No planet B

A wide-ranging new work by **Mike Berners-Lee** looks at some of the urgent questions facing humanity. *There is No Planet B: A Handbook for the Make or Break Years* covers everything from tackling climate change to the future of work. In this edited extract, he explores how we can keep fossil fuels in the ground.

Will we have renewables *as well as* or *instead of* fossil fuels?

Does more renewables mean less fossil fuel?

Not necessarily. The big question is whether we will have the renewables as well as or instead of the coal, oil and gas.

The past 150 years of energy history tells us that the arrival of new sources have dented but not stopped the growth of other energy sources. Oil softened the rise of coal somewhat, but it continued to grow. Later, the arrival of gas only softened the growth in oil. When a new source comes along we have traditionally used more energy in total, but we have also felt relatively energy-rich for a while and the hunger for other sources has somewhat slackened.

A huge surge in solar and other renewables could give us a period in which it is relatively easy to let go of fossil fuels, but it won't be enough to make it happen automatically. Policymakers need to get their heads around this. Please don't vote for any who haven't.

What is the catch with energy efficiency?

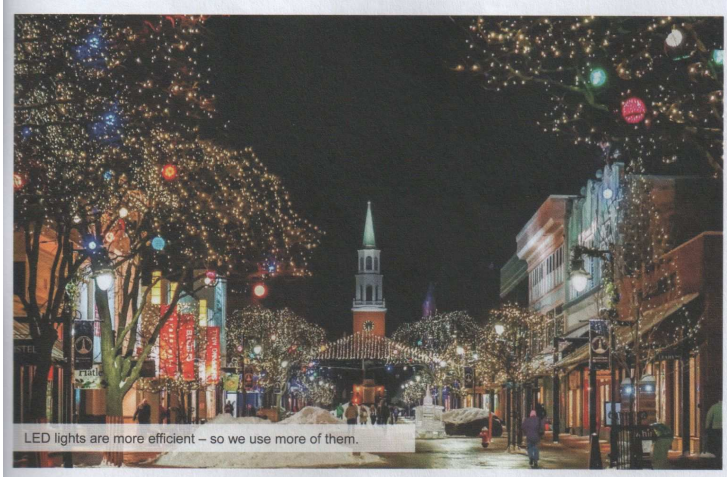
It goes hand in hand with an even greater increase in demand for whatever the energy is used for.

In 1865 William Stanley Jevons spotted that if the UK used coal more efficiently it would end up wanting more of it, not less. This phenomenon has become known as the Jevons Paradox.

Energy efficiency leads, by default, to an increase in total demand, rather than the decrease that is often assumed. It applies just as widely today as it did in 1865 and it has game changing implications for energy and climate policy. It may be counterintuitive at first but makes perfect sense on reflection.

Look at it this way. Imagine if it took a tonne of coal to keep a family warm for one night and that family saves up to enjoy one warm winter evening - a New Year celebration perhaps. Now imagine that a more efficient burner is invented, and the same tonne of coal can keep them warm for two nights. Coal has just become twice as valuable to them, so they make extra effort to buy enough to keep themselves warm for three nights in the year. They might spend one of those nights fitting new insulation so that the coal becomes even more useful to them and the other night working by the fire to earn the extra money they need for their increased coal budget. However, the price of coal per tonne comes down a bit to help them because demand is going up so much and economies of scale are kicking in, along with a stack of investment in new extraction technologies. And so it goes on. This is just a caricature of how the Jevons Paradox works, but I hope it demonstrates the principle.

Over the years we have become many times more efficient in our production of just about everything. LED lighting is hundreds of times more energy efficient than oil and gas lamps. Microchips are millions of times more efficient at storing data than paper,



LED lights are more efficient – so we use more of them.

and the cloud more efficient still. Electric trains are many times more efficient than steam trains, let alone horses. Yet our energy usage has risen hand in hand with those efficiencies and is actually enabled by them.

In fact, we can see that we don't use more energy *despite* the efficiency gains, but rather we are able to use more energy *because* of the efficiency gains. Wow! Feel free to pause at this point and reflect on the gigantic policy implications of this perspective. It means that whilst efficiency gains help us get more benefit from any given amount of energy, they also end up leading to an increase in total consumption unless that is deliberately constrained.

Just before you go ripping out all your double glazing and deflating your tyres, note that I am not saying that efficiency gains cannot be useful in the future. But I am saying they are no good at all on their own.

Given the catch, what can efficiency do for us?

We badly need more efficiency, but we also need to learn not to squander it with increased consumption.

We have to make efficiency work for us in a different way than we are used to. From now on when we get an efficiency improvement we have to deliberately bank the savings rather than allowing the default outcome in which our consumption appetite increases and the savings are lost through a myriad of rebound effects. This is a critically different approach to adopt at the point of consumption.

The way to make it work is to have a *constraint on total use of resources*, and in particular fossil fuels. When fossil fuel use is forced downwards, rebound effects will cease. The dynamic will change. Efficiency will suddenly become a force for wellbeing that will, for the first time, come without hidden, detrimental environmental consequences.

Under these conditions, efficiency will be one of the key routes to having the things we need and want.

How can we keep the fuel in the ground?

Since green energy on its own won't help much and efficiency on its own won't help at all, there is no escaping the need for a constraint on extraction.

The fossil fuel we use will be the gap between the clean energy supply and the total energy use. Straight away that gives us two clear levers; push the green supply up and hold the demand down. A third lever is to constrain the fossil fuel supply. This hard cap will end the rebound effect on carbon emissions.

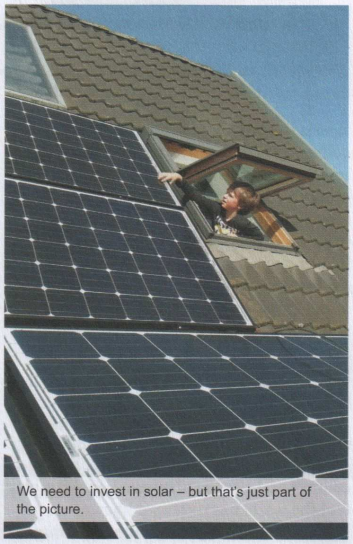
To push the clean energy supply up, we need to invest in it hard. This includes the global rolling out of the renewable (especially solar) supply and the infrastructure to go with it, as well as the research and development into the rack of accompanying technologies that will be required to make solar work for us: storage, electric transport and so on. All this is doable.

Where does the money come from? As luck would have it a whole lot of investment opportunity is created by the divestment from fossil fuels. The switch from yesterday's energy system to tomorrow's is loaded with business opportunities, and it will be net positive for jobs as well.

To constrain the supply, it is no good hoping that renewables will be so good that we lose interest in the coal and can't be bothered to dig it up. And it is no good hoping that with just some parts of the world doing the right thing we will get somewhere. We need an *enforceable global deal to leave the fuel in the ground*. It doesn't matter how hard you think this is to achieve, because nothing else will do. The 2015 Paris Agreement was progress towards that, although leaving a long way yet to go. Subsequent climate talks in Marrakech and Bonn have barely inched us any closer.

For such a deal to be possible, there are some conditions that will need to be in place. A limited amount of fossil fuel remaining in the total carbon budget will somehow need to be shared out and the very different ways in which countries will be affected by such a deal need to be taken into account, because unless it works for everyone, it won't happen.

The early stages of climatic change also look very different in different parts of the world. While the Maldives sinks, Bangladesh floods, and California burns,



We need to invest in solar – but that's just part of the picture.