**On Wednesday 8th November twenty-twenty-three, an American start-up called NuScale announced it was terminating its contract to construct a Small Modular Nuclear Reactor for Utah Associated Municipal Systems, having previously been forced to raise its target price for power generation by fifty-three percent, from an originally quite competitive fifty-eight dollars per megawatt hour to a somewhat prohibitive eighty-nine dollars.**

**NuScale's Small Modular Reactor, or SMR, design was the only one to have been approved by the United States Nuclear Regulatory Commission and, before the November bombshell, the Utah plant had been on track to become the first US SMR project to win a full construction licence.**

**Meanwhile, over on this side of the pond, another vocal proponent of small modular reactors, Rolls Royce, said last year that it’s five-hundred-million-pound SMR programme was “facing a cliff edge” and that without a significant cash injection by the UK government the project would burn through all of its cash by the end of twenty-twenty-four.**

**Now, I don’t know about you, but those two news stories suggest less than spectacular progress on SMR technology since we last delved into the subject on this channel back in twenty-twenty-one.**

**So, as part of our sustainable technology review series…what the bloody hell’s going on?**

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

**Now, I don’t normally do plugs for other stuff, as you know, but I’m a bit giddy with excitement at the moment, because I’ve been asked by our friends over at the Fully Charged Show to host some discussion panels on each of the three days of their upcoming Everything Electric extravaganza at London Excel this Easter. And, once again they’ve kindly allocated a ticket discount code exclusively for viewers of this channel. I thought I’d tell you about it now rather than at the end of the video when you might have nodded off listening to my dulcet drones, I mean tones. So, if you’re in the UK and you fancy coming along to discover the astonishing array of exhibitors and new electric vehicles that you only get at the world's Number one Home Energy and Electric Vehicle show, then follow the link on screen or in the description section below and use the code to get twenty percent off all your tickets.**

**So, Small Modular Nuclear Reactors, then. I have to say, the more I read about this technology, the more it seems to be sliding towards the slightly smellier end of the sniff test scale.**

**Not because of public perception of risk. Because, although the perception might be real in some people’s minds, the risk is not, as we discovered in our very first video about SMR technology back in twenty-twenty.**

***“But as this chart from the website ‘Our World in Data’ shows, statistically, at least from an operational point of view, nuclear power is one of the safest forms of energy available.”***

**And not because of the amount of radioactive waste that we hear so much about either. Nuclear waste is not a good thing, don’t get me wrong. But it’s not quite the existential threat to life on earth that some would have us believe.**

**And not because of the rather strange suggestion that nuclear power doesn’t work very well from a technical point of view.**

**It does.**

**Once they’re built and certified and fully commissioned, modern gigawatt-scale nuclear power plants work very reliably and efficiently indeed, generally running at about ninety percent of full capacity for most of their operational lifetime.**

**There’s a whole bunch of other arguments for and against SMR technology that we thrashed out in that twenty-twenty video, using information published by the World Nuclear Association and counter points set out in a research paper from the Union of Concerned Scientists. I won’t rehash all of that here, but I have left a link in the description to that video in case you want to jump back and refresh your memory.**

**The fundamental reason for the sniff test fail, though, is not ideological or environmental. It’s really just plain old-fashioned economics. The majority of the four hundred and fifty or so large centralised nuclear facilities in operation around the world today have capacities of a gigawatt or more, and are the size of a small town. They are truly enormous bespoke engineering undertakings, and while most of them had their own very well publicised project overruns and overspends, their sheer scale nevertheless allows for what the industry bods call ‘Economy of Vertical Scale’, which basically means big thermal generation units tend to get more cost-efficient as they get bigger.**

**Why? Well, because in very basic terms that I can understand, if for example you want to send ten times more fluid through a network of pipes, you don’t need to increase the diameter of those pipes by ten times or increase their wall thickness by ten times. In other words, it doesn’t require ten times as much material to move ten times as much stuff. You don't need ten times the labour either. Getting a fitter, welder, painter and insulator to install ten small pipes costs a lot more than fitting one large one. You get the idea!**

**You lose that advantage if you’re building relatively small machines with generating capacities in the megawatt range instead of the gigawatt range.**

**SMR developers argue that they will be able to more than make up for that limitation, partly by working on much shorter timescales, which in theory would minimise the often crippling interest rates on long-term financing deals suffered by conventional nuclear power stations, and partly by exploiting ‘horizontal scaling’. Basically the Henry Ford philosophy of fast-moving production lines shoving stuff out at huge volume.**

**The trouble is, as industry experts and friends of the channel Michael Barnard and Paul Martin explain quite comprehensively in these recent articles , to make those economies of scale work, you need to be churning out literally tens or hundreds of thousands, or even millions of units, just like Henry Ford demonstrated to the world more than a century ago. That is very definitely NOT what’s happening in the SMR world. Nor is there any realistic prospect of it happening anytime soon. Every country seems to have its own preferred proprietary technology, and national governments tend to support and protect their own companies, quite understandably. Sharing knowledge and resources on an international scale to drive volume for the good of all humankind is, I think you’ll agree, not exactly the direction our global geopolitical juggernaut is heading in right now. So, the grand aspiration of massive horizontally scaled cost savings looks extremely unlikely to be achieved.**

**There would also be potentially very significant security and safety risks with so many decentralised, possibly suburban sites, not just from bad people doing violent stuff, but also from the ravages of an ever more chaotic climate in the coming decades. Who will insure against those risks? It won’t be a commercial entity because the odds of a financially damaging claim are simply too high. So, governments would have to get involved and underwrite hundreds of thousands of SMR projects that would be springing up all over the planet. And when I say governments, I do, of course, mean tax payers like you and me. And even if all those overwhelming economic challenges were somehow overcome, there’s still the long-term issue of decommissioning, which Michael Barnard suggests could be a billion dollar, one-hundred-year venture based on evidence from reactors in several countries that are going through that process right now. There’s no reason to suppose SMRs wouldn’t require the same duration and proportional clean-up costs when their time is up.**

**Despite these somewhat daunting challenges, all the rich industrialised nations still seem dead keen to get involved. Even Mr Putin has been mobilising his best people to build out a national SMR network over there in the Russian Federation. They’ve already got a floating SMR called the Akademik Lomonosov, which we talked about in our previous video, and in April twenty-twenty-three the Russian firm Rosenergoatom, was issued a licence to construct the Yakutsk land-based SMR in the Ust-Yansky District of the Republic of Sakha. Here's a nice photograph of the little model they made to woo their Kremlin backers.**

**Good luck with that one!**

**There is one country that has already built a Small Modular Reactor though. I bet you can’t guess which one it is, can you?**

**Oh..! China, SCHMEINER!!!**

**Actually, they’ve built two. You know – like you do! In December twenty-twenty-three the People’s Republic quietly switched on this 400MW modular reactor in Shandong Province, designed to co-generate electricity AND high temperature steam at five hundred degrees Celsius to run various processes in the petrochemical industry, effectively removing the need to burn natural gas and coal, which is what they currently have to do.**

**But the achievement the country seems most pleased with, and the one it’s shouted about in the global press, is that on the 7th February twenty-twenty-four, the outer containment dome was successfully hoisted into place at the ACP100 SMR project in HAINAN Province, which will be capable of providing baseload power to more than half a million homes. Initial planning for this one started back in twenty-ten. First concrete was poured on 13th July twenty-twenty-one and commercial operation is slated to commence by the end of twenty-twenty-six. So even Xi Jinping’s behemoth industrial machine will have taken sixteen years to get one of these things up and running.**

**And NuScale? Well, according to the stock market monitor Iceberg Research, the collapse of the UAMPS deal could mean real trouble for the company. NuScale shares reached fifteen dollars following their stock market flotation, but on the day of the Utah contract cancellation they crashed to only two dollars, as all their venture capital investors took whatever short-term profits they could plunder and jumped ship. At the time of making this video those shares are still hovering around the two-dollar-seventy mark so, although the company is still trading, I’ll let you make your own mind up about whether to sink your pension fund into them.**

**There is another American Nuclear powerhouse though, that I’m sure you heard of. They’re called Westinghouse. They’re developing what they call their AP300 model, which is a two-hundred and twenty-five megawatt modular reactor designed to utilize the passive safety systems in the company's existing AP1000 nuclear power plant technology. They’ve apparently just signed a deal in the UK that could completely scupper whatever was left of the Rolls Royce SMR dream. According to** [**this**](https://www.proactiveinvestors.co.uk/companies/news/1040531/rolls-royce-snubbed-for-uk-s-first-private-nuclear-plant-1040531.html) **February twenty-twenty-four article at the website ‘Proactive’, the US group inked a deal with Community Nuclear Power to install four of their AP300 small modular reactors at a project in the North of England that could potentially provide enough power for up to two million homes. It’ll be at least the early twenty-thirties before any electrons actually start flowing through local supply cables though, even assuming nothing at all goes wrong in the meantime which, let’s just say, is far from assured.**

**But all this conjecture is arguably a bit pointless anyway, isn’t it? No doubt you sharp-eyed folks out there will have already spotted that most of the world’s governments are on a big push to convince you and me that they want to reduce greenhouse gas emissions by at least forty percent by twenty-thirty, determined as they are to continue suggesting that we have any chance whatsoever of keeping average global temperatures to only one-point-five degrees Celsius above pre-industrial levels. Even though most climate scientists and energy industry analysts regard that target as palpable nonsense, in a slightly weird sort of way, it still makes quite a lot of sense to keep aiming for it, rather than getting all defeatist and giving up entirely. And to that end, the only available, affordable, rapidly scalable and sustainable technologies that we have at our fingertips right now are wind, solar and battery energy storage, backed up heroically by things like hydropower, a bit of geothermal and high voltage interconnectors, all of which are real, really work, are cheap and safe, and are well understood.**

**And we don’t need to fret about whether or not Small Modular Nuclear Reactors will work in a safe way at an affordable price, because by the time the developers of the technology get any of their rather prodigal metaphorical ducks into anything that resembles a row, the world will have moved on and we just won’t need them.**

**I imagine I may have engendered a reasonably strong reaction in some viewers with that last bit of rhetoric, and I’m always happy to find out what those reactions look like, so if you have views or news, or indeed direct industry experience of working with SMR technology, then why not jump down to the comments section below and leave you thoughts there.**

**That’s it for this week though. A massive thank you to our Patreon supporters, without whom this channel quite simply would not exist. And I must just give a quick shout out to a couple of folks who have recently pledged ten dollars or more a month to support the work here at Just Have a Think. They are -**

**Gary Stark**

**Stefan Flos**

**Cori Even**

**And**

**Arlene Allen**

**And of course, a huge thank you to everyone else who’s joined the Patreon team since last time too.**

**If you fancy getting exclusive early access to all my videos AND having YOUR say on the direction of the channel’s content, then why not jump over to patreon.dot.com forward slash just have a think to find out to get involved.**

**And if you don’t want to miss out on notifications of new videos each week, then make sure you click on that subscribe button. It won’t cost you a penny to do that, and it’s just a simple click away either down there somewhere or on that icon there.**

**As always though, thanks very much for watching! Have a great week, and remember to just have a think.**

**See you next week.**