**Back in September 2020, President Xi Jinping of China made a statement that kind of took other world leaders by surprise. He announced that his country would reach what he called peak carbon emissions by 2030 and then go on to achieve net-zero carbon emissions by 2060.**

**China’s not known for making grand declarations about these sorts of things, unless they’re very sure they can deliver, so this latest announcement has been received cautiously but positively by the International community.**

**And its fair to say that China has got many reasons why getting to net zero as fast as possible is in their interest. Not only will it alleviate the crippling air pollution suffered by hundreds of millions of people in its largest cities, which currently causes an estimated two point four million premature deaths every single year, but it’ll also have a massive influence on mitigating the worst effects of climate change, much of which would be felt as severely, if not more so, by China than anywhere else. Just last year, for example, the most expensive climate driven weather event anywhere in the world was the relentless monsoon flooding across many Chinese provinces during the summer. Millions of peoples’ livelihoods were adversely affected, and hundreds died. Croplands were destroyed, infra-structure was damaged, and the whole thing cost an estimated seventeen billion dollars.**

**Last year China installed the equivalent of three large wind turbines and five football fields worth of solar panels every hour. But they also added the equivalent of one large coal plant to their grid each week as well.**

**So, what’s going on? Is China really genuine in this pledge? And can they really achieve what they say they will? And even if they do, is their timeline fast enough to stay in line with the Paris emissions reductions targets?**

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

**In April 2021, two research papers were published , both scrutinising President Xi’s plan. The first came from a group of economic, environment and climate experts from various well-respected institutions in several countries, including China, The US and Germany, headed up by lead author Dr Hongbo Duan, Associate Professor at the University of Chinese Academy of Sciences. It was published in the online Science Magazine and it’s broad conclusion was that China’s 2060 pledge was broadly in line with the 1.5 degree Celsius target set out in the Paris agreement, but with a whole bunch of caveats that we’ll take a look at in a moment.**

**The second report comes from a UK based organization called Transition Zero, set up in November 2020 by a group of analysts who spent many years working together on the Carbon Tracker initiative – a program that aims to help markets and corporations understand and quantify the risks that climate change poses to them and their shareholders if they don’t take the appropriate rapid action.**

**You may have heard of China’s famous five-year plans. The first one was put in place by Mao Zedong way back in 1953. In March of 2021 China announced details of the fourteenth of these plans. It pledged that energy consumption and carbon emissions per unit of Gross Domestic Product or GDP will decline by thirteen and a half percent and eighteen percent respectively by 2025. The plan includes impressive targets for wind and solar installations, but it also contains phrases like “promoting the clean use of coal”. According to the transition zero report, the two activities of rapid growth in renewables and the continuation of new coal capacity are mutually incompatible and are leading to unsustainable and unnecessary over capacity in the Chinese energy market. In 2020, an estimated thirty- one gigawatts of net coal capacity came online in China. Another thirty-seven gigawatts was granted construction approval, and seventy four gigawatts worth was given planning approval. That’s an estimated total investment of a hundred and twelve billion dollars in power generation that will enter an already oversupplied market. The average capacity factor of China’s coal fleet has declined from fifty-seven percent in 2010 to forty-nine percent in 2020. In other words, those coal fired power plants are only producing half of their potential maximum, and far less than they should be doing in order to justify their capital and running costs. If all the currently planned new coal capacity up to 2030 is actually built and commissioned, then the Transition Zero research predicts that the operating capacity factor will drop down to thirty two percent – less than a third of maximum power generation potential. That’s assuming a growth in energy demand of four percent per year. But even at a growth of six percent per year, the capacity factor still drops significantly.**

**Meanwhile, the analysis caried out by Dr Duan and his team found that for China to stay in line with the 1.5 degrees goal, it’s power sector would need to phase out coal completely by 2050, and reduce its greenhouse gas emissions by sixty six percent over the coming decade. That means that coal would need to be substantially replaced by renewables during that time window.**

**So why would China actively build out more coal plants that are being rendered more and more expensive and less and less useful by China’s own renewable energy program?**

**Well, the Transition Zero report points out that, although China may look to us in the West like a complete autocracy dominated by one man and his ever-obedient entourage, there are in fact quite complicated power dynamics bubbling away between Xi Jinping’s central government, and state-owned enterprises and local governments. Some of those local government and industry decision-makers appear to be acting against President Xi’s net zero plans. The report highlights the northern province of Inner Mongolia, where just last year, electricity and industrial facilities were locally approved with an estimated energy demand equivalent to eighty million tonnes of coal a year. That’s equivalent to the total coal demand of Germany.**

**Coal driven electricity projects in the provinces of Henan, Inner Mongolia, Jiangsu, and Shandong make up a third of China’s total capacity, but these new local investments look like yet another example of wilful ignorance and blind faith on the part of regional actors who refuse to accept the dictats of central government and who’ve convinced themselves that they can just brave it out by ignoring reality.**

**The diminishing capacity factors and economic modelling set out by Transition Zero suggest that any new coal driven projects implemented from now on in those regions will quite likely end up as stranded assets, as facilities become less and less able to service their debt requirements.**

**Conversely, according to the research analysis, if China did accelerate it’s coal phase out program then a potential overall saving of no less than one point six trillion dollars is up for grabs, and ironically a large proportion of that would be in Inner Mongolia, as this colour coded map shows.**

**Dr Duans research team evaluated nine different projection models of Chinese emissions running up to 2050, to get a range of reductions necessary to keep China on track for their net zero target.**

**The resulting emissions chart is pretty complicated and detailed analysis of all those assessment models is outside the scope of this video. But we can see the range of projections for reductions in CO2, methane and nitrous oxide. It’s a bit counter intuitive because the reductions are measured in percentage terms, so the more each line goes up, the higher the percentage reduction will be. And at the top end of the CO2 range, the line actually goes above a hundred percent. In fact, it reaches a hundred and twelve percent, to be precise. That means, in addition to energy consumption reduction, and fuel switching, it looks likely that on its current trajectory, the world’s largest greenhouse gas emitter is going to have to employ so-called negative emissions technologies, or NETS. That includes what the papers authors call “the formidable role” of carbon capture and storage. In fact, the paper finds that captured carbon would have to account for, on average, 20% of total reductions in 2050. CCS is a widely quoted technology that allows most emissions projection models to show how the world might stay within the one-point five degree or two degrees warming targets. The trouble is though, there are currently no examples of full scale, economically viable facilities anywhere in the world that are purely focussed on capturing and permanently sequestering carbon dioxide without using it for any other purpose. CCS facilities do exist though. In fact, according to this report, there are currently twenty-six operational commercial CCS facilities worldwide, ostensibly capturing forty million tons of CO2 each year (that’s about one tenth of one percent of total annual human induced CO2 emissions by the way). Seventeen of those facilities came online since twenty nineteen and twelve of those are in the United States, where a generous tax break known as 45Q allows oil companies to inject CO2 into depleted oil seams to release otherwise inaccessible fossil fuels which then get burnt, releasing CO2 back into the atmosphere. Because the CO2 injected into those oil seams stays underground, the oil companies get to call it permanent carbon capture and storage, and win themselves a handsome subsidy in addition to the extra revenue they get from scraping out a bit more oil.**

**Alternatively, and more likely in China’s case, coal gasification or steam reforming of methane gas to make hydrogen can in theory be combined with carbon capture and storage. The commercial product of the process is just the hydrogen though. The captured carbon dioxide is of no value of it’s simply pumped underground forever. So without heavy incentives for compliance and penalties for non -compliance coupled with very careful monitoring, it’s easy to become slightly sceptical that best practice would always be followed, if you know what I mean.**

**So, in the face of all this fairly compelling data from two independent research papers, both of which arrive at remarkably similar conclusions, the insanity of opening new coal fired power plants in China today is hard to ignore.**

**The Transition Zero team have developed technology to measure coal plant output using satellite data and machine learning. It can help estimate carbon emissions, water use, air pollution , operating costs, gross profitability and abatement costs at plant level. Their system has what they call a Mean Absolute Error of fourteen percent at plant level and between three and eighteen percent at province level depending on the number of facilities in each area. By crunching the numbers for all coal fired power plants across the country, the team calculated that China’s own Emissions Trading System may have been oversupplied by almost one point six billion tons of CO2 equivalent between twenty nineteen to twenty twenty. That’s equivalent to the entire annual capacity of the Emissions Trading System operated in the European Union. All these variables are fed into constituent models, each of which uses its own specific method to compute a probability of what’s known as ‘asset vulnerability’. The results from all four models are then combined to produce a final risk score which can then be used to better inform divestment strategies for investors, plant retirement schedules by policymakers, environmental audits, and analysis for potential financial regulation. The proposal from the Transition Zero Team is that China could adopt a version of this system to assess the viability of its existing coal fleet and make much better informed decisions that could accelerate their decarbonisation program.**

 **Their assessment is that the carbon intensity of Chinese energy generation needs to drop from six hundred and seventy-two grams of CO2 per kilowatt hour today to three hundred and fifty-six grams of CO2 per kilowatt hour by 2030, and they reckon that by 2040, most**

**coal generation will need to be closed, converted, or put into reserve capacity.**

**Its certainly a big ask. Xi Jinping may be the supreme leader of his nation, but he has exactly the same challenges as many other countries in cajoling and convincing state governments, and a very powerful fossil fuel industry, that change needs to happen very rapidly. The renewable energy industry is producing hardware at an eye watering pace, and the economic advantages of wind and solar may well become unavoidable within the next few years even for the most hard-nosed coal producers. One final caveat remains though, that neither report mentions, but that can’t in all conscience be ignored.**

**A very recent investigation by the UK’s Sheffield Hallam University alleges that forced labour of Uyghur Muslims is being deployed in Xinjiang province where almost half of the world’s polysilicon is produced for solar panels. That claim is denied by the Chinese government of course, but it’s a reminder that, as the world accelerates the move away from fossil fuels, our leaders must be kept under pressure to ensure that alternative energy production methods are genuinely reducing overall carbon emissions and that basic working conditions and human rights for industry employees are upheld wherever they are in the world. Otherwise, we’ll be failing in one of the United Nations key objectives, which is to achieve a just and fair transition of the workforce, and the creation of decent work and quality jobs.**

**Now, anytime I focus on China in one of my videos, there is always very understandable strength of feeling from many viewers. If you have constructive and objective views that you’d like to share about China’s transition to a more sustainable future, then jump down to the comments section below, and leave your thoughts there.**

**That’s it for this week though.**

**A big thank you to the folks who make these videos possible by supporting my work via Patreon. They allow me to remain completely independent, and they enable me to keep all my videos completely ad free. And I must just give a quick shout out to those people who joined recently with pledges of ten dollars or more a month. They are**

**Zach Orion Miller**

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**Richard Alsop**

**Bob Jackson**

**Jim Baker**

**Terry Richter**

**Skip Moss**

**Rick May**

**Stuart O’Neill**

**And Carlos Gonzalez,**

**And of course, a big thank you to everyone else whose joined since last time too.**

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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.**