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HCOMM 312

22 October, 2015

Weighing the Cost of Nuclear Energy

While it may not be constantly at the forefront of newscasts every day, the inhabitants of this planet are struggling amongst themselves daily to decide where exactly our civilizations should get their energy from. Due to the large carbon footprint created by the use of fossil fuels, many believe that, in order to ensure a healthy future for our planet and the creatures residing on it, we must turn away from the use of oil and such similar fuel sources. However, that is where the conversation splits. There are multiple forms of alternate fuel available, but none have been developed to the level of efficiency found with fossil fuels. With money and resources being what they are, many in this argument want to choose one source and focus all of the time and energy available into developing it alone. The most commonly quoted alternate fuel sources are wind, water, solar, and nuclear energy. Present technology considered, and development timelines scrutinized, nuclear energy is the best bet for a clean energy future.

The process of nuclear energy is fairly straightforward: heat generated by breaking down uranium atoms through the process of nuclear fission creates steam that drives turbines, in a manner very similar to fossil fuel plants. Currently, nuclear energy powers about 11% of the world's electricity, with over 430 reactors currently operational in thirty-one countries around the world. Beyond that, some countries are currently operating research reactors that provide small amounts of electricity for the owners of the reactors, and 180 nuclear reactors are currently active on ships and submarines located around the world. Many of these reactors are not running

at full capacity for various reasons, which means that the potential output from these systems could be much greater. As of February 2015, 70 more reactors were under construction, with more than 160 reactors being "firmly planned" (World Nuclear Association, 2015). The vast majority of these reactors use Uranium-238 and Uranium-235 in the fission process, that, while capable of being used for years on end, and then recycled into new fuel, does create highly radioactive waste that is normally stored on site in large, deep tanks of water that very efficiently cuts the area affected by radiation. Currently, researchers are developing several new reactors that would improve efficiency and reduce the radioactive waste produced, but it remains to be seen how soon these reactors can be put into effect.

One very large detail in this matter is that the waste the fission does produce can be incredibly harmful, even fatal to all organic life it comes in contact with. In the past, events like Three-Mile Island and Chernobyl, as well as the potentially apocalyptic nature of nuclear weapons have deeply affected the worldview of nuclear energy, with a good amount of it culminating in the fear of radiation poisoning. It does not help matters that, during the cold war, the United States government acquired much of their weapons-grade plutonium from the waste produced at reactors. Recent meltdowns like Fukushima in March 2011 have only increased the fear of what reactors could be unintentionally capable of wreaking on the planet. For example, following the 2011 earthquake that caused Fukushima's demise, Japan went from nearly 300 reactors to less than fifty in use today. Months after the incident, newscasts were still reporting on the level of nuclear waste that may have spilled into the ocean. Also not helping matters is that most of the reactors currently active are well below the safety standard (Fukushima was heavily under code when the earthquake struck, and built in a different fashion than many of the

reactors present in America and other nuclear countries around the world, which is a big reason why the spill occurred). Many are one natural disaster away from another devastating incident.

However, much of the fear associated with the problems listed above are actually remnants of the fear born in the Cold War. The waste storage systems on site are so safe that radiation poisoning would only occur if a person was within fifteen feet of the waste. Unless a crack in the tank was within that fifteen feet radius, the vast majority of the water that would spill would be harmless to life. As it is, the current direction of nuclear power is aimed at the use of Thorium, a 'breeder' element that is three times more plentiful than uranium and would create fuel as it deteriorates, deeply extending the efficiency of the fuel. Many of the new reactors currently in development are intended for thorium use rather than just uranium. What should be also brought into consideration is that, while this fuel can be used in nuclear weapons, because the explosive power is far less than the normal uranium-plutonium mix, it is highly unlikely that this fuel would be used for the proliferation of nuclear weapons.

The most important detail of nuclear energy, however, is that reactors leave absolutely no carbon footprint; technically, reactors produced entirely clean energy. Now, many of those who oppose both nuclear energy and fossil fuels believe that the future of energy production lies in other renewable resources such as water, wind, and solar. While these renewable resource fuels are also completely clean of waste in theory, their current incarnations are incredibly inefficient when compared to fossil or nuclear fuel sources, and therefore must often use one or both as a back-up. But, theoretically, as we overcome more technological hurdles, it is very possible that these resources could one day become far superior to both nuclear and fossil fuel energy. However, much like the proposed timelines for new, more efficient nuclear reactors, it is nearly impossible to really gauge how long it will take for these advances to be made.

Focusing our resources on the development of nuclear energy is our planet's best bet. Once we get the new, more efficient reactors in action, we could wipe our hands of fossil fuels and cut a large amount of our carbon dioxide emissions. It should also be noted that nuclear energy can be seen as a compromise: once nuclear reactors are running to full efficiency, we can spend much more time and money on developing the other green energy sources while at least ensuring that we are no longer killing our planet in the process. Right now, nuclear energy is the most feasible source of clean energy.

Works Cited

"World Nuclear Association." *Information Library*. 1 Feb. 2015. Web. 29 Oct. 2015.