**Back in twenty seventeen I had solar panels installed on the roof of my little terraced house. And they were a pretty good investment in my view. I got a four-point eight kilowatt-hour lithium-ion battery storage system at the same time, and the combined set up keeps my electricity bills nice and low for six months of the year and close to zero during periods of mid-summer sunshine like we’re currently enjoying here in the UK. The projection is that I’ll break even on costs in year seven, which for me will be twenty-twenty four, after which any electricity from the panels will effectively be free for the rest of their operational lifetime, which could be fifteen more years, OR, judging by the feedback from some of you very long-time solar panel users out there, it could be way longer! A few folks have told me their panels are still going strong after thirty years!**

**But however well your panels hold up, there will inevitably eventually come a point where they need replacing. And that raises the old chestnut of what happens to the dead panels when they get scrapped.**

**Until recently, the answer to that question has usually been to shred them and chuck them into landfill along with everything else we can’t be bothered to deal with responsibly. And when the number of panels in operation globally was relatively low, the waste could be massaged into the general garbage without anyone really noticing.**

**But as the number of panels continues to grow almost exponentially, the folks in the solar PV industry are realising that the lack of effective recycling is kind of making them look bad. And at the same time some of the worlds more entrepreneurial types are starting to wonder whether there might just be some money to be made from the hundreds of millions of panels that are due to be scrapped in the coming decades, if they can just find a way to transport and process them all in a cost-effective way.**

**So, are they right? Can it be done at scale, and can profits really be made along the way?**

**Well, a new report, published in July twenty-twenty two, says this**

**“Oh Yeah”**

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

**Now, I’ve got to be honest, I always feel a bit uncomfortable using the profit motive as a means to justify taking actions that we should have been taking anyway as responsible human beings, but sadly in most cases that seems to be the only way to motivate the folks holding the purse strings. I guess the trick is to attract entrepreneurial investment that actually results in a positive impact on our climate and environment, and if this latest analysis from the Norwegian research consultancy Rystad Energy is anything to go by then solar PV recycling definitely fits that bill.**

**Solar panels contain all sorts of components, some very valuable, like silver, and others very energy intensive to produce, like polysilicon, but all of which could potentially be harvested from old panels and re-used in new ones.**

**The trouble is landfill is far too cheap and easy an option nowadays, and prices for recycled PV materials just don’t currently compensate for the cost of transportation, sorting and processing required to separate them all out and ship them to different locations.**

**Back in 2018, when I last looked at this topic on the channel, the International Renewable Energy Agency, or IRENA was projecting that recovered materials from PV panels could be worth something like 450 million US dollars by twenty thirty and more than fifteen billion US dollars by twenty fifty. But according to this latest Rystad analysis, demand for recycled solar panel components is set to skyrocket in the coming years as the number of installations surges and the threat of a materials supply bottleneck looms. Rystad’s new set of projections puts the value of recyclable materials from PV panels at more than two point seven BILLION dollars in twenty-thirty, compared to only a hundred and seventy seven million in twenty-twenty two, and more like EIGHTY billion dollars by twenty fifty.**

**The transition away from fossil fuel and towards more sustainable energy comes with its own set of significant challenges, as we’ve looked at many times on this channel, not least of which is the relentless demand for the materials and minerals needed to make solar panels. And here again, the Rystad report goes further than the currently accepted thinking on the subject. IRENA’s sister organisation, the International Energy Agency, or IEA, suggests that about forty percent of the worlds power should be generated by solar energy by twenty-fifty. But Rystad calculates that in a scenario that keeps global temperatures to just one point six degrees Celsius above pre-industrial levels, solar will be providing more like fifty three percent of global power, and they reckon the current rate and scale of new solar installations around the world puts us well on track to meet that number.**

**In twenty eighteen, the world was marvelling at a vast new facility in China known as the Longyangxia Dam Solar Park. NASA had photographed the park from space, and its four million solar panels covered an area of ten square miles with a generating capacity of eight hundred and fifty megawatts.**

**That’s already been dwarfed by the Bhadla Solar Park in India, which boasts more than ten million panels on an area of land about twenty-two square miles in size and with a generating capacity of two thousand two hundred and forty-five megawatts.**

**And even this monster will look like small fry when the final phase of the Mohammed bin Rashid Al Maktoum Solar Park in Dubai is completed in a few years’ time. By then the MBR solar park will have a generating capacity of 5 gigawatts, enough to supply nearly one point five million homes and offset about 9 million tonnes of CO2 emissions each year.**

**And of course, there are plenty of other examples cropping up all over the world. They’re mostly in Asia, as this map shows, but Europe and North America are also fast-growing regions.**

**So that’s an awful lot of panels that’ll need to be dealt with at the end of their operational lifetime.**

 **Rystad analyst Kristin Stuge said**

**“Rising energy costs, improved recycling technology, and government regulations may pave the way for a market where more defunct solar panels are sent to recycling rather than the nearest landfill. Recycling PV panels can help operators save costs, overcome supply chain woes and increase the likelihood of countries meeting their solar capacity goals,”**

**There’s plenty of good stuff to be harvested too. The highest value components are aluminium, silver, copper and polysilicon. Silver accounts for only about zero-point zero five percent of a panel by weight, but it makes up fourteen percent of the material value. Polysilicon is currently derived through very energy and carbon intensive processes, which is reflected in its high price, and copper and aluminium are both commodities in high demand as well.**

**Rystad Energy reckons that by twenty thirty-five, PV recycling will be supplying at least eight percent of the polysilicon, eleven percent of the aluminium, and more than twenty percent of the silver needed for new solar panels, with those percentages constantly rising as we approach mid-century. That’ll take a great deal of strain off the mining sector and significantly reduce the carbon footprint of solar PV panel manufacturing.**

**In Europe there are already strong regulations around the disposal of waste electrical and hazardous substances, and as part of those regulations eighty five percent of decommissioned PV panels must be collected and eighty percent must be recycled.**

**Three quarters of all European PV manufacturers are part of an EU funded non-profit recycling body called PV Cycle, which by the end of twenty eighteen had already collected more than twenty-seven thousand tonnes of panels, of which about ninety five percent have been recycled.**

**Similar initiatives are happening over in the States. In 2017 Washington became the first state to pass a solar stewardship bill requiring manufacturers selling solar products into the state to have end-of-life recycling programs for their own products. New York has a similar bill on its statue books called the Solar Panel Collection Act, and California’s SB 489 bill, passed in 2015, designates end-of-life solar panels as universal waste, which encompasses all types of hazardous electrical waste widely used in homes and businesses. By California law universal waste cannot be trashed or land filled. In twenty twenty-two a US start-up called SolarCycle was founded to provide what they describe as a low-cost, eco-friendly, comprehensive process for retiring solar panels and repurposing them for new uses, much like the European PV Cycle initiative, and so far they’ve raised nearly seven million dollars in seed investment, so I’ll be keeping on how they grow in the coming months and years.**

**The biggest obstacles though, can be found where the biggest manufacturers operate, which means Asia, and China in particular where until very recently the urgency of solar panel recycling hadn't dawned on most manufacturers, largely because the cost of solar panel waste recycling doesn’t have to be factored into their production budgets, unlike in Europe for example, where for the last decade a directive has been in place that requires producers to take responsibility for recycling the PV panel's that they sell.**

**A recent Chinese report estimated that by twenty thirty-five, that country would have more than a million tonnes of retired solar panels. It does look like the top brass in central government are beginning to see the coming problem though.** [**Earlier this year they issued a new policy**](http://www.gov.cn/zhengce/2022-02/15/content_5673675.htm) **that promotes the development of technologies for the reuse of retired solar and wind facilities, and to improve recycling systems for EV batteries. But because they’re so far behind the curve on this one, there’s currently a gap between the quantity of waste and the capacity to handle it. China’s first pilot project for PV recycling only came into operation in January this year. It can process the equivalent of ten megawatts of waste solar panels. But that number is dwarfed by the fifty-three thousand megawatts of new solar power that China installed just in twenty twenty-one alone! Now, Xi-Jing Ping’s regime has historically demonstrated a breath-taking ability to catch up extremely quickly once they set their mind to a project, so I guess we’ll just have to hope that the challenge of recycling renewable waste products is no exception.**

**If you’re involved in this fast-growing industrial sector, or if you just have views on how we’re adopting and adapting to renewable energy in general, then why not jump down to the comments section below and leave your thoughts there.**

**That’s it for this week though.**

**A massive thank you, as always, to our fantastic Patreon supporters who keep these videos completely independent and ad-free.**

**And I must just give a quick shout out the folks who’ve joined recently with pledges of ten dollars or more a month**

**They are**

**Christopher Hefferin**

**Merra Lee Moffitt**

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**Douglas Smith**

**Mikael Jonsson**

**Doug Hughes**

**Marcus Buchan**

**John Evans**

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**and**

**Eric Noriega**

**And of course, a huge 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**