Q4 2021 Earnings Call

Company Participants

- Andrew D. Baglino, Senior Vice President of Powertrain & Energy Engineering
- Elon Musk, Chief Executive Officer
- Lars Moravy, Vice President, Vehicle Engineering
- Martin Viecha, Senior Director for Investor Relations
- Zachary J. Kirkhorn, Chief Financial Officer

Other Participants

- A.M. Toni Sacconaghi
- Benjamin Kallo
- Jed Dorsheimer
- Pierre Ferragu

Presentation

Martin Viecha {BIO 17153377 <GO>}

Good afternoon, everyone, and welcome to Tesla's Fourth Quarter 2021 Q&A Webcast. My name is Martin Viecha, Senior Director of Investor Relations, and I'm joined today by Elon Musk, Zachary Kirkhorn, and a number of other executives.

Our Q4 results were announced at about 3 PM Central time in the update deck we published at the same link as this webcast. During this call, we will discuss our business outlook and make forward-looking statements. These comments are based on our predictions and expectations as of today. Actual events or results could differ materially due to a number of risks and uncertainties, including those mentioned in our most recent filings with the SEC.

During the question-and-answer portion of today's call, please limit yourself to one question and one follow-up. Please use the 'raise hand' button to join the question queue.

But before we jump into the Q&A, Elon has some opening remarks. Elon?

Elon Musk {BIO 1954518 <GO>}

Thanks, Martin.

So, just to recap 2021, it was a breakthrough year for Tesla and for electric vehicles in general. And while we battled -- and everyone did, with supply chain challenges through

the year, we managed to grow our volumes by nearly 90% last year. This level of growth didn't happen by coincidence. It was a result of ingenuity and hard work across multiple teams throughout the company.

Additionally, we reached the highest operating margin in the industry, in the last widely reported quarter, at over 14% GAAP operating margin.

Lastly, thanks to $5.5 billion of -- $5.5 billion of GAAP net income in 2021, our accumulated profitability since the inception of the company, became positive, which I think makes us a real company at this point. This is a critical milestone for the company.

So after an exceptional year, we shift our focus to the future, Texas and Berlin. So we've begun production at both Texas and Berlin. We started that last quarter. But that's not the most important thing. We're focused more on when to get to volume production and when can we deliver cars to customers.

But I think it is worth noting that we've -- and as the internet has observed, we've been making quite a few cars in Texas and Berlin. So -- in Austin and Berlin. So, in Texas, we're building the Model Ys with the structural battery pack and the 4680 cells. And we will start delivering after final certification of the vehicle which should be fairly soon.

Capacity expansion will continue. We're maximizing output of each factory and building new factories in new locations in the future. Although, we're not ready to announce any new locations on this call, but we will, and through 2022, look at new locations, and probably be able to announce new locations towards the end of this year, I expect.

So, in 2022, supply chain will continue to be the fundamental limiter of output across all factories. So the chip shortage, while better than last year, is still an issue. And yeah, so that's -- there are multiple supply chain challenges. And last year was difficult to predict and hopefully this year, will be smooth sailing, but I am not sure what you do for an encore to 2021, 2020. Nonetheless, we do expect significant growth in 2022 over 2021, comfortably above 50% growth in 2022.

Full Self-Driving, so over time, we think Full Self-Driving will become the most important source of profitability for Tesla. It's a -- I mean actually if you run the numbers on robotaxis, it's kind of nutty -- it's nutty good from a financial standpoint. And I think we're completely confident at this point that it will be achieved. And my personal guess is that we'll achieve Full Self-Driving this year, yes, with, at a safety level significantly greater than a person.

So, it's -- the cars in the fleet essentially becoming self-driving via a software update, I think might end up being the biggest increase in asset value of any asset class in history. We shall see. It will also have a profound impact on improving safety and on accelerating the world towards sustainable energy through vastly better asset utilization. Let's see.

So, on the product roadmap front, there's quite a lot to talk about. I'm not going to go through every sort of thing that we're working on because I think a lot of them deserve

product launches of their own as opposed to a few minutes on an earnings call. So, I'll talk kind of at a high level -- yes, mostly at a high level.

The fundamental focus of Tesla this year is scaling output. So, both last year and this year, if we were to introduce new vehicles, our total vehicle output would decrease. This is a very important point that I think people do not, a lot of people do not understand. So, last year, we spent a lot of engineering and management resources solving supply chain issues, rewriting code, changing our chips, reducing the number of chips we need, with chip drama central. And that was not the only supply chain issue. So it was just hundreds of things. And as a result, we were able to grow almost 90% while I believe almost every other manufacturer contracted last year. So, those are good results.

If we had introduced say a new car last year, we would -- our total vehicle output would have been the same because of the constraints, the chips constraints, particularly. So, if we'd actually introduced an additional product, that would then require a bunch of attention and resources on that increased complexity of the additional product, resulting in fewer vehicles actually being delivered.

And the same is true of this year. So, we will not be introducing new vehicle models this year. It would not make any sense because we'll still be parts constrained. We will, however, do a lot of engineering and tooling and whatnot to create those vehicles, Cybertruck, Semi, Roadster, Optimus, and be ready to bring those to production hopefully next year. That is most likely.

But like I said, it is dependent on, are we able to produce more cars or fewer cars. So, in terms of priority of products, I think the -- actually the most important product development we're doing this year is actually the Optimus humanoid robot. This, I think, has the potential to be more significant than the vehicle business over time.

If you think about the economy, it is -- the foundation of the economy is labor. Capital equipment is distilled labor. So, what happens if you don't actually have a labor shortage? I'm not sure what an economy even means at that point. That's what Optimus is about. So, very important.

So, Drew, do you want to talk about the 4680 program -- or is this a good, the right time?

Andrew D. Baglino {BIO 21161872 <GO>}

Yeah, sure.

So throughout 2021, we focused on growing cell supply alongside our in-house 4680 effort to provide us flexibility and insurance as we attempt to grow as fast as possible. As we sit today, cells from suppliers is actually, it sort of exceeds our other factory limiting constraints that you mentioned Elon, in 2022, or to say it differently, 4680 cells are not a constraint to our 2022 volume plans based on the information we have.

But we are making meaningful progress of the ramp curve in Kato. We're building 4680 structural packs every day, which are being assembled into vehicles in Texas. I was driving one yesterday and the day before. And we believe our first 4680 vehicles will be delivered this quarter.

Our focus on the cell, the pack, and the vehicles here, is driving yield quality and costs to insure we are ready for larger volumes this year as we ramp and next year. And the 4680 and pack tool installations here at Giga Austin are progressing well with some areas producing first parts, and the internet has also noticed that.

Elon Musk {BIO 1954518 <GO>}

Yeah,

Andrew D. Baglino {BIO 21161872 <GO>}

I was touring the factory, the cell factory here yesterday. I'm super pumped. It's like a really exciting accomplishment for us to bring everything into one Austin factory here in Texas.

Elon Musk {BIO 1954518 <GO>}

Absolutely. And just to repeat, we're still expecting to be part or and primarily chip limited this year. So that's the thing that's actually the driver.

Andrew D. Baglino {BIO 21161872 <GO>}

Yeah.

Elon Musk {BIO 1954518 <GO>}

And that should -- limitation should alleviate next year, and then probably we transition into a cell limitation, battery cell, total gigawatt hours of cell limitation, which is when the 4680 will become very important.

Andrew D. Baglino {BIO 21161872 <GO>}

Agreed.

Martin Viecha {BIO 17153377 <GO>}

Thank you.

Elon Musk {BIO 1954518 <GO>}

Yeah.

Martin Viecha {BIO 17153377 <GO>}

Thank you very much. And now Zach has some opening remarks as well.

Elon Musk {BIO 1954518 <GO>}

The long [ph] opening remarks.

Zachary J. Kirkhorn {BIO 20940148 <GO>}

Yeah, thanks Martin.

As Elon mentioned, 2021 was a financially transformative year for the company. If we look across the full year '21 and compare that to 2020, our automotive gross margin excluding credits, rose by over 600 basis points, enabled by work on cost reduction, utilization of our Shanghai factory for exports, and accelerating demand.

OpEx, as a percentage of revenue, reduced despite the impact of one-time items and unique items, and operating income more than tripled with operating margin reaching our guidance of mid-teens. And these margins are trending up.

We also saw regulatory credits accounting for relatively small portion of our 2021 profitability, which we expect to continue to reduce in materiality going forward.

For Q4 specifically, automotive gross margin, excluding credits, increased to 29.2%, which is our highest yet. We do continue to see some impact of higher pricing on certain models and trends as was the case in prior quarters, but please keep in mind that due to backlogs, changes in pricing will generally impact our financials in future quarters.

Supply chain challenges, import congestion, resulted in a significant increase in our expedite costs in Q4. We also took reserves associated with warranty and recall cost.

Operating expenses were meaningfully impacted by stock-based compensation from the final two tranches of the CEO stock grant becoming probable, and payroll taxes associated with the exercise of the 2012 CEO options. The total impact of these payroll taxes, warranty and recall costs, and excess expedites, was just over $700 million in the quarter.

Our free cash flows have remained strong, reaching record levels in Q4 of $2.8 billion despite increased CapEx. In addition to using cash to grow the business as quickly as we can, we have been retiring legacy and high interest debt. Note that we plan to continue to utilize the ABS market for product specific financing.

As we look forward, we expect 2022 to be another significant and exciting year for the company. We continue to drive for vehicle volume growth at or above 50%, as Elon mentioned. And our plans show that this is actually achievable with just our Fremont and Shanghai factories. For quite some time now, these factories have been running below capacity due to macro challenges with supply and logistics. As Elon mentioned as well

from what we're seeing, the pace of growth in 2022 will again be determined by supply chain and logistics, which is quite difficult for us to forecast.

Despite these constraints, it's important to begin the ramp of Austin and Berlin to ensure that we are prepared once limitations ease, enabling us to increase total output more quickly in the future. This will result in higher fixed and semi variable costs in the near-term, in addition to the usual inefficiencies as we ramp a new factory.

We are also seeing inflation and rising commodity prices, which we expect to continue to put pressure on our costs. How this specifically impacts gross margins in the near-term is uncertain, given the mix of both tailwinds and headwinds. However, we do expect to continue to see stronger operating margins as we grow our volumes and improve operating leverage.

Over a longer-term horizon, we're quite optimistic about the expansion of margins though. From the hardware side, we are aggressively driving manufacturing innovations and operational efficiency to reduce cost. And with the rapid development of FSD, software-based profits will ultimately become a strong addition to the profits generated by selling hardware.

So congratulations to the Tesla team for a terrific 2021, and thank you to our suppliers who supported us. Looking forward to another great year.

Elon Musk {BIO 1954518 <GO>}

I'd like to just second the thank you to the suppliers. A lot of suppliers worked late nights, weekends, vacations, around the world and we're very grateful for that.

Questions And Answers

A - Martin Viecha {BIO 17153377 <GO>}

(Question And Answer)

Thank you very much. Let's go to the Q&A from the investors' side. The first question was on 4680 cells, which we already answered. So, let's go to the second question. How is the progress of the $25,000 compact car? Can you give an update?

A - Elon Musk {BIO 1954518 <GO>}

We'll -- we're not currently working on the $25,000 car. We, at some point we will but we have enough on our plate right now, too much on our plates, frankly. So at some point, there will be -- but I think that's a sort of a question that -- it's just sort of a wrong question. Really it's a, really the thing that overwhelmingly matters is when is the car autonomous, I think, at the point in which it is autonomous, the cost of transport drops by, I don't know, a factor of 4 or 5.

A - Martin Viecha {BIO 17153377 <GO>}

Thank you. The next question from investors is, since we're talking product roadmaps today, how do you view domestic cooling and heating in the context of accelerating the sustainable energy transition, and how might Tesla's HVAC and heat pump advances fit it?

A - Elon Musk {BIO 1954518 <GO>}

You want to take that Drew?

A - Andrew D. Baglino {BIO 21161872 <GO>}

Yeah, I think from a mission perspective, it's very aligned. If you imagine replacing natural gas, water, and space heaters, with electric heat pumps, it offsets something equivalent to like 80% of what a solar plus Powerwall system would offset. So it's very impactful. And we have learned a lot about how to make capable and reliable heat pumps that work in all environmental conditions and are excited about the idea of working on that problem one day. We put it that way. It's definitely aligned with our mission to transition to sustainable -- accelerate the transition to sustainable energy.

A - Elon Musk {BIO 1954518 <GO>}

Yeah. I think it really becomes quite a compelling solution to the consumer where you integrate the electric vehicles' charging, solar energy storage, hot water, HVAC, in a very tight compact package that also looks good. It just doesn't exist.

A - Lars Moravy

Yeah, I mean the integration of those systems in our house --

A - Elon Musk {BIO 1954518 <GO>}

That's Lars by the way.

A - Lars Moravy

The integration of those systems in our house are no different than integration of those systems in a vehicle.

A - Elon Musk {BIO 1954518 <GO>}

Yeah.

A - Lars Moravy

The only difference is, we do it on a vehicle, way hotter in a vehicle.

A - Elon Musk {BIO 1954518 <GO>}

Yeah. And then, it's a sort of a constrained on mass and volume and energy. It's like, it gets the house like wow --

A - Lars Moravy

Kind of easy problem.

A - Elon Musk {BIO 1954518 <GO>}

Yeah.

A - Lars Moravy

But, obviously those systems are all just disparate and what we've been doing with Powerwall and charging and solar, integrating them more and more. The next logical step is obviously HVAC and water heating, so we will do that and we will integrate it probably better than anyone has. But as you said, we have a lot of stuff on our plate. Yeah, so.

A - Elon Musk {BIO 1954518 <GO>}

Yes. And integration too, if you like, with your phone, everything and the car can -- like the house can just heat and cool things because it knows you're coming home type of thing.

A - Lars Moravy

Yes.

A - Elon Musk {BIO 1954518 <GO>}

It still needs to be like randomly that temperature when you're not there or --

A - Lars Moravy

When the cat moves.

A - Elon Musk {BIO 1954518 <GO>}

Yeah -- I mean -- definitely. So, here's do sensible things and just -- work really well. I think it'd be interesting, quite a game changer down the road. We got a lot of fish frying on and so it is a thing we will do but we're not committing to a timeframe at this point.

A - Andrew D. Baglino {BIO 21161872 <GO>}

And people should do it anyway.

A - Elon Musk {BIO 1954518 <GO>}

Yes. If somebody else wants to do it (inaudible).

A - Andrew D. Baglino {BIO 21161872 <GO>}

Yes, it's super beneficial for achieving the goal here.

A - Elon Musk {BIO 1954518 <GO>}

Yeah.

A - Martin Viecha {BIO 17153377 <GO>}

Thank you. The next question is, would you consider splitting FSD packages into perpetual and term licenses with a higher tier for both options for commercial use, a perpetual license could be attached to individual or business and not the vehicle itself.

A - Elon Musk {BIO 1954518 <GO>}

No, I mean, it sounds maybe too complicated. We're just going to be focused on like what sells for the fully considered lowest cost per mile or kilometer of driving and these other the -- so that's what matters. Like, how do we maximize the efficiency, go from one place to another, and then charge them in a sensible way, including the charging infrastructure, that's a big part of it.

A - Andrew D. Baglino {BIO 21161872 <GO>}

Yeah.

A - Elon Musk {BIO 1954518 <GO>}

So, it'd be charging for money and charging for energy.

A - Andrew D. Baglino {BIO 21161872 <GO>}

Yes.

A - Martin Viecha {BIO 17153377 <GO>}

Thank you. The next question is, is Dojo on track for summer 2022? And what challenges if any are you working through? Is Dojo necessary for FSD to operate better in cities like New York City? Or on a separate note, where should we expect the first implementation Teslabots in your factories?

A - Elon Musk {BIO 1954518 <GO>}

Okay, there's a few questions in it. At least six questions.

Yeah, Dojo appears to be on track for doing something useful in the summer of this year. The, I think the threshold that really matters is at which point it -- when does it become more competitive than a GPU cluster for training? And obviously GPU cluster is getting better. So it's a moving target. But that's the goal I've set for the team, is the FSD team running our GPU Supercluster, needs to tell me that they want to use Dojo instead. That's way better. that's how --

I'll pay obviously for the threshold, and I don't know when that will be. It's like, I wouldn't say like success is 100% certainly here. Like we just generally want to overestimate meaning options to underestimate ourselves. But it does seem as though we might pass that threshold next year with Dojo if we execute well.

Dojo is not needed for Full Self-Driving, but it is a cost optimization on training vast amounts of video data. Customization also a rate of improvement, you know so, so if you can train models faster, have a shorter iteration interval, then you can make progress faster. Like not everything can be just distributed to on GPUs. So there's some elements of serialization there. So -- and then if Dojo is competitive, then it does seem like the kind of thing where we would offer it to other companies that want to do neural net training. Those are very much a neural net training optimized system.

But in theory, it should be better than a generalized computing platform or say GPUs which were not really intended for -- you know they're pixel shaders not directly intended for optimizing training of neural networks. They just happen to work better than CPUs in most cases. So, (inaudible) like Dojo is like a giant ASIC optimized for neural net training, especially video or video like things. But as -- like I said, we're not saying for sure, Dojo will succeed. We think it will. We would encourage those who think this is an interesting problem to join Tesla. And yeah --

A - Martin Viecha {BIO 17153377 <GO>}

Thank you, and the first use of Teslabots whether it's in the factory or elsewhere?

A - Elon Musk {BIO 1954518 <GO>}

Yeah. The first use of the Teslabot, Optimus, the Optimus name seems to be sticking, into -- internally, Optimus Subprime. Like, if we can't find, if we can't find a use for it, then we shouldn't expect that others would. So the first use of the Optimus robots would be at Tesla and are like moving parts around the factory or something like that.

A - Martin Viecha {BIO 17153377 <GO>}

Okay. Thank you very much. And the next question on insurance. When do you plan on having your insurance service rolled out in all the states? International rollout timing in markets that have Tesla Insurance, what kind of uptake rates are you seeing?

A - Zachary J. Kirkhorn {BIO 20940148 <GO>}

Yeah, we currently offer Tesla Insurance in five states in the US. Four of them are telematics, which is Texas, Illinois, Ohio, and Arizona. And then California, which has a more standard insurance offering based upon regulations there.

A - Elon Musk {BIO 1954518 <GO>}

It should be clear, like, we're pushing very hard for California to change the rules to allow informatics, which basically means that you're as safe as your driving is measured. So we think this, the current California rules are contrary to the best interest of the consumers in California and should be changed.

A - Zachary J. Kirkhorn {BIO 20940148 <GO>}

Yeah, and that's evidenced by what we're seeing in Texas.

A - Elon Musk {BIO 1954518 <GO>}

Yeah.

A - Zachary J. Kirkhorn {BIO 20940148 <GO>}

We've been in this market now for about three months. And what we see in the data is, the frequency of collision by folks who are in -- who are given a feedback loop on how they are driving, is quite a bit lower than the frequency of collision otherwise.

A - Elon Musk {BIO 1954518 <GO>}

Yeah.

A - Zachary J. Kirkhorn {BIO 20940148 <GO>}

And --

A - Elon Musk {BIO 1954518 <GO>}

We can do a direct feedback on whether driving is safe, and if they drive safer, their insurance costs less, so they drive safer. It's great. It's encourages Tesla Insurance with informatics and real-time feedback encourages safer driving and rewards it monetarily, it's great.

A - Zachary J. Kirkhorn {BIO 20940148 <GO>}

Exactly. Yeah. And so, we see that so far in Texas. Take rates have been quite strong. We measure this on the conversion rate from when folks quote to see what their monthly rate would be at the starting point, to what percentage of them purchase. So we're very encouraged by the interest that we're seeing in Texas and then we've had enough history in Texas to see what does the loss ratios look like, and how do the economics of the program work, and we're on the right track there as well.

So we're comfortable with what we've seen in Texas to move as quickly as, and to scale this across the US. Specifically on the question about when we will be in all states, this is a slow process because of insurance being regulated at the state level. And so, we have to go through each of those processes with each of the departments of insurance at each state.

But our internal goal here, by the end of the year, is to be in enough locations that 80% of our customers within the US could choose to sign up for Tesla Insurance if they wanted to. There's a lot of uncertainty around that based upon the regulatory processes, but that's our goal.

And then, as we make more progress rolling out in the states and each incremental state becomes a little bit less effort than the prior, that's when we'll turn our attention to the Europe market. We might be able to do that by the end of the year, starting to get work on Europe by the end of the year. We'll have to see how we progress in the US.

A - Martin Viecha {BIO 17153377 <GO>}

Thank you. The next question is, what is your expected max capacity from each of your current factories, Fremont, Shanghai, Berlin, and Austin? And timing for new factory announcements.

A - Elon Musk {BIO 1954518 <GO>}

I don't think we want to comment on that. It's always possible to increase the output of any given factory. To say, what's the max capacity, well, it's difficult to say, what that max capacity is, because you put a lot of effort into it. You increase capacity quite a lot. I think there's -- look at the big picture. You'd initially always want to increase capacity at one factory, because your logistics cost of transporting cars, needs to be considered especially as the cars become more affordable.

You want to have factories that are not like thousands of miles away from the customers. So even if you could increase output, it may not actually be the smart thing to do. So, in the US, with for example, with Giga Texas coming up, we would want to deliver same Model Ys that are going to the eastern two-thirds of the United States from this factory. The Logistics costs are going to be much less. We will continue to increase output in Fremont and at Giga Nevada, and at Shanghai and as I said, being on the call, 2022 is the year we'll be looking at factory locations to see what makes the most sense, possibly with some announcement by the end of this year.

A - Martin Viecha {BIO 17153377 <GO>}

Thank you. And the next question is, what are the biggest obstacles for Cybertruck volume production besides battery shortage?

A - Elon Musk {BIO 1954518 <GO>}

Batteries will probably not be the limiting factor in Cybertruck production. There's a lot of new technology in the Cybertruck that will take some time to work through. And then there's a question of like what's the average cost of a Cybertruck and to what degree, is that affordable. There's -- you can make something infinitely desirable but if it's not affordable that will constrain people's ability to buy it, because they don't have the money. I worry more about like, how do we make the Cybertruck affordable despite having all sorts of technology. That's the thing that will really set the rate. Yeah, aspirationally, we'd like it to go, just a rough order of magnitude, we'd like the Cybertruck to be at least on the order of a quarter million vehicles a year. But it'll take us a moment to get to that level.

A - Martin Viecha {BIO 17153377 <GO>}

Thank you. The next question is, how much of Tesla's margin improvement is from; number one, economies of scale, number two, production design -- production line design efficiencies, number three, reduced transportation costs from multiple plant locations, and number four, pricing versus cost inflation, or number five, other sources, and how much further could margins improve and why?

A - Zachary J. Kirkhorn {BIO 20940148 <GO>}

There's basically, yeah there's basically four major factors if you look over the last year to margin improvement in the company and they're in no particular order here, but these are

the big ones. So our mix of Model Y is increasing as we've ramped that to higher capacity in Fremont and also in Shanghai. And the reason that matters is the Model Y is a vehicle that carries a higher profit than the Model 3.

And so that is helpful on our margins and then as we increase the volume on that program with labor efficiencies, fixed cost amortization, they improve and the costs go down as well. The second one here is localization in Shanghai has been a huge help for margins for the company. And the obvious things around logistics and duties, is a big part of it but we've also -- that factory had a different line design, more efficient from the start and we've been pushing the boundaries on the volume there. So that has been helpful.

If you recall, at the beginning of the year, we are also, we're in a transition to the new version of the Model S and Model X. And so as that has ramped over the course of the year, that has been helpful. And then we've also done various price increases in certain markets on certain models, which has helped there. So that's generally the story at a high level.

As we look over the next quarter or two, as I mentioned in my opening remarks in the last call as well, we have ramp in efficiencies from the launch of Austin and Berlin. We also have pressures coming from inflation, supply chain, raw materials, et cetera. And so, where that nets out is hard to say in the immediate term and we obviously as a company are going to be driving to increase margins as much as we can. But I just want to be realistic that we're launching two factories simultaneously here and it unavoidably will add cost to the business as we do that.

And as we look further out, and Elon mentioned this in his opening remarks as well, the software portion of the business I think is the one to really pay attention to. As Full Self-Driving features get rolled out to more and more folks, mean for me personally, I prefer to drive my car with the FSD beta on, and I think as more and more people experience that, take rates there, and then as we work towards the robotaxi space, this is actually quite a bit of upside on margins from a software perspective.

A - Elon Musk {BIO 1954518 <GO>}

Yeah, I think basically everything pales in comparison to the value of robotaxi or Full Self-Driving. I mean, it's just -- I mean that just tends to warm everything. You just go from having an asset that is -- has a utility of perhaps 12 hours a week per passenger car to maybe around 50 or 60 hours a week to a 5X increase in the utility of the asset. The cost didn't change or -- yeah so. That's where just things just -- just kind of where's your mind.

A - Martin Viecha {BIO 17153377 <GO>}

Thank you. And the last question from investors is, Elon mentioned level 4 autonomy could be achieved this year. Is it based off initial FSD beta rollout experience or is level 4 ability predicated on Dojo being complete and online?

A - Elon Musk {BIO 1954518 <GO>}

As mentioned earlier, Dojo is not required for Full Self-Driving. You know, it should have a positive effect on the cost of training neural networks. It's not just a question like, does it

get you to Full Self-Driving but really kind of like the March of Nines of reliability, is it 99.999% reliable or 99.999999% reliable? This is -- it gets nutty.

So, we obviously want to get to as close to perfection as possible. So frankly, being safe than a human is a low standard, not a high standard. People are very, very lousy, often distracted, tired, texting. Anyway, it's just remarkable that we don't have more accidents. So, it's -- yes -- so actually being better than a human, I think, is just relatively very forward, frankly, how do you be a 1,000% better or 10,000% better. Yes. That's what gets much harder.

But I think anyone who's been in the FSD beta program, I mean, if they were just to plot the progress of the beta interventions per mile, it's obviously trending to a very small number of interventions per mile and the pace of improvement is fast. And there are several profound improvements to the FSD stack that are coming in the next few months. So, yes, I would be shocked if we do not achieve Full Self-Driving safer than a human this year. I would be shocked.

A - Martin Viecha {BIO 17153377 <GO>}

Thank you. Let's go to analysts' questions now and the first question comes from Jed from Canaccord. Jed, feel free to unmute yourself and ask a question.

Q - Jed Dorsheimer {BIO 6360573 <GO>}

Hi, thanks and congratulations on a great year. Elon, I guess my question's around the Megapack or your energy business. And so as we look at the strategy or the supply chain constraints that you mentioned, you have two different strategies, or it seems like with Megapack and Powerwall. And I think the Powerwall was answered with 4680 and the 2170 opening up. So I was wondering if you could just talk about the supply chain and LFP for the Megapack and what we should expect for that?

A - Elon Musk {BIO 1954518 <GO>}

To be clear, we do think that all stationary storage, Powerwall and Megapack, will transition to an iron-based system and non-nickel system. Manganese is also -- could be part of the future, but primarily iron. It just comes out, iron nickel -- we need something that is formed in a star before a supernova, ideally. So, iron is. So that's -- because there's a ridiculous amount of iron in earth, there's also a ridiculous amount of lithium. So, we really expect all stationary storage to transition to iron over time and likes it --with manganese, it is like a wild card. There's also less manganese. And I should say like we did shortchange the energy business last year, in that vehicle took priority over the energy side. So --

A - Andrew D. Baglino {BIO 21161872 <GO>}

Not on sales, but on --

A - Elon Musk {BIO 1954518 <GO>}

Yes. I'm sure, it's -- exactly. So --yeah. We do see a very -- I mean long-term terawatt hour per year energy business.

A - Andrew D. Baglino {BIO 21161872 <GO>}

Yes.

A - Elon Musk {BIO 1954518 <GO>}

Well a lot. It's very vast. Yeah.

Q - Jed Dorsheimer {BIO 6360573 <GO>}

That's helpful. Thank you. So, you see that '22 is kind of the opening of the energy business reaccelerating?

A - Elon Musk {BIO 1954518 <GO>}

It's hard to predict 2022 because we're still have lingering supply chain -- there are still lingering supply chain issues globally. But I think the chip stuff, at least the chip side of things appears to -- looks like it will alleviate end of this year or '23. I mean, there are a crazy number of chip that's being built, which is great. The sheer number of chips that's being built right now is exciting to see. Yeah, so, but it could be other issues, we're trying to anticipate those as much as possible, but predicting future is difficult.

A - Zachary J. Kirkhorn {BIO 20940148 <GO>}

And the goal is definitely to grow it this year.

A - Elon Musk {BIO 1954518 <GO>}

Yeah, we will grow it this year, for sure.

It just -- we if we're simply -- we're able to respond to demand, it might grow by like 200% or 300% or something as opposed to 50% or something.

A - Zachary J. Kirkhorn {BIO 20940148 <GO>}

Yeah. I mean, I think it's exactly that. I mean, it's a question of does a double, triple, quadruple. Mean either way, I think our plans are pretty ambitious for Megapack this year and storage in general.

A - Elon Musk {BIO 1954518 <GO>}

Yeah.

A - Zachary J. Kirkhorn {BIO 20940148 <GO>}

The exact amount of growth is hard to know. But ultimately, I mean, to Elon's point about the growth of this business, I mean we need to be growing faster than the vehicle business.

A - Elon Musk {BIO 1954518 <GO>}

And it will actually grow faster than the vehicle business once we initiate the --

A - Zachary J. Kirkhorn {BIO 20940148 <GO>}

Yeah.

A - Elon Musk {BIO 1954518 <GO>}

-- damn chip constraints frankly. So it will grow like kelp on steroids basically on the road, it needs to. Our primary mission is to accelerate sustainable energy. That's always been our primary mission and we're trying to stay true to that.

A - Martin Viecha {BIO 17153377 <GO>}

Thank you. The next question comes from Ben Kallo from Baird.

Q - Benjamin Kallo

Hi. Thanks for taking my question. I was wondering on the R&D front because like you said, you have so many fish frying. How do you organize R&D efforts so that you can start talking about all these new products, is there like an incubator or some type of thing like that. But just structurally, I'm curious about that. Thank you.

A - Elon Musk {BIO 1954518 <GO>}

We don't have incubators or research centers.

A - Zachary J. Kirkhorn {BIO 20940148 <GO>}

Research centers.

A - Elon Musk {BIO 1954518 <GO>}

Yeah, we don't have research centers and we work on things that go into our products. Yeah. We're like this is a useful product that the world really needs and we're just like let's make this thing, design it up and iterate fast and then figure out how to make this at scale at a reasonable price. That last part is the super hard part. Many times, we've said prototypes are easy, production is hard. We could work out on many prototypes, but what's the point of that? Like you actually have to reach scale production and have cash and exceed cash out. That's the super hard part.

A - Zachary J. Kirkhorn {BIO 20940148 <GO>}

So everybody needs to be in the factory often enough to be able to understand that last part of the equation.

A - Elon Musk {BIO 1954518 <GO>}

Yeah.

A - Andrew D. Baglino {BIO 21161872 <GO>}

And if you're in a research center --

A - Lars Moravy

Yes. Doing them separately is like -- for actually making products. So, we don't think of it as R&D and then like the product development. It's just one -- one be able to just make great product --

A - Elon Musk {BIO 1954518 <GO>}

Is the same general societally with there's way too much value placed on the idea. It's like the -- like the idea of going to the moon. That's what the hard part. Okay, going to the moon is the hard part by far. And the thing is that that is true for really most products. So, this is just way too much value placed in the idea versus execution. And we have ideas -- we have a bazillion ideas. So many ideas we don't know what do with. Sort through them and say, which one are we actually going to going through blood, sweat and tears in terms of bringing to volume production. That's the super -- and then actually do that, that's tough.

A - Andrew D. Baglino {BIO 21161872 <GO>}

And the closer you are to applying blood, sweat, and tears to actual production, the faster you'll be able to bring new things into actual production.

A - Elon Musk {BIO 1954518 <GO>}

Yes, exactly. You want to tie it back with production, just like the office we're sitting in right now, literally looks over the Giga Texas production line, like the offices are integrated into the factory.

Q - Benjamin Kallo

Thank you.

A - Martin Viecha {BIO 17153377 <GO>}

Thank you very much. The next question comes from Tony Sacconaghi from Bernstein.

Q - A.M. Toni Sacconaghi {BIO 3056875 <GO>}

Yes. Thank you for taking my question. I have two please. First to you, you spoke a lot about FSD and how the economics could be very attractive going forward. I'm wondering, if you could just share what your current attach rate might be for FSD on your vehicles or how to think about the progress of your attach rate or revenue in FSD, let's say in '21 verses '20, and how much deferred revenue for FSD was drawn down during the year? And I have a follow-up please. Thank you.

A - Elon Musk {BIO 1954518 <GO>}

I think the FSD stuff, you really don't want to be looking in the rearview mirror. It would not be a good indicator for the future. This is where you need to look out the front windscreen. So because it is such a profound step change, effectively long term, every car will have FSD. And so -- and the value of that will be a very big number. It's like, just look at this as asset utilization, and you have a passenger car which normally is driven maybe one

and a half hours a day on average, maybe 10 hours, 10 or 12 hours a week. A lot of cars in parking lots.

They're spending money, they're not just driving the cars but storing them all over the place. We can get rid of a lot of parking lots if you have a car that is operating all the time. But there will be a challenge with traffic. So, we got like this little tiny baby company, the Boring Company, which I initially started as a joke and now but now it seems -- I think it actually could be quite essential to alleviating the insane traffic that will happen when cars are autonomous because you reduce the pain of travel and you reduce the cost of travel so dramatically that there will be a crazy number of cars on the road.

I mean, it's going to be, I think way cheaper to go point-to-point with a robotaxi, which is an autonomous Tesla which every car we've made in the past, three or four years, will be capable of that than a bus or a subway. This will cost less than the subsidized value of a bus ticket. So, if you want to go to, I'm not going to take the bus. You know, if it costs you, I don't know, for argument's sake, you know 2 bucks to travel 10 miles point-to-point, everybody's taking the bus, especially in cold weather or it's dark or maybe a little bit dangerous or hell that, we're going to.

People just do not understand how profound a change this is. It's not like some little feature. It's like the most profound software upgrade, maybe in history. Millions of cars suddenly have four or five times utility (inaudible) overnight. I don't actually know how to quantify that and actually except that it's some big number.

Q - A.M. Toni Sacconaghi {BIO 3056875 <GO>}

Okay, thank you for that. Elon, I was wondering if I could just follow up and ask you, you talked about your product roadmap, and I'll see your goal to keep growing at 50% per year or better. That would put you at 3.2 million vehicles and or more in 2024, and I think you made reference to Cybertruck maybe being 250,000 vehicles. If there is no $25,000 vehicle being worked on, is it really realistic to think that you can sell more than 3 million vehicles with two very high volume cars and Cybertruck in 2024, or how do we think about that or what else is missing in that equation?

A - Elon Musk {BIO 1954518 <GO>}

Yeah, I mean, it is apparent from the questions that the gravity of Full Self-Driving is not fully appreciated. If an asset has five times more utilization than the -- in fact, it's like dividing the cost of that asset by 5. So if you have $50,000 car is like having a $10,000 car all of a sudden, but may be better than that because so you don't need anyone to drive, where the person can be engaged in productivity or amusement instead of having to onerously drive through traffic. It's probably better than five times. I don't know. Yes. Basically, if the cost of our cars do not changed at all, we would still sell as many as we could possibly make.

A - Martin Viecha {BIO 17153377 <GO>}

Thank you. And the next question comes from Pierre Ferragu from New Street Research.

Q - Pierre Ferragu {BIO 15753665 <GO>}

Hey. Thank you for taking my question. Can you hear me well?

A - Elon Musk {BIO 1954518 <GO>}

Yes.

Q - Pierre Ferragu {BIO 15753665 <GO>}

I wanted to come back on battery. So, it's great to hear on one hand that you guys are expected to sell like the first car with 4680 this quarter. And at the same time that you don't really depend on that ramp to achieve your -- what you hope to achieve in terms of significant volume growth this year. And the question I had is, I understand well the ramp with 4680 internally but I'd be curious to hear you talk about how you think about 4680 as being a form factor that your suppliers could adopt as well. And how you see in the long run in the greater scheme of things, what does 4680 become? Is it going to be a side of Tesla's allow just form factor for batteries, is it something that you guys are going to deploy in all cars whatever the chemistry, also in the Megapack, in all your energy storage business, and do you expect eventually a lot of other companies to use that form factor as well?

A - Andrew D. Baglino {BIO 21161872 <GO>}

Yeah. On the 4680 as a form factor, yes, we've engaged with a number of our partners, our suppliers on the form factor and they're all working on it. And, they look at it the way we look at it, as a way to drive fundamental cost efficiencies in production, and also ultimately the design of the cell itself to drive the cost down of the cell. And so, that's what's engaged -- I mean, we're engaged, because we think it's a good form factor. They're engaged because they think it's a good form factor and we want people to make it for sure.

To the question about, should everything be 4680, it doesn't have to be. In the end, it's about cost competitiveness, scalability and manufacturing, and when you compare like a iron cell with a nickel cell for example, like there are some just physics-based differences in what happens in certain corner cases that would drive different form factors and we just have to be cognizant of that and design into that. So it isn't like the ultimate form factor for all things. There's other form factors that could be better for an iron cell for example. So we don't use 4680 at all for the iron based cells.

Q - Pierre Ferragu {BIO 15753665 <GO>}

Okay. Thanks. And I have a quick follow-up on chips. So you talked about all this shortage and supply difficulties. And I was wondering, if you could give us some color on like the power chips you need for inverters and also the power systems you're putting together versus like the more traditional, logic chips, if the situation is different between the two. And should we understand from the situation today that you're working very hard and so at extending the scope of your suppliers, and should we expect like Tesla to take onboard additional suppliers in the near term, especially on the power side?

A - Elon Musk {BIO 1954518 <GO>}

Well, last year was chip hell of many chips. So silicon carbide inverters, still be one of them but --

A - Andrew D. Baglino {BIO 21161872 <GO>}

Honestly, there's a lot of annoying, very boring parts.

A - Elon Musk {BIO 1954518 <GO>}

Yeah, a ton of very simple control chips that run of the mill literally, yeah. Basic chips to control --

A - Andrew D. Baglino {BIO 21161872 <GO>}

Pulses, references, oscillators, these are very boring things.

A - Elon Musk {BIO 1954518 <GO>}

Yeah, exactly. Like, there were chip that allows you to move your seat back and forth, it was actually was a big problem.

A - Andrew D. Baglino {BIO 21161872 <GO>}

Yeah.

A - Elon Musk {BIO 1954518 <GO>}

So couldn't make seats. So, like, but a lot of these things are alleviating. I think there's some degree of the toilet paper problem as well, where if there is a toilet paper shortage through COVID, like obviously, it wasn't really suddenly a tremendous enhanced need for ass wiping. It just fueled a panic in order to -- and got every paper product you probably, you can wipe your ass with basically.

And I wasn't sure, is this like a real thing or not? Actually took my kids to HEP and Walmart in Texas to just confirm if it was real, and indeed it was. And there was plenty of food and everything else, but just nothing, no paper products, that didn't cause a splinter. So, an odd choice for people to panic about. These things are -- if the end of the world is coming, I think toilet paper is the least of your problems. So, I think we saw just a lot of companies over-order chips and buffer the chips. And so, we should see, we are seeing alleviation in almost every area. But the output of the vehicle is -- it goes with the least lucky, what are the most problematic item in the entire car, isn't it like, at least 10,000 unique parts in the car. You know, way more than that, if you go further up the supply chain, and so it's what -- it's just -- which one is going to be least lucky one this time. It's hard to say.

A - Andrew D. Baglino {BIO 21161872 <GO>}

Yeah, I mean on a go-forward basis straight, the idea is to continue to drive simplification. So there are fewer unique parts, fewer of them on the power side in particular, it is still like

an area of like technological development where the next chip can do the same thing with less dye area. So like the tool fab required to accomplish the function goes down. So there's still room to grow without needing more fab capacity, but in general, there's a lot more fab capacity coming. So that's like a win-win there.

A - Elon Musk {BIO 1954518 <GO>}

Yeah, exactly. It's just not a long term thing. It was going to be this crazy amount chips that's being built, it's just great.

A - Martin Viecha {BIO 17153377 <GO>}

Well, thank you very much. Unfortunately this is all the time we have for this session. Thanks very much for all your good questions. And we will speak to you again in three months' time. Have a good day. Bye-bye.

A - Elon Musk {BIO 1954518 <GO>}

Thanks.