EGTM71 Power Generation Systems
Essay on "Sustainable Energy – without the hot air" by David McKay
551192

- Introduction

The book "Sustainable Energy – without the hot air" is a personal endeavour by author David McKay to educate the layman reader in an informal and engaging way on sustainable energy and its present need. His principal feature in this is walking the reader though "back of the envelope" style calculations examples of sustainable production and current consumption, then 5 example solutions, before inviting the reader to take critique and develop the same.

This essay is concerned with doing just that: with analysing the political, economic and technical feasibility of the 6 plans, before finally proposing a plan based on the conclusions.

- Look at each option offered by the book

This essay was written in November 2014, whilst the book was published in November 2008. So this essay has the benefit of 6 years of hindsight when reviewing the books 6 plans.

This essay believes that the book underestimated PV cells when it was written, as they have since dropped in price, seen an reform in government subsidiaries, and have began to gain popularity, despite concerns about NIMBY opposition. Research into technologies such as titanium dioxide PV paint have made significant progress and could potentially find applications within the UK that, combined with greater than expected (from the book) domestic PV roofing uptake, could extend PV's contribution to the UK's energy beyond the book's highest estimation.

Concentrated solar in North Africa and Middle East deserts, however, have seen the added complication of the Arab Spring and associated civil wars and instability in the region. The UK is part of the EU and EEA, which has a free trade agreement between member states and imposes tariffs on trade that crosses its borders. Building solar farms that feed the UK grid would almost certainly count as trade and, given even concentrated PV farms are among the most expensive per-watt sustainable energy sources, it is the opinion of this essay that solar farms in deserts outside the EU are among the least economically attractive options avaiable. Combines with the current political situation, it is likely that only a combined EU effort will likely see such farms feeding EU states.

Clean coal

The fear and protest surrounding the topic of nuclear power in the UK is very real and has grown in Europe, especially Germany, since the Fukushima disaster in Japan where an earthquake and resulting tidal wave damaged a poorly maintained nuclear power station. However, the current UK coalition government is pushing ahead with plans to build new nuclear power facilities in the UK. Nuclear is by far the cheapest per-watt non-carbon source of energy currently, making it very attractive to government. It is possible that only a few nuclear facilities will be built, less than proposed in most of the book's plans.

Tide and wave suffer from very high capital costs

Hydroelectric dams are comparatively old among sustainable electricity generation technologies and, consequently, many of the suitable locations in the UK and Europe have already been dammed, so this essay agrees with the book that there is little more to be had from hydroelectric in the UK.

However, it must be noted that a lot of power in Europe comes from hydroelectric. If connection capacity between the UK and the continent grids, particularly with Norway and France, this could provide the UK with much needed buffering of demand and supply.

This would do much to solve the main concern with wind, as it is unlikely that the Alpine and Norwegian rains, and the Danish, German, British and Irish winds are likely to

all be in a lul at the same time for much time.

Councils in the UK have already realised their supply of land fills is running low and is unlikely to be replenished and have pushed to force users to recycle, despite complaints, and would appear to have had a lot of success. Given countries like Japan and German have already demonstrated that a country can almost all of its burnable waste for energy with little problem, this essay believes complaints about burning UK waste for energy are likely to be successfully overcome by ignoring them.

Solar heating has the disadvantage of being a choice between itself and PV cells. However, in rural areas with poor grid connections, the storage of hot water could prove more cost effective for residents than PV cells that could not sell to the grid, so could see more limited usage than proposed in all 6 plans.

Biofuel is likely to be essential should the UK be serious about going completely carbon neutral, as attitudes about motor vehicles could prove difficult to change. Compounding that, in rural areas, biofuels could potentially be more efficient than attempting to extend electrical vehicles across the required distances.

This essay believes onshore, and especially offshore wind famr will prove central to at least early efforts to increase the UK's sustainable energy production. Their main oppositions are cost, reliability and self-interested complaints. Concerns about dangers to wildlife have been shown to be less than other forms, the RAF has withdraw concerns about its RADAR systems, the government has already shown commitments to increase wind capacity despite cost, and this essay has discussed previously options to handle supply fluctuations.

Additionally, it could be possible to use excess wind energy to generate hydrogen for use in transport, which could be turned on and off very quickly to help the grid meet supply and demand, and to reduce the short term redundancy of the large volum of currently existing internal combustion cars.

- Concluding plan

This essay believes the best plan is to build some nuclear plants on old nuclear and brown sites, where public will allow, invest heavily in wind farms and solar, increase the capacity of UK-EU grid connections and retrofit carbon capturing devices to coal burners to aid oil extraction, which is still currently required for cheap plastics and other complex hydrocarbons.