RENEWABLE ENERGY:

THE TIPPING POINT

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Renewable Energy: The Tipping Point

The cost of generating power from solar panels and wind turbines has collapsed over the last five years.

In many parts of the world, the price of electricity produced by such methods has now reached – or is below – the price of power produced by conventional sources. Renewable power has now reached so called "grid parity"

As a result, subsidies for renewable power generation are now being gradually phased out and – as prices continue to fall – the cost of building solar panels and wind farms is still reducing.

You might be forgiven for thinking "job done" and assuming that renewable power will now gradually replace polluting electricity derived from fossil fuels.

But the revolution isn't complete. There are still several problems to be solved.

The major problem with renewable power from solar and wind sources is that it is intermittent.

At night there is no solar power to be captured and when the wind does not blow, there is no energy to be converted by wind turbines.

Think of renewable power as low-density energy farming, while fossil fuels can be thought of as high-density energy mining. Today, energy mining works best.

To change this, the first problem to be solved is how to store the energy produced by wind and solar farms. If we could store energy produced in times of abundance, it could be used to cover the gaps when renewable systems aren't producing.

But our current generation of batteries are still basic and expensive.

Bill Gates said in 2011 that if all the conventional batteries that exist in the world were linked together and attached to the world's grids, they would provide the world with power for only 10 minutes.

But in the same Tweet he hinted at new battery technologies to come.

Of course, there are other ways of storing excess power produced by intermittent renewables.

When local topography allows, water or heavy weights can by pumped or lifted up mountain sides to be released when required.

Water can also be pumped underground to gain heat and thus retain energy – but these storage methods are expensive and limited in application.

Which brings us back to batteries.

In March 2016 there was an exciting announcement from a U.S. Government Agency called ARPA-E. The E stands for energy.

Ellen Williams – the director of the agency – announced at a Washington conference that companies funded by her research agency had made several major battery breakthroughs – in fact she described the developments as "the holy grail of battery design".

These new batteries are said to be able to store power on a scale suitable for hooking up to the main electricity grid – and to do so economically.

Once again, that sounds like job done. But having made the announcement of major battery breakthroughs, Dr Williams declined to provide any further details of the new technology, saying only that new chemistries are involved and that the new batteries will soon be reaching the market.

We are now on the cusp of solving the storage problem for renewable power. In addition to breakthroughs being made by U.S. Government-funded researchers, great progress is also being made in the commercial and academic sectors.

Billionaire entrepreneur - Elon Musk of PayPal, Tesla and SpaceX fame is already building PowerWall batteries which allow homes to store renewable

power. He has also build the world's largest battery factory in Nevada to produce batteries for storing renewable power.

And in Cambridge in the UK, a quiet announcement made at the end of 2015 generated huge excitement.

The breakthrough in electrochemistry made at Cambridge University is expected to lead the way to rechargeable super-batteries that pack five times more energy into a given space than today's best batteries, greatly extending the range of electric vehicles and potentially transforming the economics of electricity storage.

Meanwhile developments at MIT, Harvard and elsewhere also point to a tipping point in battery design being reached.

I think it is fair to say that by 2020, the problem of how to store excess renewable energy will have been solved.

Which still leaves us with a couple of problems to be resolved before renewable energy can start fully replacing power derived from fossil fuels.

The first is that electricity transmission grids need to be re-designed to distribute power from multiple renewable sources rather than central power stations.

This is a major task and it will require government intervention and investment.

The second problem is that vested interests in fossil fuels are fighting back.

Fracking technology is now producing shale gas and oil at ever cheaper prices – and new fracking technology is constantly extending the amount of fossil fuel deposits that are accessible.

This problem will be the hardest to crack. Billions of dollars have been invested in the energy status quo.

For the sake of the planet we need to move quickly to the wide-scale adoption of energy from clean and renewable sources.

The technology is now becoming available- but only governments can make this happen.

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