The Future of Nuclear Power after Fukushima: Thorium Reactors?

March 24, 2011 — Stuart Farrimond

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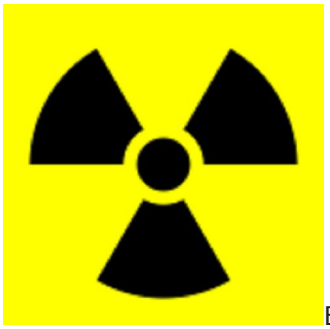
Hands up - Who thinks nuclear power is safe?



Before the Japan earthquake and tsunami on March 11, opinion surveys showed that most people thought it was. But as radiation seeps from the stricken Fukushima power plant, the world suddenly seems a very different place…

Fossil fuels have nearly run out and we all want *safe, clean* and *affordable* power for *this generation and the next*. *But is this an impossible dream?* Today's post describes how **it is possible:** It can be done with a hitherto little known type of nuclear power (yes, you read that correctly) – **the Thorium Reactor.**

Fukushima: Could have been avoided

A '*Thorium Reactor*' is ***completely different*** to the Fukushima power plant design: A Thorium reactor doesn't produce *radioactive waste* that lasts a thousand years, it won't ever have a *Chernobyl-like 'melt-down'* and it can't be used to make an atomic bomb… And **here's the Sucker Punch:** We've known about this super-efficient green technology for *over 50 years!*

Thorium technology was mothballed in the 1970s for financial and political reasons – this could well be a real-life conspiracy. Had Fukushima been a Thorium reactor, *things would have been very different…*

The Great Nuclear Conspiracy: Why you haven't heard of Thorium Reactors before...

A brief history of nuclear power: Back in the 1950s, atomic energy had just been born. Researchers and engineers slavishly tested dozens of different ways to yield this new found source of power: There were *literally thousands* of different ways tosplit an atom. But one method won out: **The solid fuel Uranium Reactor**.

A decision made in the early 1950s set in motion the wheels that means nearly every nuclear power plant today is based on this technology. The thing is, the solid fuel uranium reactor wasn't the best design. *Not by a long shot*.

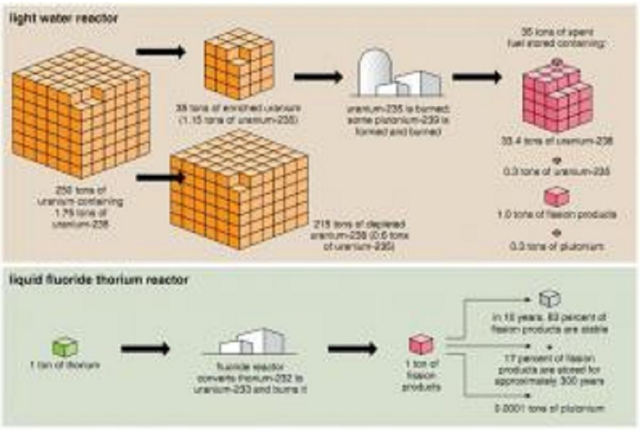
Sad but True: Atomic Bombs were the main driving force behind today's nuclear reactors

Why pick a bad design? In the early 1950s, the US Military wanted nuclear bombs. The fastest way they could do it was by getting uranium built. That way, they would have an *abundance* of the raw material they wanted for bomb making – **Plutonium-239;** a nasty waste product of a normal uranium reactor. It really didn't matter that uranium reactors were pretty *inefficient*, tended to *overheat* and relied on a rock that needed *intensive mining* and refining. *They had a bigger agenda.*

It was known then, and nuclear physicists know it now: There is a much better, safer and more environmentally friendly way to split an atom – the liquid fuel Thorium Reactor

Fast Facts: What so great about a Thorium Reactor?

- **It's safe**: Nuclear reactors, like the one at Fukushima need *constant cooling* – even if they've been switched off. Nuclear 'meltdown' happens when these cooling systems fail (like in Fukushima) and the uranium fuel core overheats. But within a **thorium reactor**, a 'meltdown' simply isn't possible – turn the power supply off and the reaction just stops.
- **It's cheap:** At the moment, thorium is being thrown away. In rare earth metal mines around the world, millions of tonnes of thorium are extracted. They don't need it – and so these companies are literally paying someone to get rid of it!
- **It's efficient:** Thorium reactors (also called LFTRs) use liquid fuel rather than solid uranium. Liquid fuel means things can mix together better, meaning thorium reactors are 200-300 times more efficient than even the best uranium reactor. Powering 1,000 homes for one year **needs only one ton of thorium**! (compared to 250 tons of uranium)
- **It's clean**: Thorium 'burns' much more cleanly than uranium, and only produces 1% of the waste (see image below). Much of the 'waste' from a Thorium reactor is actually quite useful and can be re-used for powering space probes (amongst other things)!
- **Reactors are easy to build:** Conventional nuclear power plants take about 15 years to set up and build. A thorium reactor is a much more simple structure and operates at a much lower temperature., therefore they can be much smaller and are faster to build.



Thorium vs. Uranium Reactor. Click to enlarge (Copyright: American Scientist, reproduced with kind permission)

Is Nuclear Energy really the future?

Staring in the face of fossil fuel shortages and impending climate change, the world desperately needs to change. Before now, I have never liked the idea of nuclear power being a part of that future- radioactive waste and nuclear disasters just don't really appeal! But thorium reactor technology seems to offer a great compromise for safer, greener energy.

Thanks to the internet, the word about alternative nuclear power is slowly getting out. Online communities such as **EnergyFromThorium** are also gathering momentum in the Western world. But politicians and energy companies are reluctant to invest in change. At the moment, the only country that really taking thorium technology seriously is China – and they are leading the way in researching and developing a new generation thorium power stations.

Had Fukushima, Chernobyl and Three Mile Island had thorium reactors, today's newspapers would be telling a different story. My hope is that the ongoing tragedy in Japan can act as a catalyst for change.

Many thanks to:

American Scientist Magazine – check out their website for up to date science news, articles and information

Find out More:

The EnergyFromThorium Community

An excellent video Interview with Kirk Sorenson explaining Thorium reactor technology

Read more and watch videos at the Thorium Energy Alliance

Find out about the health effects of radiation (BBC News)

What happened at Fukushima? Questions and Answers (BBC News)

References:

Robert Hargraves, & Ralph Moir (2010). Liquid Fluoride Thorium Reactor *American Scientist, 98*, 304-313