**Have a look at these numbers for stationary battery energy storage capacity from twenty-twenty-four to twenty-twenty-seven in the main industrial nations, based on existing installations and projects already in progress. Quite impressive, don’t you think? Batteries already play a major role alongside renewables in grid stability and supply, especially in leading regions like California, but increasingly all over the world. Combine them with other clever technologies like grid forming inverters that could remove the need for the inertia that turbines currently provide, and you’ve got a pretty resilient grid that will be much more likely to prevent freak events like the recent blackout on the Iberian Peninsula.**

**Then there’s the relentless rise of battery electric vehicles. They’re already firmly established in China, Korea and parts of Southeast Asia, and growing very quickly here in Europe. Progress is slightly delayed in North America of course, for obvious reasons, but they’re on the rise there too, nevertheless. And when there’s hundreds of millions of batteries sitting around all over the place inside metal boxes with a wheel at each corner, all with the ability to SEND electrons INTO the grid as well as receive them back, then the spiky parts of the electricity distribution curve across the course of a day will become much smoother, helping renewables to be fully implemented in place of fossil fuels.**

**That’s the plan anyway. We’re not there yet though, are we? And there’s a massive amount of work still to do in a very short space of time if the world is to reach that lofty goal. A not insignificant part of that work will be convincing the majority of folks who sit in this big bulbous part of the normal distribution curve that their next car purchase should be electric instead of gasoline or diesel.**

**Obviously, cost is a big part of that, but so are range anxiety and charging speeds, despite the fact that the vast majority of existing EV drivers have found those two things to be almost completely irrelevant to their everyday driving experience.**

**But of course, perception is everything in the marketing game, isn’t it? So, battery makers have been slogging away to develop cell chemistries that enable electric cars to travel distances approaching a thousand kilometres on a single charge AND find ways to charge those batteries up in the same time as it takes to fill up an internal combustion engine car with fuel.**

**And now the world’s second largest battery manufacturer and definitely the world’s most ambitious car maker, BYD, has announced a technology that finally achieves that fast-charging goal in an actual real-world battery that’s economically viable and accessible to the mass market.**

**So, what have they created and how does it actually work?**

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

**Before we get stuck, I just wanted to let you know that several long-time viewers of the channel have yet again been reporting to me recently that they’ve been unsubscribed by the YouTube algorithm.**

**Subscriber numbers are the absolute lifeblood of any YouTube channel, and for reasons that I’ve never really been able to get to the bottom of, this automatic unsubscribing glitch does seem to happen from time to time. So, if you’ve subscribed in the past then it might be worth checking that you still are, and of course if you’re not yet subscribed, which is still the majority of you, then you really would be showing your support for me and the work I do here each week if you could click that little button and select ‘all notifications’. And I would be forever in your debt.**

**Anyway, back to batteries.**

**Let’s cut to the chase and have a think about how this new BYD technology works and why it’s apparently so superior to anything else that currently exists.**

**I guess we can say there are three main ingredients in BYD’s so-called Super e-Platform. Ingredient number one is the company’s revolutionary blade battery technology, which I’ll come back to a bit later in the video. The other two ingredients can be found in the battery charger itself. Namely a power rating of a thousand kilowatts, or one megawatt, coupled with a one-thousand-volt architecture.**

**So, what does all that mean then?**

**Well, I’m sure we all remember the P equals IV equation for power that we learned at school. So power, as expressed in Watts, equals the electrical potential difference across a circuit, expressed in Volts MULTPLIED by the current in Amps.**

 **So, if you want very high power, you either have to send the energy down the wires more quickly, in other words increase the current, OR create a larger electrical potential difference between the two points by upping the voltage. The analogy that I’m sure we’ve all seen many times before is the water tank and the tap. The height of the water tank determines the potential of the system, a bit like electrical voltage, and the tap governs how quickly that potential is allowed to flow, a bit like electrical current. That’s kind of where the analogy stops though, because unlike plumbing pipes, which can happily cope with more or less any rate of water flowing inside them, electrical cables cause a resistance to the flow of electrical energy, and that resistance creates heat. Bigger cables basically have more space for electrons to vibrate inside of and therefore have lower resistance. BUT, if the VOLTAGE, or potential difference is increased, then you can send much MORE power down the SAME sized cable because you can REDUCE the amount of CURRENT flowing through them and therefore minimise resistance.**

**And keeping cables as small as possible is something that will be pretty much essential for EV drivers who need to be able to physically lift and use them on public chargers.**

**A typical one-hundred- and fifty-kilowatt fast charger today can, for example, be configured to run at four hundred volts and three hundred and seventy-five amps, or eight hundred volts and about a hundred and eighty-seven amps.**

**BYD’s one thousand kilowatt, one-thousand-volt architecture would, by contrast, be running at a thousand amps. Because a thousand kilowatts is a million watts, so a thousand volts needs a thousand amps to reach that power target.**

**That is a lot of amps! So many amps in fact that even at such high voltage, the cables still need to be water cooled. High voltage and low current is the most efficient way to move electrical energy over short distances though, and BYD says it’s new system can in theory deliver roughly two-hundred and fifty miles of range in just five minutes.**

**Which is ridiculously fast.**

**The big caveat here though, is that it only works if the car’s battery can cope with such an onslaught of electrons in such a short space of time, and most existing electric vehicle batteries are nowhere near that level.**

**Which brings us nicely to the blade battery that I mentioned earlier.**

**As the name suggests, BYD has configured the battery in long thin blades. That means greater surface area to dissipate heat, which is a good start. But the blade battery also utilises something called Cell to Pack or CTP technology.**

**A typical battery today consists of cells that are stacked into modules that are then grouped together to form the battery pack. That means additional weight, space and cost as a result of the extra wiring and casing. The blade battery eliminates the module step and instead puts the cells directly into the pack, in parallel, side by side like books stacked neatly onto a shelf. That gives you more battery per volume of space, increased energy density at the pack level, improved structural integrity and much better thermal management, as I just mentioned.**

**When BYD launched the first-generation blade battery, it had a 2C charging rate, which basically means a full charge took thirty minutes. And its lithium iron phosphate or LFP chemistry had an energy density of between a hundred and forty and a hundred and sixty watt-hours per kilogram.**

 **This latest iteration ups the LFP energy density to a hundred and ninety watt-hours per kilogram and massively ramps up the charge rate to TEN C, which equates to a full charge in only six minutes.**

**Not to be outdone though, the world’s largest battery maker CATL has also developed a cell-to-pack, or CTP battery option which it calls the Qilin battery. The latest version of this technology can cope with a six-hundred-kilowatt charger, with a charge rate of four to five C which, according to CATL, equates to about two-hundred and twenty miles of range in roughly twelve minutes.**

**Both batteries boast high safety levels too. BYD provide us with this footage of a nail being driven through their blade battery with no drama whatsoever, and CATL’s Qilin battery will apparently be the first ever battery to achieve the so-called ‘no fire, no explosion’ safety standard set to come into effect in China in July twenty-twenty-six. That legislation states that batteries must be able to withstand any thermal runaway event without causing a fire or explosion and that any smoke must not pose any risk or danger to the vehicle’s passengers. That’s an even stricter standard than an earlier version, which only required warning signals before a fire or explosion occurred.**

**So, China is really setting the standard here, not just in terms of performance but also for safety as well.**

**Now, you could argue that using a one-megawatt system to charge up the batteries in a vehicle the size of a car is a bit like using a sledgehammer to crack a nut. That power output is currently only used for heavy goods vehicles. Most EV owners don’t have range anxiety or any concerns about charging speeds anyway, because they’ve sussed out how and when to charge up their car and they’ve come to understand the sea-change in operational cost reductions, ride comfort and efficiency that electric vehicles bring. The vast majority of those folks wouldn’t dream of changing back to an internal combustion engine vehicle. But as I said at the start of the video, perception is everything in marketing, isn’t it? So perhaps BYD and CATL decided that a grand PR gesture was required to finally win over the laggards and tip the balance of EV adoption for good.**

**It’s not all a one-way street to the East though. There are plenty of other battery makers in other parts of the world including the United States that are racing to develop their own batteries with various different chemistries and electrode materials and electrolyte configurations, all geared towards producing ultra-safe batteries with very fast charging times.**

**It’s all moving at breakneck speed though, that’s for sure. Any assessment of the energy market published even just a year ago is now already looking a bit hopelessly out of date.**

**Even as I was putting this video together, yet another Chinese battery maker, SEVB, has unveiled a fourteen-hundred-amp ultra-fast charger called the Star Chaser two-point-O, that they say can deliver a hundred and fifty kilometres of range in just one minute!**

**So, the disparaging commentary about EV’s and batteries and renewable technologies in general that we seem to get on an almost daily basis from the naysayers in much of the mainstream press and on social media is all starting to look a little bit misplaced, and well, let’s just say, the writers of those articles have got some serious catching up to do, haven’t they!**

**No doubt you’ve got your own views and perhaps even more up to date news on this topic though, so as always, the place to leave your thoughts is in the comments section below.**

**That’s it for this week though.**

**I’m taking a quick break for the next few days, so there’s no video next week, but I’ll be back in a couple of weeks’ time with more news from the world of climate change and sustainable energy.**

**In the meantime, a huge thank you to our Patreon supporters, who help me keep the channel completely independent and ad-free. Do have a look at our patreon page if you feel you’d like to get more involved with the direction of the content.**

**And don’t forget to give us a like and subscribe if you can. That really does make all the difference to how we get distributed by the YouTube algorithm.**

**Most important of all though, thanks very much for watching.**

**Have a great week, and remember to just have a think.**

**See you next week.**