**In January twenty-twenty-three, during the annual love in of the world’s richest people, known as the World Economic Forum, held in the delightfully exclusive Swiss ski resort of Davos,**

**a brand-new research paper was launched by an energy industry consultancy called Systemiq, in conjunction with the University of Exeter and the UNFCCC’s Director of Economics, Simon Sharpe. The report analyses the potentially transformational influence that new technologies will have on our future sustainability and survivability.**

**You get a bit of a clue from the title, don’t you…**

**So, me being me, I couldn’t resist delving into the guts of the thing to find out how that apparently very positive assertion might really stack up in the real world.**

**And me being me…I made a pretty little video about it…which is this video…**

**Hello and welcome to Just Have a Think,**

**This latest report from Systemiq was backed by the Bezos Earth Fund. That’ll no doubt provoke a variety of reactions depending on your view of Amazon’s founder, but I don’t propose to debate that today. You can make your own mind up. I’m just declaring it for full disclosure.**

**One of the main tenets of the report is the concept of what the authors refer to as ‘cascading tipping points’. What they mean by that is that the sectors of our economies that have high greenhouse gas emissions don’t exist in isolation from each other, so if you can positively influence one area, you’ll most likely cause a positive knock-on effect in another.**

**Take batteries for example. They’re being increasingly utilised in the power sector for stationary grid balancing energy storage, AND in the transport sector for electric vehicles. That’s leading to greater demand for clean energy to power our cars and trucks, which in turn is driving the cost of renewables down still further and reducing EV running costs. Those cheaper renewables are also starting to make things like air source heat pumps more price competitive, which is driving up their volume and reinforcing the demand for more renewables on our grids. More renewables on the grid will help spark an exponential rise in the production of genuinely green hydrogen for example, not for anything as ridiculous as heating our homes, as our mad politicians would have us believe, but for decarbonising several industries from shipping and aviation to steel making and fertilizer production.**

**That kind of cross fertilization is one of the contributing factors resulting in the famous S-curves that economists often refer to.**

**There are loads of examples of S-curves throughout history, and not just in major infrastructure projects like canals, railways, and roads. They were often very banal and apparently dull products like flushing toilets, radial tyres, fridges, microwaves and washing machines. All things we take totally for granted today but which completely upended their sectors when they first arrived, not because some government legislation dictated it, but simply because the products themselves were just better and usually cheaper than what was currently available. So, people bought more of THEM and less of the existing stuff, which meant prices went down even further, so demand increased even faster, and so on and so on. As new producers enjoyed a rapid upward surge, existing producers experienced feedback loops that went in the opposite direction, accelerating their decline. They very quickly lost their structural advantage as DISECONOMIES of scale kicked in. Falling demand led to cuts in production, job layoffs, financial devaluation, a loss of investors and an increase in the cost of capital. In other words, the perfect storm of business nightmares that, in the case of capital intensive and highly leveraged sectors can lead to stranded assets. The coal industry in America is a good example. According to Systemiq’s analysis, demand for coal peaked in twenty-twelve, followed by a sharp drop in profitability as production site utility rates fell to less than fifty percent. Within two years, half of the companies in the sector went bankrupt.**

**Having scrutinised and factored in as many variables as they could turn up in the course of their extensive research, the Systemiq team arrived at an assessment of the status of tipping points for key zero-emission solutions by sector, using the tried and tested ‘green, amber, red’ colour coding notation that I’m sure many of us have seen in our everyday workplaces on delightful documents like our annual employee reviews forms for example!**

**It's not an overwhelmingly verdant table is it!?? So, let’s have a brief look at what created this particular colour pattern.**

**A green box means there’s no cost disadvantage to the new technology AND there’s no current barrier to it creating the sort of tipping points that we’ve just looked at.**

**Amber means cost parity is less than five years away and that although strong progress is under way, there do, still, remain some impediments to tipping points kicking in.**

**Unsurprisingly, red means cost parity is MORE THAN five years away and current impediments are acting as a significant brake on progress.**

**Only three of the eleven key industries outlined here give the Systemiq team high confidence that they have the potential for near-term tipping points. They’re the power sector, which is currently responsible for twenty-six percent of all global emissions, road vehicles which make up twelve percent, and the fertiliser industry which represents two percent.**

**Battery costs have come down by ninety percent since twenty-ten, and the levelised cost of electricity, or LCOE of solar plus batteries is expected to be cheaper than gas power in the US by 2023.**

**And by the way, if you want a really understandable description of LCOE and what the current state of play is across all energy technologies, you really need to pause this video and click up there to watch the brilliant Rosie Barnes provide the best explanation of how it all works in this video on her Engineering with Rosie channel. It sets it all out in layperson’s terminology with understandable animations that help make sense of some complicated facts and figures, and I learned a lot of useful stuff from watching it.**

**Anyway, back to renewables. Solar and wind made up more than seventy-five percent of all new global capacity additions in twenty-twenty-two and now represent more than ten percent of global power generation. But the power sector gets a red mark for accessibility because, as you folks in the US don’t need me to point out, much greater investment is needed from central government, not just in America but all over the world, in the infrastructure required for transmission and distribution, rising from about three hundred billion dollars last year to at least five hundred billion by twenty-twenty-five. There also need to be far shorter planning permitting timelines for these new infrastructure installations. According to the Systemiq research, every single EU country currently exceeds legal permitting time limits, and some countries take five times as long as their legislation demands.**

**In the electric vehicle market, the Systemiq team projects that in the EU, the US and China, EVs will reach cost parity with internal combustion engine vehicles during twenty-twenty-five, so that gets an amber. And in fact, there is arguably already no cost disadvantage to owning an EV over its entire lifetime, so the box for attractiveness is green. But once again it’s the infrastructure, controlled largely by central government, that is holding back progress. At the end of twenty-twenty-one there were one-point-eight million EV charge points around the world. What the market requires is at least five million chargers plus the requisite upgrades in electricity grids to really hit a tipping point. So, you know, we need to get a wiggle on!**

 **You might not immediately think of fertilizer as a game changing industrial sector, but more than ninety-nine percent of all the ammonia used to make the stuff today is derived from so called grey hydrogen that comes from the steam reformation of methane, which releases a large volume of carbon dioxide into the atmosphere. GREEN hydrogen on the other hand, is made from the electrolysis of water with no carbon emissions at the point of use, as long as it’s powered by renewables. So, it potentially represents an industry disruptor, which is being enthusiastically pursued by some big operators, including Andrew Twiggy Forrest over in Oz, who has almost literally bet the farm on capturing a very large part of the new green hydrogen economy from vast new production facilities planned for sites in Western Australia. Many other companies in the industry are also now implementing plans for large-scale green fertiliser production, and policy support from central government is finally starting to trickle in. But industrial scale electrolysis for hydrogen production is still a very nascent industry and the technology is currently several times more expensive than steam reforming methane. That represents a major hurdle. The Systemiq report argues that to get green ammonia to a lower cost than grey ammonia and therefore to hit the tipping point we’re after, there will need to be a globally agreed carbon price of about a hundred dollars per tonne, and as so many of this channels US viewers have pointed out to me over the years… good luck getting that one through Congress.**

**So, while the attractiveness box goes green on this one, affordability and accessibility currently only just reach amber. But centralised government support for genuinely green hydrogen could produce really very significant cascading tipping points for the steel industry, which currently spews out seven percent of global emissions, the global shipping industry which makes up three percent of emissions today and which is an open door of receptiveness as shipping companies race to find alternatives to the absolutely filthy gunk known as bunker fuel that they currently use, AND for the aviation industry which accounts for about TWO percent of emissions today but which is projected to rocket up to nearly fifteen percent by mid-century if it continues using fossil fuels to power its jet engines. All those sectors get a green rating in their ‘attractiveness box’ but the Systemiq team only have ‘medium’ confidence that they’ll hit tipping points that could unlock those mass market S-curves.**

**And then we come to food and agriculture and land use change, which is usually the point where a large number of viewers hit the off button, because they just don’t want to hear about it. That’s actually one of the reasons why these two categories score so badly in the analysis. But like it or not, it’s a massive problem and until it’s faced properly, there’s really no chance of a long-term solution to the climate emergency.**

**The report projects that alternative proteins will gain about a ten percent market share by twenty-thirty-five, rising to about twenty percent with the right technological and policy advances. The good news is that there has already been a fifty percent increase in the so called ‘plant-based meat alternative’ market in Europe and, believe it or not, a seventy three percent increase in the States. And the market is even bigger over in China, so there are very clear signs that these sorts of foods are heading towards mass market adoption. But in order to get there, the quality of taste, texture and nutritional value, as well as the cost of these products will need to outperform existing meat products, and that is by no means a given, so it’s an amber across the board here I’m afraid. And that moves to full red when we get to avoiding land use change. This one, say Systemiq, will require strong regulation once again from central governments around the world. In fairness there is a notable shift towards the notion of preserving land rather than continually ripping up more and more of it to make ways for grazing and crops. There’s been a five-fold increase in the size of the Voluntary Carbon Market, or VCM, which is where big companies pay money to buy so called Nature Based Carbon Credits, or NBCs, which ostensibly help redevelop land through things like rewilding or reforestation, and then use those credits to offset their own emissions. It’s a far from perfect system though. There are tons of problems with regulatory enforcement and the quality of credits, which often pay for stuff that would have happened anyway, or fund projects that don’t last long enough to make any difference, like for example planting a bunch of trees that don’t survive in their new environment and die off within only a few months. There’s no silver bullet being proposed by the Systemiq research team in this category. The lack of transparency here really is proving to be major barrier to adoption.**

**So while this report’s headline title could be construed as suggesting the world was on the cusp of some sort of major revolution in the way we operate our systems and run our everyday lives, I have to say that, if I’d ever received an annual performance review form with that distribution of colours on the right hand side, I think I’d have been looking for another job pretty quickly. If only some of our key lawmakers felt the same way, eh?**

**That’s it for this week. A massive thank you, as ever, to our fantastic team of supporters over at Patreon who keep me going and keep these videos free of ads and sponsorship messages.**

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**As always, thanks very much for watching, have a great week, and remember to Just Have a Think.**

**See you next week**