Sustainable energy update

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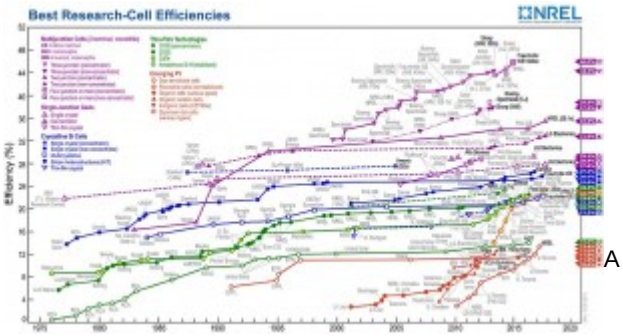

A sustainable energy update. I have been thinking about "Sustainable Energy — without the hot air" by the late Professor David JC MacKay. I had another look at the PV data a few months ago on this site. I've ben thinking about some of his conclusions and how they still stack up. The book was published in 2009. There has been no major unforeseen new technology (nor will there be), but there have been both incremental and even major changes in some areas. I'll consider a number of these briefly and draw some conclusions in this sustainable energy update in the next post. First re-reading the PV section I had a look at what module efficiency he had used. Interestingly he used 2 figures. He used 20% for domestic installations and 10% for stuff in fields. He used the lower figure since he thought they could be massed produced and used in fields if they were low efficiency and hence cheaper. This is the first thing that he got wrong (wrong is too stronger a statement but the PV world has changed dramatically in a way no could have seen) in less than 10 years. Module prices have collapsed. PV electricity is almost competitive with that on the grid and an unsubsidised solar farm has opened. Most PV capacity (of which there is a lot) in the UK is in fields. Domestic PV cell efficiency has not generally reached 20% but is generally in the 17% range. There are however modules you can buy that are 22% efficient and I doubt if those on solar farms are of a lower efficiency than domestic ones (they are same modules). There is one remaining prediction that McKay is looking to get wrong on module efficiency. He doubted if modules could be made more than 30% efficient and be massed produced. The data shows that modules in the lab are at almost 50%*. It seems likely that the 30% figure will be breached at some point its only a case of when. Why is this important? Obviously you can pack more energy output into a given area. With as I blogged on previously PV capacity in the UK have barely scratched the surface this means McKay's figures are too low even looking only at optimal sites. Energy efficiency is something that Professor McKay considered very important. For what its worth so do I and the next part of the sustainable energy update will consider this. Running a renewable energy economy is much much easier if we radically reduce our energy use. One way of doing this is to use more energy efficient lighting. Professor McKay was writing about LED's which were in their infancy then and very expensive. Since then the "ban the bulb" has forced the technology to come on leaps and bounds. The quality of light is indistinguishable from incandescent bulbs and the cost has plummeted. Use of this technology allows a big potential saving on lighting energy use which Professor McKay estimates as 2.7kwh per person. He kind of foresaw this though saying in a few years LED's would be the way to go. One major disagreement I had with the book was over devices on standby. He said switch them off but it makes little difference compared to our overall energy use. I can sort of see where he is coming from. Apart from the first argument there is the person that says I don't leave anything on standby so I can fly. I always thought Professor McKay lived in a house with not many devices plugged in and charging. Its the shear number per house multiplied by 22 million (UK). Again the situation has changed and EU directive has limited such things as phone chargers to 0.1W I believe and all other electrical stuff you buy has become more energy efficient. But consider 22 million houses with 2 chargers left on all the time per year this is 52MW a year. Still not much but consider all the other stuff left on all the time in your house.... As a last thought there is one thing Professor McKay mentions that uses more energy than in 2009. That is the broadband router. We have had to have another one recently. It uses exactly double the amount that the old one used which was anyway more than was listed in the book. The next part of the sustainable energy update will consider planes, cars and wind turbines... Neil *please note thermodynamic limits are about 60%

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