

UK solar potential

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What is the UK solar potential? That is what I've been asking

myself over the last few weeks as I have written some of the recent blog posts. I revisited [Renewable Energy Without the Hot Air](#) by the late great David McKay (who my brother knew quite well). He says the theoretical upper UK solar potential is 1260GW (actually this is the quantity of capacity needed to produce 50kWh/day/person). He reckons this is 5% of the UK's land area and regards this as almost inconceivable. But is it? Quite a lot about McKay's book is out of date. Offshore wind power and solar costs and capacity are much more favourable than he envisaged. Also population has risen so getting to that figure is actually more difficult. Getting the actual theoretical UK solar potential is actually quite challenging but I found a recent blog post that suggests that all our needs could be met with just 1% of the land area. So who is right? Lets have a look at the maths - I'm writing this with a completely open mind and I am going to be very conservative. I have made the assumption that we will use domestic roofs and commercial roofs only. Actually most of the UK's capacity is in fields. I don't have a huge problem with that but think that 5% would be excessive if this was where the systems were. Other non-domestic building types have really yet to take off as far as solar is concerned. **Domestic** The first thing we need to think about is power output. In the UK I have assumed an average of 750kWh per 1kWp of capacity. This is on the low side but takes into account using non south facing roofs. The next thing is to think about the roof size. The Energy Saving Trust have done some work on this. They say the most common size of installation (2015) was 4kW which takes just under 29m². I find this surprising since I see very few installations of this size. I am going to assume an average of 2. How many domestic roofs are there? The BBC say [25 million in 2004](#). However 17% are tenements or flats. Although putting PV on some of these is not impossible and there are such systems its definitely more complicated so I've assumed none do. This is 20.75 million Put it all together. = $750 \times 2 \times 20.75 \times 10^6 = 31125000000\text{kWh}$. A huge figure. However its more helpful to think in terrawatt hours (TWh) which is the country scale consumption unit in a year. Divide by 1000 puts it in MWh and then by another 1000 puts it in GWh finally another division by 1000 puts it in TWh. so this by my reckoning gives us 31.25TWh a year. This is a lot of electricity but not more than 10% of current yearly demand. **Commercial** How about "commercial*" roof space? DECC (now renamed) suggested in 2014 there is 250,000 hectares of south facing roofs in the UK (funnily enough this is about 1% of UK land area). This is $2.5 \times 10^9 \text{ m}^2$. Divide this by 29m² which give you the number of 4Kw systems you could fit on this roof. Again put it all together. $2.5 \times 10^9 / 29 = 86206896 \times 4\text{kW}$. This would generate in a year = $86206896 \times 4 \times 750 = 258620688000\text{kWh}$. Again divide by 1000 three times. = 258TWh. Adding these two figures almost gives what we do use now. So at the moment we could meet all our needs (almost) *in theory*. McKay was right meeting a large amount of our future needs from solar would be a struggle when you take into account heating and transport without putting a lot of stuff in fields. However I would add the commercial roofs do not include other directions of which East and West work pretty well, this could almost triple the above figure (think about it). In addition PV modules are are getting steadily more efficient. On an individual system basis this is just significant but with well over 100 million panels would help somewhat. No one is suggesting that we should try to run our entire energy system off solar. That would be crazy and lead to a huge number of problems however solar can make a huge contribution to our energy scene and we have really only just scratched the surface of its potential. Please feel free to correct my maths or method * includes government buildings such as hospitals MOD etc. Neil

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