One thing we have learnt this week – energy storage

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Energy storage gets talked about a lot at the moment. When this subject is mentioned its almost always Li ion batteries. There are other options for energy storage but these are tending to get forgotten about. There is pumped storage of course but there are a also a variety of mechanical systems. These include flywheels (there is I believe a small demonstration scheme in New York) and compressed air systems. One of these has been operating in Germany since the 1970's with 290MWp capacity and another smaller 110MWp in the US since the 1990's. Both seem to have operated without any problems. It would be useful not to put all our eggs in the Li ion basket just in case there is not enough lithium for cars and other uses. The technology is fairly straightforward. A bit like a cycle tyre you use excess energy to compress air (to about the same pressure as a tyre) and store it under pressure, when you want energy you let the air flow out through turbines. There are few drawbacks though. If you ever pump a tyre up you will know the pump gets very hot. This is because the molecules of air are colliding more and more with each other as the pressure increases. As you will remember when you let the air out the opposite effect occurs. The valve gets very cold. This hot/cold dichotomy is regarded as a problem I think since the turbines work both ways and the kit cannot be expected to withstand extremes of temperature. The air is usually cooled on compression and then warmed on decompression. In principle the heat can be recovered from the compression phase and used in the second - either directly or indirectly and thereby raise the efficiency of the process. Another drawback is implied by the above photo of the German plant, its not pretty, basically it looks like a huge warehouse. The energy density is relatively low of such systems so it makes sense only to build very large schemes- hence extenuating the aesthetics problem. The reason I'm writing this is that I learnt of a scheme in Northern Ireland to use caves with a larger compressed energy storage scheme. The scheme has been awarded the funding as part of the EU's TEN-E project (despite Brexit). A little bit more background. Northern Ireland has its own grid. As far as I know its not connected to the Republics' grid but is to the UK grid. Electricity has always been more expensive in Northern Ireland, so much so that when the solar PV grant scheme was operating it was much more generous to take this into account. Putting compressed energy storage into caves has drawbacks. The oxygen must not react with the rock or interact with micro-organisms and of course must not leak. For these reasons old salt workings are ideal and this is the type of cave at Islandmagee. I hope this scheme goes ahead since one heck of alot of EU money has gone into it so far with even more to follow. Whether this type of energy storage solution will become commonplace if caves are used I think is open to question. Like nuclear each scheme would end up being individual and bespoke which makes it more expensive. The uglier warehouse type could be very cheap to build though. The technology is believed to be competitive with other energy generation systems. Neil

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