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GridReserve® - Nuclear Energy Compatible with Renewables

Nuclear Energy has traditionally been used only for baseload power – we can change that with a proven, economically viable, energy storage technology

Baseload power is an old concept that is rapidly becoming meaningless. The idea that much of our power generation could run 24 hours a day was correct when we only had to worry about power demand going up and down. There was always a baseload demand. But today we not only have power demand varying, but we also have renewable power generation varying – and not at the same time. There was a day in 2015 when the UK energy demand was fully satisfied with wind power. In the USA, wholesale power prices regularly go negative when lots of renewable energy coincides with low demand. Generators actually pay their customers to take their power!

As a result a large part of our total generation capacity has to remain gas powered, because only gas can economically turn on and off quickly during the day. CO2 emissions therefore stay high despite the increase in renewable energy sources.

Why can nuclear energy not replace gas as this backup power source? The problem is actually not technical - nuclear plants can be designed to ramp power up and down. The problem is economic. A nuclear power station saves almost no cost when it shuts down, so if it only operates for 50% of its capacity, its cost of electricity doubles. That is utterly unaffordable.

The solution is of course obvious. Store the excess energy when it is not needed and use it during times of peak demand. But there is no technology capable of economically storing electricity at large scale yet available.

A commercially proven technology does however exist to store heat. It is used in concentrated solar power plants where the sun's heat is stored during the day and then used at night to maintain electricity production. It works and it is highly economical, adding only a fraction to the cost of electricity produced. You can see the detailed costing at http://www.nrel.gov/docs/fy12osti/53066.pdf. The technology actually uses molten salt - but a different one to those used in our reactor.

Why do we not already use this technology to store our excess nuclear energy? Conventional nuclear reactors only produce heat at about 300°C and that is just not hot enough to be usefully stored.

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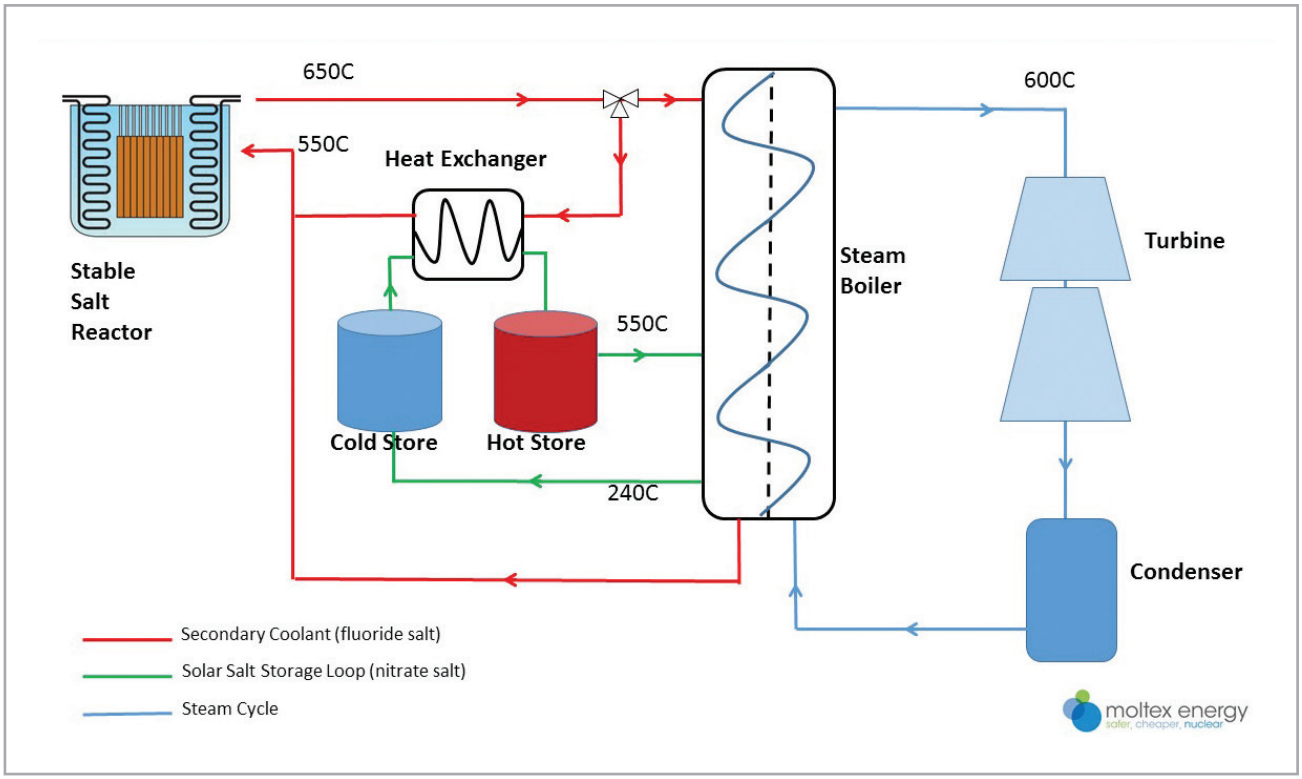
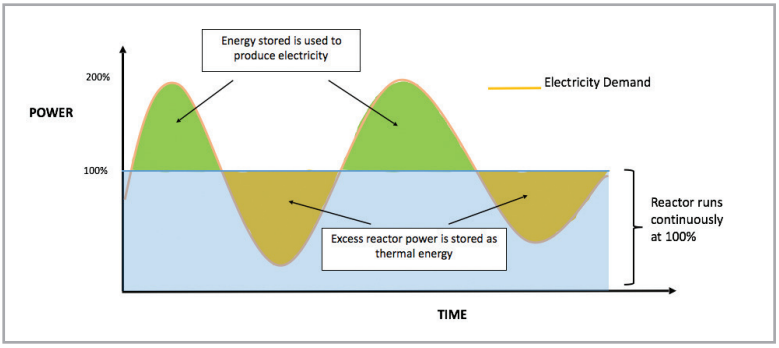
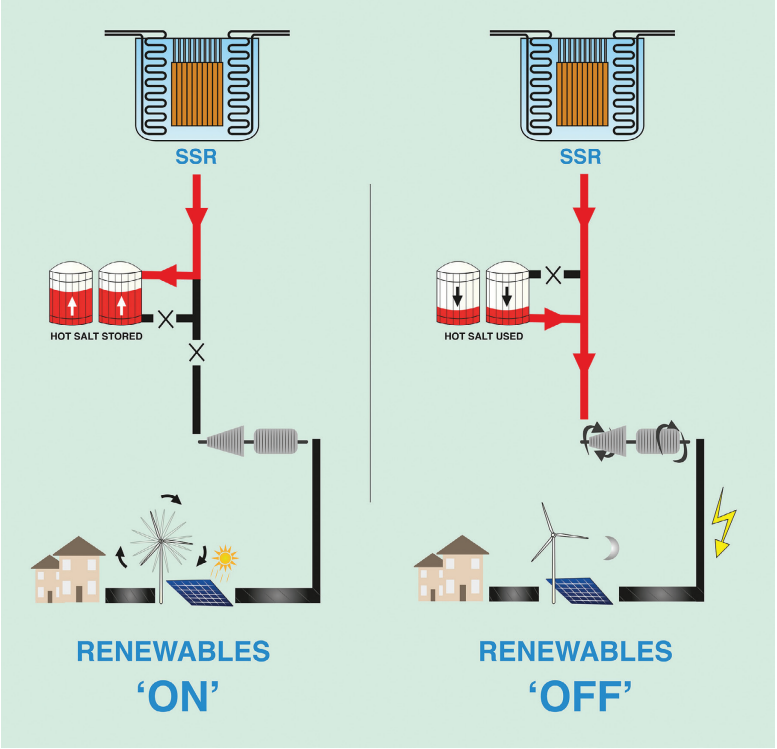


But the Stable Salt Reactor produces its heat at just the right temperature for this heat storage technology, around 600°C.

What this means is that we can run a 1000MW Stable Salt Reactor 24 hours a day but store its heat output for as much as 8 hours when there is no demand for the electricity. Then when electricity demand rises we can double our power output to 2000MW for 8 hours.

This is a game changer for flexible electricity supply. We can continue to build a renewable power system. But the power needed to complement the renewable energy's intermittency can be carbon free power from our Stable Salt Reactors. This opens up the real opportunity for a fully carbon free electricity generation system.





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