity nationwide, so if more than a few nuclear power plants are built the amount of the PTC will be reduced proportionately.

(3) There is a limit on the PTC per facility that will reduce the PTC per kwhr for power plants producing more than 1000 MWe, a major loss for EPR or APWR (1600-1700 MWe each).

(4) Plants must be placed in service before 1 January 2021. Thanks to NRC slowness, that practically eliminates any PTC for new nuclear power.

Regarding your question about investments in renewables, I am surprised that you seem to be unaware of why renewables are generating more investment than nuclear power. Do you know about “renewable portfolio standards”? If government cares about young people and nature, why are these not “carbon-free portfolio standards”? Who pays the hidden cost of such rules? The cost is passed to all electricity users. This is a huge hidden subsidy, reaped by only renewables. There is a complex array of other financial incentives for renewables. Their lobbyists threaten to halt construction if any of these “temporary” incentive programs end. Incentives include the possibility of a 30% investment tax credit in lieu of the PTC, providing a large “time-value-of-money” advantage over a PTC spread over 8-10 years, accelerated 5-year depreciation, state and local tax incentives, loan guarantees with federal appropriation for the “credit subsidy cost”.

Nuclear power, in contrast, must pay the full cost of an NRC license review, at a current rate of \$272 per professional staff hour, with no limit on the number of review hours. The cost is at least \$100-200 million. The NRC takes a minimum of 42 months for its review, and the uncertainty in the length of that review period is a major disincentive.

Your question also includes the false implication that these other technologies have less carbon emissions than nuclear power. Wind is close to nuclear power in low carbon per MWe, but most solar energy technologies have higher carbon emissions per MWhr of electricity produced.

**Menendez question #2:** In your testimony, you state that further nuclear cooperation with China is important. From a climate perspective I can understand your argument. However, given China’s lack of transparent governance, can we trust that they will adequately oversee nuclear safety and protect the health and safety of the public?

**Response #2:** Are you implying that United States cooperation with China would make China’s nuclear reactors less safe?? Are you aware that Russia is more than willing to provide their technology to China? Your question turns reality on its head. If the United States wishes to make Chinese nuclear plants as safe as possible, we should be working with them.

You seem to be implying that you think there would be nuclear accidents in China killing more than 1,000,000 per year. Coal emissions (excluding the present and future damage from climate change) now reduce life expectancy more than 5 years in China, killing more than 1,000,000 people per year, and also make the years prior to death much less healthy and happy.

The technology of presently operating nuclear reactors in the United States is 40-50 years old and would not be built in China. Newer reactors, such as the Westinghouse AP-1000 now being built in China, will shut down in the event of an anomaly such as an earthquake and they can cool themselves for days without any external power. This technology is already a vast improvement over existing power plants in the United States, and still better technologies are possible if we would cooperate in the research, development and demonstration.

**Summary:** Globally, nuclear power has an essential contribution to make, if the world is to phase off fossil fuels in time to avoid disastrous climate consequences. In the United States, nuclear power is essential if we are to avoid massive expansion of “fracking” and increasingly destructive fossil fuel mining as the industry goes after sources that are harder and harder to reach.

When the history of our planet is written, the United States will stand in stark relief. It remains to be seen whether that bold impression will be positive or negative. At the end of World War II and in years thereafter we stood as a positive leader, with generosity to our foes and generosity to our friends in the rebuilding of their nations.

Are we so blind and selfish that we cannot see what is happening now? We burned more than twice as much fossil fuel as any other nation (including China, even though their population is four times larger). Are we so foolish that we will pretend that renewables provide all the energy the world needs, refusing to admit the obvious conclusion that this locks our children into fracking, that it locks them into tar shale and tar sands, and that it locks the world into coal?

Our parents did not understand that their burning of fossil fuels caused a problem for future generations. On the contrary, they were the great generation responsible for the generosities that I mentioned above. If we continue on our current path, pretending that we do not understand the consequences, what adjective do you think our children will apply to our generation?