

# Tesla, Inc. NasdaqGS:TSLA

## FQ3 2017 Earnings Call Transcripts

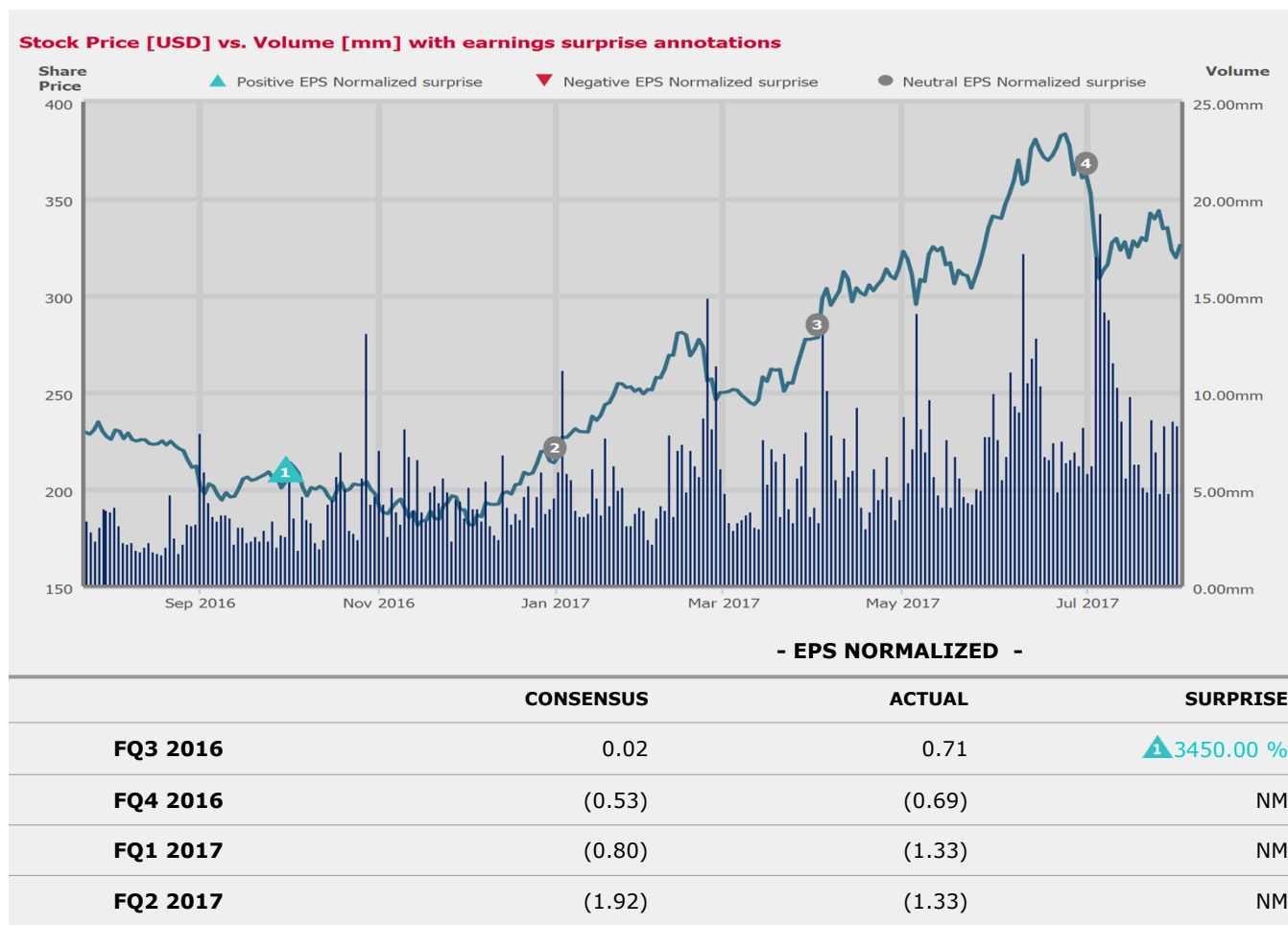
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### S&P Capital IQ Estimates

	-FQ3 2017-			-FQ4 2017-	-FY 2017-	-FY 2018-
	CONSENSUS	ACTUAL	SURPRISE	CONSENSUS	CONSENSUS	CONSENSUS
<b>EPS Normalized</b>	(2.29)	(2.92)	NM	(1.76)	(6.48)	(1.27)
<b>Revenue (mm)</b>	2938.53	2984.68	▲1.57	3431.11	11792.75	20578.97

Currency: USD

Consensus as of Nov-01-2017 9:08 PM GMT



# Call Participants

## EXECUTIVES

### Deepak Ahuja

Chief Financial Officer

### Elon R. Musk

CEO, Product Architect, Chairman  
& Co-Founder

### Colin William Rusch

Oppenheimer & Co. Inc., Research  
Division

### Jeff Evanson

Vice President of Investor  
Relations

### James Joseph Albertine

Consumer Edge Research, LLC

### Jeffrey B. Straubel

Chief Technology Officer

### John Joseph Murphy

BofA Merrill Lynch, Research  
Division

### John Douglas Field

Senior Vice President of  
Engineering

### Joseph Robert Spak

RBC Capital Markets, LLC,  
Research Division

### Jonathan McNeill

President of Global Sales & Service

### Robert George Cihra

Guggenheim Securities, LLC,  
Research Division

## ANALYSTS

### A.M. Sacconaghi

Sanford C. Bernstein & Co., LLC.,  
Research Division

### Rod Avraham Lache

Deutsche Bank AG, Research  
Division

### Adam Michael Jonas

Morgan Stanley, Research Division

### Romit Jitendra Shah

Nomura Securities Co. Ltd.,  
Research Division

### Alexander Eugene Potter

Piper Jaffray Companies, Research  
Division

### Ryan J. Brinkman

JP Morgan Chase & Co, Research  
Division

### Benjamin Joseph Kallo

Robert W. Baird & Co.  
Incorporated, Research Division

### Brian Arthur Johnson

Barclays PLC, Research Division

# Presentation

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## Operator

Good day, ladies and gentlemen, and thank you for your patience. You've joined the Tesla Motors Third Quarter 2017 Financial Results Q&A Conference Call. [Operator Instructions] As a reminder, this conference may be recorded. I would now like to turn the call over to your host, VP of Investor Relations, Mr. Jeff Evanson. Sir, you may begin.

## Jeff Evanson

*Vice President of Investor Relations*

Thank you, Latif, and good afternoon, everyone. Welcome to Tesla's third quarter 2017 Q&A webcast. I'm joined today by Elon Musk, J.B. Straubel, Deepak Ahuja and Jon McNeill.

Our third quarter results were previously announced in the update letter 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.

[Operator Instructions]

Before we jump in to the Q&A, Elon has some opening remarks. Elon?

## Elon R. Musk

*CEO, Product Architect, Chairman & Co-Founder*

So, pardon me for 1 minute. I have a bit of a cold. So let's see. Actually, we're doing this call from the Gigafactory because that's where the production constraint is for Model 3, from the most important thing for the company. And I always move my desk to wherever -- well, it's not like we have a desk, actually. I move myself to wherever the biggest problem is in Tesla. Somewhat, I really believe that one should lead from the front lines, and that's why I'm here, and I'll go into some of the Gigafactory issues later in the call, but I'd like to start off by acknowledging some, I think, pretty amazing milestones for Tesla.

One thing that I thought was really profound was that we surpassed cumulative deliveries of vehicles. We surpassed 0.25 million cumulative deliveries since the company's inception and had record Model S and X net orders and deliveries last quarter. So things are really, I think, going quite well.

To put that into perspective, 5 years ago, we had only delivered 2,500 cars. So our -- the Tesla fleet has grown by a factor of 100 in 5 years. I would expect, 5 years from now, to be at least an order of magnitude, we're beyond where we are right now and possibly even closer towards magnitude.

But for the skeptics out there, I'd like to say -- ask them, which one of you predicted that Tesla would go from 2,500 units delivered to 250,000 units delivered now? I suspect the answer is 0, right? So consider your assumptions for the future on whether they're valid or perhaps pessimistic.

So for Model 3, we continue to make significant progress each week. We see no primary problems with our supply chain or any of our production processes. Obviously, there are bottlenecks, there are thousands of processes in creating the Model 3, and we will move as fast as the slowest and least likely process among those thousands. In fact, there's 10,000 unique parts. Or I could just say, of the tens of thousands of processes necessary to produce the car, we will move as fast as the least competent and least likely elements of that mixture.

So while the vast majority are going incredibly well, there are some problem areas, and after I give the business overview, I'll do a deep dive into the biggest problem area.

So based on where we -- what we know now, as we've gotten really into the details of some of the worst bottlenecks, we expect to achieve approximately 5,000 Model 3 vehicles per week by late Q1 2018, so

probably sometime in March. This -- I think, in the vast scheme of things, this is a relatively small shift. The Model 3 is a 10-year program, and so we're talking about a few months out of a 10-year program that's, in the grand scheme of things, as certainly if one is doing net present value calculations, this is immaterial.

The -- and we have a clear path to that. We understand the bottlenecks. It's difficult to fully understand these things as we actually try to do them. And it's worth noting that some of our manufacturing areas, we're actually seeing capabilities that are, we estimate, in the 6,000 to 7,000 unit per week capability, well in excess of the 5,000-unit capability. So -- and we're optimistic with further optimization that many of our production processes will need fairly little, and in some cases, no -- so I'm not saying no, but almost no CapEx to reach something close to 10,000 units per week. It's the amount or how much can be done by just beating up robots, shortening the path, intensifying factory, adding additional robots for choke points and just making lines go really, really fast. Speed is the ultimate weapon. And our -- the design of Tesla Model 3 being that it was designed for manufacturability is turning up to be accurate. It's far easier to build this car than a Model E -- than a Model S and vastly easier than a Model X.

The primary production constraints really by far is in battery module assembly. So this is -- so I'll just do a little bit of a deep dive on that. There are 4 zones to module manufacturing. So it goes through 4 major production zones. The zones 3 and 4 are in good shape; zones 1 and 2 are not. Zone 2 in particular, this is -- we had a subcontractor -- a systems integration subcontractor that unfortunately really dropped the ball, and we did not realize the degree to which the ball was dropped until quite recently, and we had to -- this is a very complex manufacturing area. We had to rewrite all of the software from scratch and redo many of the mechanical and electrical elements of zone 2 of module production. We've managed to rewrite what was about 20 to 30 man years of software in 4 weeks, but there's still a long way to go. It's -- because the software work can be fast with the electromechanical elements that need to be fabricated and installed, and that -- getting these items in place and rebuilt is, unfortunately, a lot longer, and that's -- it's probably more external constraints than software. This is what I spent many a late night on the Gigafactory working on. J.B. has been here constantly, and we've -- we allocated many of our best engineers to fundamentally fixing zone 2 of the module line and then most problem behind that it is zone 1.

On the plus side, we now have a very detailed understanding of what is necessary to fix zone 1 and zone 2. We also have a new design for zone 1 and 2 that is about 3x more effective than the current design. So when we put in -- and there are 3 lines of module production. Lines 1, 2 and 3 are essentially identical. Line 4, which will have the new design, will be at triple the effectiveness of -- will be as good as the other 3 lines combined. So we're very confident about the future path of having incredibly efficient production of modules and that this will not be a constraint in the future, but unfortunately, it just takes some amount of time. This is like moving like lightning compared to the -- while there's no one in the automotive industry, there's still some finer amount of time necessary to fix something that we thought was in good shape. We were told by our supplier it was in good shape, but it was really not. So this has now been typified Tesla's internal automation group in the U.S. and -- Tesla automation in the U.S. and Tesla Grohmann from Germany. We have a large team on -- from the -- from Tesla Grohmann also working the issue and making very rapid progress. And like I said, I am personally on that line in that machine, trying to solve problems personally where I can. And J.B.'s basically spending his life at the Gigafactory. So that's the sort of deep dive on that front.

The other thing I want to mention is that there are a lot of articles about Tesla firing employees and laying off some lines and stuff. These are really ridiculous. And like anyone -- any journalist who'd written articles in this effect should be ashamed of themselves for lacking journalistic integrity. At every company in the world, there's annual performance reviews. In our annual performance review, despite Tesla having an extremely high standard, and a standard far higher than other car companies, which we need to have in order to survive against much larger car companies, you can't be a little guy and have equal levels of skill as the big guy. If you have 2 boxes of equal votes and one's much smaller, the big guy's going to crush the little guy, obviously. So little guy better have a heck of a lot more skill. And that is why both are just going to get hovered. So that is why our standards are high. They're not high because we believe in being mean to people. They're high because if they're not high, we will die.

Despite that, in our annual performance reviews, only 2% of people didn't make the grade. So that's about 700 people out of 33,000. This is a pretty low percentage. GE, I don't know if they still do, but they certainly have for a long time had a policy of firing 10% of their employees poor performers every year, no matter what. If you were to stack Tesla's performance, late releases compared to industry -- other companies, the number would be low. So the only reason these articles had any play whatsoever is because journalists and editors with low integrity, they'll provide any context for where they stood. Because the actual article would've read, "Tesla fires 2% of its employee base for performance-based reasons. They're remarkably lower number compared to other companies." But of course, that will be a meaningless article, so they forget to include that. Shame.

And then also, it was not reported that several thousand employees were promoted, and almost half of those promotions were in manufacturing.

Right. I think let's go to questions.

**Jeff Evanson**

*Vice President of Investor Relations*

Okay, Latif, let's go to that question queue, please.

## Question and Answer

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### Operator

[Operator Instructions] Our first question comes from the line of James Albertine of Consumer Edge.

#### James Joseph Albertine

*Consumer Edge Research, LLC*

Great. Wanted to ask with respect to -- and Elon, thank you for doing the deeper dive into the zones and the bottlenecks. How does this change the trajectory -- or does it change the trajectory from a margin perspective on the Model 3? And then maybe as an aside, can you tell us where you are today on a production-per-week basis and where you expect to be by the end of 2017, just so we can get an idea of the ramp?

#### Elon R. Musk

*CEO, Product Architect, Chairman & Co-Founder*

I don't really like the week-by-week stuff. But the thing -- the reason it's tricky is because people just read too much into it. The ramp curve is a step exponential. So it means like as you alleviate a constraint, the production jumps -- suddenly jumps at a much higher number. And then so although it looks a little staggered, if you sort of zoom out, that production ramp is an exponential with giant week-over-week increases. I'd like to state a number at the end of Q4, but there's too much uncertainty right now to give that with any precision. Now I do feel confident about the end of Q1, maybe sooner, but really, it's like -- we're like in a vertical climb here. So it's really hard to say it. Yes.

#### Deepak Ahuja

*Chief Financial Officer*

And also to your earlier point -- Deepak here. It does not change any of our projections in terms of the long-term target gross margin. These are all short-term issues.

#### Elon R. Musk

*CEO, Product Architect, Chairman & Co-Founder*

Right. I mean, it's -- just let me state, by the end of the year, it will be in the thousands. It's well at the end. Yes. Yes.

#### James Joseph Albertine

*Consumer Edge Research, LLC*

I'm sorry, well into the thousands per week or by...

#### Elon R. Musk

*CEO, Product Architect, Chairman & Co-Founder*

In the thousands by the end of the year. But where exactly, it's hard to say. And this way, if you move the calendar by like 2 or 3 weeks, you will see giant changes. So it's like the quarter-to-date will fall somewhat sort of arbitrarily in that exponential curve. So even a matter of a few weeks would show a very different number. As far as like people tend to extrapolate on a linear basis instead of an exponential. First of all, you all know what an exponential is. So if your intuition is -- tends to be a straight-line extrapolation but really on a very steep exponential. So it's really an S-curve. So it starts off really slow, and then it ramps very rapidly on an exponential basis. And this starts to go sort of linear right in the middle and then it sort of asymptotes off at the target production capacity. You really target a whole supply chain or a factory for a given production capacity. And yes, probably get this done as soon as possible. We're also -- we're highly confident of the long-term margin number of 25% or higher for Model 3. Deepak, I mean...

#### Deepak Ahuja

*Chief Financial Officer*

Yes, none of our projections in terms of our material cost or manufacturing, labor and overhead or depreciation of the other elements have changed as a result of these last few months to modify that target.

### **Operator**

Our next question comes from Adam Jonas of Morgan Stanley.

### **Adam Michael Jonas**

*Morgan Stanley, Research Division*

Just one question and one follow-up. Elon, you described Model 3 -- the Model 3 launch as production hell. How -- I mean, you have a cold, but how hot is it in hell right now? And is it getting hotter or less hot? I mean, are we solving worse problems that are coming up?

### **Elon R. Musk**

*CEO, Product Architect, Chairman & Co-Founder*

Yes, I mean, it's sort of imprecise. I'm just shooting at what this level means really, but let's say level 9 is the worst, okay? We were in level 9. We're now in level 8, and I think we're close to exiting level 8. I thought we'd be probably more like in level 7 by now, but it's -- and I have to tell you, I was really depressed about 3 or 4 weeks ago when I realized that we were kind of in level 9. Then we got to level 8. Now I can see sort of a clear path to sunshine. And so I feel really pretty optimistic right now. If you talked to me 3 to 2 weeks ago, I'd be -- I would've been quite pessimistic, and I was for sort of quite down the dumps. But now it's very obvious what we need to do. It's just a matter of work to get there. We're working 7 days a week to do it. And I've personally been here on zone 2 module line at 2 a.m. on a Sunday morning, helping diagnose robot calibration issues. So I'm doing everything I can. J.B. is doing everything he can. The whole team's on it, we're on it. And we are on it, we've got it covered, it's going to take us a few much longer than we expected.

### **Adam Michael Jonas**

*Morgan Stanley, Research Division*

Got it. Just one follow-up for Deepak. The -- on the secured bonds due 2025, the issuance from last August, was this meant to be a permanent part of the cap structure? Or is it more of a bridge loan to help fund some of the near-term cash absorption issues related to the Model 3 delay and things of that nature?

### **Deepak Ahuja**

*Chief Financial Officer*

It is. It's an 8-year tenure on that debt offering and meant to give us that capital for that time frame.

### **Operator**

The next question comes from Tyler Frank of Baird.

### **Benjamin Joseph Kallo**

*Robert W. Baird & Co. Incorporated, Research Division*

It's been Ben Kallo for Baird. Elon, you guys talk a lot about the 3 being easier to manufacture than the S and the X. Could you just give us a sense, though, about the difference of manufacturing the volume of the 3 compared to -- you -- basically 10x the volume that you're trying to get to in the near term? Then I have a follow-up.

### **Elon R. Musk**

*CEO, Product Architect, Chairman & Co-Founder*

Yes. There's vastly more automation with Model 3. Now the tricky thing is that when one front of this -- of that automation doesn't work, it's way harder to make up for it with manual labor. So with S or X, because a lot less of it was automated, you -- we could scale up labor hours and achieve a high level of production.



With Model 3, it's like -- tends to be either the machine works or it doesn't or it's lumping along and we get short quite severely on output. So yes. I mean, J.B., do you want to add?

**Jeffrey B. Straubel**  
Chief Technology Officer

Yes, I think that's spot on. Because the design on a whole is much easier to build...

**Elon R. Musk**  
CEO, Product Architect, Chairman & Co-Founder

Yes. By a lot.

**Jeffrey B. Straubel**  
Chief Technology Officer

But the -- it's also intensely automated, which is part of what lets us realize the margin in the cost targets. But that does become difficult to bring that automation online. That's really -- that's where we are.

**Deepak Ahuja**  
Chief Financial Officer

And Doug is on the line. Perhaps he can add some on ease of manufacturability.

**Elon R. Musk**  
CEO, Product Architect, Chairman & Co-Founder

Doug, do you want to maybe cite a few examples?

**John Douglas Field**  
Senior Vice President of Engineering

Sure. The number of actual, what we call a pitch, which is a station for a robot to work on the car in general assembly, is about 1/4 of the typical industry average for number of stations it uses to build a car. So the way we do subassemblies and the care we've taken and designed for manufacturing does make it much simpler. But as J.B. said, each of those stations is fairly automated and requires time and engineering to make it work.

**Benjamin Joseph Kallo**  
Robert W. Baird & Co. Incorporated, Research Division

And I guess, my follow-up's on that point. So in the battery assembly and automation, things that you're working through, and the software for configuring the robots is how I'm thinking of this, is it a certain number of man-hours that have to go into this and then it's fixed? Or like you know the fix? Or what are you throwing at it right now? Is it people or is it time required to do or all of the above?

**Elon R. Musk**  
CEO, Product Architect, Chairman & Co-Founder

Yes. We're throwing a sheer amount of people at replacing machines. And then occasionally, there's like some part of a production manufacturing process where the machine is probably kind of like broken, and then we have to kind of bypass to a manual operation.

**Jeffrey B. Straubel**  
Chief Technology Officer

Until we fix the automation.

**Elon R. Musk**  
CEO, Product Architect, Chairman & Co-Founder



Yes, until we fix the automation. But that's really -- it's really inefficient because this thing is really not designed for a manual bypass to your broken machine or a machine when the software is not right or whatever the case may be.

**Jeffrey B. Straubel**  
Chief Technology Officer

It's just an extremely complicated machine with the combined electrical, mechanical and software challenges. It's not that different than what we do bringing up a brand-new car and a lot of the...

**Elon R. Musk**  
CEO, Product Architect, Chairman & Co-Founder

Yes. It is harder to supplement with manuals than S or X because the system is designed as a very tightly integrated automated system. So if there's an [ X brand ] -- we will be to try to supplement or make up for a machine not working with manual activity. So we think of it like -- it's like if you had a spreadsheet and a couple of cells in the spreadsheet were manually calculated, well, yes, you could still do your spreadsheet stuff but it's going to be a lot slower until the last cell is automated, and then it's going to be super fast.

**Operator**

Our next question comes from Romit Shah of Nomura Instinet.

**Romit Jitendra Shah**  
Nomura Securities Co. Ltd., Research Division

Great. Congratulations on the milestone. The competitiveness of Autopilot is something that's come up a lot recently, and I just wanted to ask about your hardware capability. We're actually at a technology conference today hosted by NVIDIA. And their newest autonomous solution, according to NVIDIA, is 10x more powerful than the version that Tesla's using, and they're saying it can get you to level 5 autonomy. And so along those lines, the year-over-year improvement in the NVIDIA board just seems really significant. And I was curious, Elon, if you could just talk about what you think you need to do from a hardware perspective to advance Autopilot.

**Elon R. Musk**  
CEO, Product Architect, Chairman & Co-Founder

Well, first of all, I think that we'll be able to achieve full autonomy with the current hardware. The question is not just full autonomy, but full autonomy with what level of reliability and what will be acceptable to regulators. But I feel quite confident that we can achieve human-level -- approximately human-level autonomy with the current computing hardware. Now regulators may require some significant margin above human capability in order for a full autonomy to be engaged. I mean to say it needs to be 50% safer, 100% safer, 1,000% safer, I don't know. I'm not sure they know either. But that's -- but I think I'm confident that when we can get to approximately human level with our current hardware. And yes, we'll have more to say on the hardware front soon, we're just not yet ready to say anything now. But I feel very optimistic on that front. For customers that have signed up for full subject riding capability, we'll push that option. The -- if it does turn out that a computer upgrade is necessary in order to meet the regulatory requirements in that area, we will replace their computer with something with greater power, which is sort of unplug the other one, plug a new one in. But we feel confident of the competitiveness of our hardware strategy. I would say that we are certain that our hardware strategy is better than any other option by a lot.

**Romit Jitendra Shah**  
Nomura Securities Co. Ltd., Research Division

Okay. And then if I could ask, you said that the deposit balance for Model 3 strengthened. Can you give us what that actual balance was?

**Deepak Ahuja**

*Chief Financial Officer*

We don't give specific balance of deposits by car line. We just give the combined number, which you can see on our balance sheet for the customer deposits.

**Operator**

Our next question comes from John Murphy of Bank of America Merrill Lynch.

**John Joseph Murphy**

*BofA Merrill Lynch, Research Division*

Just a question on quarterly cash flow for the fourth quarter and the first quarter. I mean, it sounds like, obviously, there's some delays here on the Model 3, which is understandable, given the complexity. I'm just curious, as we think about cash flow for the next 2 quarters, would we think about them relatively similarly to what we just saw in the third quarter plus what you would -- whatever you would sell out of inventory so it might be a bit better? I'm just trying to understand, Deepak, how much of that \$2.5 billion in the inventory is finished goods that you might be able to sell out of in the fourth quarter.

**Deepak Ahuja**

*Chief Financial Officer*

Well, firstly, as we continue to ramp up Model 3, our cash flow of operations is going to increase or improve significantly over the next few quarters. And it's -- this is the positive virtuous cycle of cash flow of working capital that Model 3 provides us, because we effectively pay our suppliers later when we collect from our customers. And also, this quarter, our CapEx payments will start to decline as we pay off, over the next couple of quarters, all the remaining Model 3-related CapEx. So there should be an improving trend over the next 2, 3 quarters.

**John Joseph Murphy**

*BofA Merrill Lynch, Research Division*

But to be fair, Deepak, I mean, it sounds like this is a little bit more uncertain than you thought before as far as production and delivery. So I'm just trying to understand what kind of cash you can generate out of the inventory that you think you hold right now.

**Deepak Ahuja**

*Chief Financial Officer*

Yes. So firstly, our inventory is going to come down on S and X, and also, what's important is it is -- given these short-term delays, we have to be prudent in how we spend our money. And so we are managing our CapEx and OpEx growth to be in line with the growth of our fleet. And so for example, CapEx related to our stores or service centers or Superchargers, we are slowing that down to be in line, and that's logical. We've got growth for our fleet. So all those actions will come through in terms of helping us conserve cash.

**Operator**

Our next question comes from Ryan Brinkman of JPMorgan.

**Ryan J. Brinkman**

*JP Morgan Chase & Co, Research Division*

Great. Just with regard to the ramp-up of the Model 3 production, I can see what's happening with the 5,000 per week target from 1Q to 4Q -- or from, now, it's 1Q versus 4Q. But I think it's less clear from reading the letter, what's happening with the previous guidance of the 10,000 units per week at some point in 2018? Is that now like beyond 2018? I think, before, investors were estimating that if you could hit it at the end of '18, you'd do over 250,000 vehicles. If you could hit it more towards the middle, you'd do over 325,000. But what now would be a reasonable expectation based upon what you know for the Model 3s that do get built in 2018?

**Elon R. Musk***CEO, Product Architect, Chairman & Co-Founder*

So it's a bit too early to make the exact number. But I think, if you extrapolate from 5,000 units towards the end of Q1, we do want to hold off on giving CapEx until we are confident about cash flow on Model 3. So then that's a question of how long it takes to implement everything necessary to get to 10,000 units a week for Model 3, which is a number we are confident can be sustained from a [ grand ] standpoint.

**Deepak Ahuja***Chief Financial Officer*

And we want to figure out how much we can push the 5,000 up from the existing equation.

**Elon R. Musk***CEO, Product Architect, Chairman & Co-Founder*

Yes, that is true.

**Deepak Ahuja***Chief Financial Officer*

And then learn from those and figure out, how do we redesign what will we do for the next step and spend more efficiently our CapEx? So it's the right thing to do.

**Elon R. Musk***CEO, Product Architect, Chairman & Co-Founder*

Yes. Yes, exactly. As I mentioned earlier, we're finding that some parts of the line, they very clearly are capable of 6,000 or that 7,000 units a week, and maybe more than that, just by shortening path length, speeding up robots, adding some robots where there are -- where the choke points exist, simplifying some of the processes and a few minor part redesigns sum up for how much you can improve cycle time. So yes.

**Ryan J. Brinkman***JP Morgan Chase & Co, Research Division*

Okay. Actually, that's helpful. Maybe just as a follow-up -- go ahead...

**Deepak Ahuja***Chief Financial Officer*

And -- no, go ahead.

**Ryan J. Brinkman***JP Morgan Chase & Co, Research Division*

Oh, I was just going to say, is the gross margin discussion also related to this at all? I mean, I see the reduced outlook for 4Q, but do you feel any differently about, for example, the ability to do 25% margin when you're doing kind of 250,000 run rate? And as long as the production is going to be restrained, do you have any ability to continue to preference for longer maybe the higher-margin, higher trim level variance of the Model 3 to help with that?

**Deepak Ahuja***Chief Financial Officer*

We can fine-tune those things when we get there, but overall, our -- and I'm reinforcing this again, these are all short-term issues, and it doesn't change our long-term prognosis on Model 3 gross margin.

**Operator**

Our next question comes from Alex Potter of Piper Jaffray.

**Alexander Eugene Potter****WWW.SPCAPITALIQ.COM**

*Piper Jaffray Companies, Research Division*

Yes, was wondering, I guess, to the extent that these production bottlenecks are ultimately somebody else's fault, is it worth your time trying to call back some of the cost that you're presumably incurring due to the subcontractor, I guess, dropping the ball, as you put it?

**Elon R. Musk**

*CEO, Product Architect, Chairman & Co-Founder*

Yes. I think first of all, I think, at the end of the day, everything is our fault and my problem, most of all. If we picked the wrong subcontractor, we're the fault. So just -- I don't want us to be -- sort of us externalizing responsibility. Really, it's our fault for picking the wrong supplier and then not realizing it until way later in the game. We will be able to call back some amounts, but it certainly will not make up for the lost revenue, the lost free cash flow. So some amount, yes, but it's not going to matter that much.

**Deepak Ahuja**

*Chief Financial Officer*

The goal is right now to fix the problem.

**Elon R. Musk**

*CEO, Product Architect, Chairman & Co-Founder*

Yes, exactly.

**Alexander Eugene Potter**

*Piper Jaffray Companies, Research Division*

Okay, fair enough. I guess, one other issue, you referenced a gross margin headwind on the S and X due to trim and mix. Was wondering if you could talk maybe a little bit more explicitly about what that was, and then what the corrective measures you're taking to address that.

**Deepak Ahuja**

*Chief Financial Officer*

Yes. Jon you want to answer?

**Jonathan McNeill**

*President of Global Sales & Service*

Yes, it's Jon. I can address a piece of this. So a large chunk of it was discontinued trims. We've introduced the 100-kilowatt battery pack, which has a 335-mile range in Model S. And as a result of that, we discontinued the 90-kilowatt pack. And as those cars were in inventory, we reduced price to move them out. And so that was a piece of the gross margin headwind that won't repeat in -- as we go forward. And in addition to that, the mix did shift. We sold more 100-kilowatt cars actually than we predicted we would, but order rate went up for the 75s even faster. And so we sold more 75-kilowatt cars in the mix than we'd predicted, and that had a gross margin impact as well. Given demand is in -- it continues to increase for the 100-kilowatt pack and the mix shift is occurring more towards that product, we'll see, as we indicated in the letter, increasing margins as we roll into Q4 and then into Q1. So this is -- the heart of the discontinuation really was the success of us debottlenecking the 100-kilowatt production that we've talked about in Q2 and really rolling out into strong demand in Q3.

**Elon R. Musk**

*CEO, Product Architect, Chairman & Co-Founder*

Yes. We also just increased the amount of value that's in a Model S...

**Jonathan McNeill**

*President of Global Sales & Service*

And the X.

**Elon R. Musk***CEO, Product Architect, Chairman & Co-Founder*

And X, but particularly Model S, because we're hoping it to be greater differentiation between the S and the Model 3. So the basic cost, the fundamental cost of a Model S increased because of more included content. So the full Model Ss have air suspension, for example, perhaps a bunch of premium contents were included by default. Just about there needs to be a get clear reason for people to buy a Model S over a Model 3.

**Jonathan McNeill***President of Global Sales & Service*

And the market responded really strongly to that in terms of demand. So in Q3, the Model S in the U.S. outsold the Mercedes S-Class by 2x -- over 2x, actually. And if you added up the sales of Audi A7 and A8, the BMW 7 Series and the Porsche Panamera, we outsold all those combined. So the market really did respond to the increased value.

**Elon R. Musk***CEO, Product Architect, Chairman & Co-Founder*

Yes.

**Deepak Ahuja***Chief Financial Officer*

Yes. And all of our deliveries in terms of our market share in the U.S., it went up in Q3 for S and X. Especially...

**Jonathan McNeill***President of Global Sales & Service*

S and X, both.

**Deepak Ahuja***Chief Financial Officer*

In the recent market, yes compared to Q2.

**Elon R. Musk***CEO, Product Architect, Chairman & Co-Founder*

Yes. And I suppose some of the articles from our quarterly earnings letter about sort of answer your question kind of S and X -- why we reduced production on S and X. We didn't reduce it very much. It's just sort of perhaps from about 2,000 units a week to 1,800, and we did in order to bring down inventory. So mainly just because inventory was too high. We also just needed a bunch of people on the Model 3 line. So we thought we'll take the third shift from Model S and the X and apply it to Model 3. Because really, running out of labor pool, honestly. It's like we're second labor pool dry, both in -- in one of the Gigafactory and in Fremont. And so it's like -- yes, there's just only so many people that can make it to the factory. And then we're out finding that we're able to improve the efficiency of the production of the S and X. So previously, it required 3 shifts to do 2,000 units a week. And it's important to appreciate, like the whole supply chain and everything is all -- it's all sized to 2,000 units a week. Sure, like why can't you just spontaneously make 2,500 units a week? Well, it's because the entire supply chain, all the parts, everything's got to go to 2,500, and that requires a bunch of CapEx. Then you got to match sort of -- the increase stores. Like everything's got to sort of work in cadence. So we sort of like decided on what seems like the right number. We think sort of the right number's about 100,000 units a year, combined S and X, and resize the supply chain accordingly. But we expect to continue making production efficiency improvements on the S and X line and be able to take that from -- you're up at 1,800 units a week to 2,000 units a week in probably over the next year and still be on 2 shifts, which means that our labor hours are reducing per vehicle, and that gets us to our sort of roughly 100,000 unit a year cadence and

we can work on supply chain efficiencies and the like. But we do expect to make an important point. We expect to sell more cars in Q4...

**Jonathan McNeill**

*President of Global Sales & Service*

Correct. Than we did in Q3.

**Elon R. Musk**

*CEO, Product Architect, Chairman & Co-Founder*

Than in Q3. So we expect sales and deliveries to be higher in Q4 than Q3 but have to reduce Model S and X inventory to achieve that.

**Operator**

Next question comes from Rod Lache of Deutsche Bank.

**Rod Avraham Lache**

*Deutsche Bank AG, Research Division*

Just had a question about how we should be thinking about capital spending maybe at a high level next year. It sounds like you're going to be deploying some capital to increase to 10,000 units per week. And obviously, there've also been some reports about you investing in another assembly facility in China. So is your CapEx still expected to be lower in 2018 versus 2017?

**Deepak Ahuja**

*Chief Financial Officer*

So Rod, in terms of the China factory, I'll leave for Elon to make comments on that. But I think maybe better if we hold on, broadly speaking, to that question to the next quarter when we provide full 2018 guidance and give you better clarity on our capital spend for the different elements in our plan.

**Elon R. Musk**

*CEO, Product Architect, Chairman & Co-Founder*

I suspect it's comparable and similar to 2017. We have some -- obviously some -- it's somewhat of a strategic choice. Do we have higher CapEx and higher growth or lower CapEx and lower growth? Yes. So it's -- if we do that we can move that lever where it makes sense, where it makes sense to do so. As mentioned earlier though, we want to make sure we know what to scale before we spend money on it. And so for the Model 3, figuring out which production lines can be simply accelerated and which production lines need to be duplicated. We'd far rather accelerate production line than duplicate it. If we were to make those CapEx decisions because right now, we'd be making them -- we'd be kind of shooting in the dark.

**Deepak Ahuja**

*Chief Financial Officer*

Yes, exactly.

**Elon R. Musk**

*CEO, Product Architect, Chairman & Co-Founder*

But -- in respect to China, I wouldn't expect any significant CapEx on China until 2019. It won't be material in 2018. The China plan is sort of maybe something like -- this is just a -- like don't set your watch by this, but we -- it's sort of a rough target of start manufacturing in about 3 years, and it would be serving the China market and perhaps the -- some other countries in the region. And that's really its intent, is to be able to provide Model 3 and Model Y. We won't be making Model S and X, but we'll be making probably Model 3, probably Model Y primarily for the local Chinese market. And it's really the only way to make the cars affordable in China. But it's 3 years out, so...

**Rod Avraham Lache**

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*Deutsche Bank AG, Research Division*

And just to clarify 2 points. Is your objective to have something that's kind of Fremont-sized in China? And I wanted to also clarify your earlier comment about when exactly the production of Model 3 goes exponential. Were you suggesting that, that...

**Elon R. Musk**

*CEO, Product Architect, Chairman & Co-Founder*

Let's measure right now.

**Rod Avraham Lache**

*Deutsche Bank AG, Research Division*

Yes. It's at -- oh, I guess, yes, off of a low number, but are you getting to a few thousand per week already by the end of this year? Or did you mean to say that you'll have a few thousand produced in total by the end of the year?

**Elon R. Musk**

*CEO, Product Architect, Chairman & Co-Founder*

Oh, no, no. Again, it's really tricky because of that being exponential. If you'd have moved the calendar date by plus, minus a few weeks, you'd see gigantic differences in weekly output. But what I meant was in -- something like a few thousand units per week at the end of Q4. But does it reflect like if you said, "Okay, what about a few weeks after Q4?" I'd say, "Yes, definitely." So it's just going to be very, very sharp. Rising very, very sharply at that time.

**Deepak Ahuja**

*Chief Financial Officer*

To be clear, Elon's talking about a broad guidance. He's just giving...

**Elon R. Musk**

*CEO, Product Architect, Chairman & Co-Founder*

This is my guess.

**Deepak Ahuja**

*Chief Financial Officer*

Yes, exactly.

**Elon R. Musk**

*CEO, Product Architect, Chairman & Co-Founder*

I mean, it'll be like a fire jet in a vertical climb here. It's like from one moment to the next it's suddenly very different.

**Rod Avraham Lache**

*Deutsche Bank AG, Research Division*

It sounds like you'll be able to provide some pretty high confidence update on the fourth quarter earnings call.

**Elon R. Musk**

*CEO, Product Architect, Chairman & Co-Founder*

Yes. For sure, yes. Absolutely.

**Jeff Evanson**

*Vice President of Investor Relations*

Even with the deliveries announcement, we'll have some feedback for you, as we mentioned in the letter.



**Elon R. Musk**

*CEO, Product Architect, Chairman & Co-Founder*

Yes. We're -- I would have -- I think very -- we'll have very good understanding and high clarity on the Q4 earnings call.

**Rod Avraham Lache**

*Deutsche Bank AG, Research Division*

Okay. And then the China size, is this a Fremont type of project?

**Elon R. Musk**

*CEO, Product Architect, Chairman & Co-Founder*

I mean, it's something in the hundreds of thousands of vehicles per year. I'm not sure where it is exactly in the -- it's at least a couple hundred thousand vehicles a year, maybe more.

**Operator**

Our next question comes from Toni Sacconaghi of Bernstein.

**A.M. Sacconaghi**

*Sanford C. Bernstein & Co., LLC., Research Division*

Yes, I have a question and a follow-up, please. Elon, you just talked about sort of this trade-off between growth and capital spending. And quite frankly, I think it's really the first time that I've heard you talk about that potential trade-off. Usually, Tesla's been all about doing as much as quickly as possible to lead the move to electrification, to establish a first-mover advantage, et cetera. So is the hesitancy in going all-out growth? Is that a concern that you might run out of cash and have to raise more cash? Is that a bandwidth concern for the organization in terms of trying to do too much too quickly? Is that a concern about using capital effectively? What's at the root of that decision? And why isn't the -- why is there even a decision, I guess, is the question?

**Deepak Ahuja**

*Chief Financial Officer*

I mean, I would say it's probably a bit of all. I mean, it's prudent for us to think through all of that as we are continuing to grow. Certainly, we would want to be in a certain sense of fiduciary responsibility that we have in addition to just growing like crazy. So...

**Elon R. Musk**

*CEO, Product Architect, Chairman & Co-Founder*

I mean, these are mad, substantial growth rates for the car industry. And I think some made some comparison of Tesla's growth rate relative to Ford in the Model T era. And we're talking about a rate of growth faster than the Model T, which is the fastest in history. So these are nutty growth rates.

**Jeffrey B. Straubel**

*Chief Technology Officer*

It's certainly not the first time we've thought about this.

**Deepak Ahuja**

*Chief Financial Officer*

Yes. We have talked about that. When our growth rate, I don't have -- recall the exact numbers, but I think it's been in the 70%, 80% every year. And next year even with 5,000, it'll be like crazy compared to this year. So our growth rate continues to be extraordinary.

**Elon R. Musk**

*CEO, Product Architect, Chairman & Co-Founder*

Yes. Yes. If our growth rate continues at anything like that in the coming years, I mean, if it continues to be something like that, Tesla will be the largest car company in the world by volume as well.

**Jonathan McNeill**

*President of Global Sales & Service*

And Toni, it may be helpful if it accelerates with new product introductions too. Model X reached Model S demand rates in half the time. So at twice the rate of demand build. So not only are we growing, but we're accelerating as we grow.

**Elon R. Musk**

*CEO, Product Architect, Chairman & Co-Founder*

Yes, exactly. Right. Model 3 will be, I'd call it, 5x -- it'll be 5x Model S or X.

**Jonathan McNeill**

*President of Global Sales & Service*

Yes, and, if you look at the timing and its order of magnitude, shifts downward. Yes.

**A.M. Sacconaghi**

*Sanford C. Bernstein & Co., LLC., Research Division*

I guess, the question is...

**Elon R. Musk**

*CEO, Product Architect, Chairman & Co-Founder*

[indiscernible] looks like, yes.

**A.M. Sacconaghi**

*Sanford C. Bernstein & Co., LLC., Research Division*

But really, perhaps to punctuate a little bit more, you've talked about pretty soon you're going to be close to cash flow-generative once you get the volume on the Model 3. And so I'm just surprised why you're actually not trying to step on that as quickly as possible, because extensively, once you get to that level, then cash flow really doesn't become a problem. And so is there any difference in that view? Otherwise, I'm just struggling to sort of reconcile why you don't want to get to scale, get to volume, get to positive operating cash flow as quickly as possible.

**Deepak Ahuja**

*Chief Financial Officer*

Just to be clear, we are trying to get as fast as we can to 5,000, and then we will work as fast as we can to get to 10,000.

**Jonathan McNeill**

*President of Global Sales & Service*

Yes. I don't think we were saying we wouldn't do it. We're just saying we have to think through it and make the strategic trade-offs in terms of timing. But we'd think through it.

**Elon R. Musk**

*CEO, Product Architect, Chairman & Co-Founder*

Yes, I mean it's sort of like we're wondering what fuels everyone's interpretations of timescales. For us, it's like, well, should we have the growth to 10,000 be -- take 9 months, 12 months or 15 months? Sort of these are like flash-in-the-pan timescales for other manufacturers.

**A.M. Sacconaghi**

*Sanford C. Bernstein & Co., LLC., Research Division*

Right, okay. If I could just follow up on a separate topic. On the S and X gross margins, they look like they must have fallen materially, unless Model 3 gross margins were worse than minus 1,000%. So maybe you can help us understand what S and X margins -- gross margins were this quarter. And given most of the onetime stuff is gone and the mix shift is favorable, why wouldn't they snap back to be similar or better next quarter? And do you think that the promotional activity helped drive volume for S and X this quarter?

**Deepak Ahuja**

*Chief Financial Officer*

Yes. I mean, I -- firstly, your analysis is completely off from what we see internally. And the mix shift that we saw, part of that continues in Q4 and...

**Jonathan McNeill**

*President of Global Sales & Service*

Largely because we're custom -- we're largely custom orders, so there's orders that were placed in Q3 that we will ship in Q4.

**Deepak Ahuja**

*Chief Financial Officer*

Right. And then as we achieve -- well, continue to achieve efficiencies and also work on that mix shift, which takes time, we will continue to see improvement. And I have full confidence in S and X gross margin.

**Elon R. Musk**

*CEO, Product Architect, Chairman & Co-Founder*

Yes. Because the Tesla cars being sold in Q4 are inventory rundown and some clearing older models.

**Jeffrey B. Straubel**

*Chief Technology Officer*

Service loaners.

**Elon R. Musk**

*CEO, Product Architect, Chairman & Co-Founder*

Discontinued models, the service loaners. And those go for slightly lower average selling price than a custom-order vehicle that has maybe a point or 2 effects on gross margin. But yes, I mean, it should get back to the mid-20s essentially in Q4.

**Operator**

Our next question comes from Brian Johnson of Barclays.

**Brian Arthur Johnson**

*Barclays PLC, Research Division*

Yes, wanted to just drill down on the service revenue and expenses line. Not something we often talk about, but a lot of the other questions have been asked. Looks like year-over-year revenues were up \$180 million, costs were up \$247 million. Could you just talk about the drivers of that change between what's left of the drivetrain outsource business, the CPO business, the service loaner actual vehicles expense and then the cost of the PP&E for the actual people and service infrastructure?

**Jonathan McNeill**

*President of Global Sales & Service*

Yes. So I think what you see there is the increase in PP&E for the service infrastructure. We wanted to get out in front of demand as we're increasing both S and X fleet size and also of Model 3. So we opened a location just about every 4 days in Q3. And to get ahead of that demand, you probably saw that we put 180 mobile vehicles on the road, and we plan to double that this quarter. And so a lot of that, what

you see is PP&E. In terms of the drivetrain issue that you mentioned, that's mostly behind us. In fact, we see very little of that now. The reliability for S and X continues to improve. And you asked about the CPO business. The CPO business, for us, last year -- or last quarter was about a \$238 million revenue business. We expect that to grow to \$1 billion run rate -- or \$1 billion business for all of 2017. And so that business is growing rapidly at the same time. And we're running those -- we do our own CPO refurbishment. We do that in the same service infrastructure that we're servicing the cars. So you see a little bit of that cost into that line as well.

**Brian Arthur Johnson**

*Barclays PLC, Research Division*

Okay. And my follow-on for Deepak, probably, is can you walk us through the depreciation when you produce, for example, in the second quarter those 100 -- P100D cars Mr. Musk talked about going into the loaner fleet? Where do those -- how do those get depreciated while they're in the loaner fleet? And when they're transferred to be sold, what's the accounting on that?

**Deepak Ahuja**

*Chief Financial Officer*

Yes. They are capitalized as inventory because these cars are salable. And when these cars get sold, the depreciation related to those cars gets recognized in COGS.

**Brian Arthur Johnson**

*Barclays PLC, Research Division*

Okay. So it's not in the cost of the service centers?

**Jonathan McNeill**

*President of Global Sales & Service*

No.

**Operator**

The next question comes from Joseph Spak of RBC Capital Markets.

**Joseph Robert Spak**

*RBC Capital Markets, LLC, Research Division*

You also mentioned some constraints in body shop welding and final assembly. And final assembly obviously makes sense, given constraints elsewhere. I was wondering if you could talk a little bit about welding. And then as you get to your year-end run rate, is there still going to be a discrepancy between sort of different parts of the entire line? Or do you think everything is going to be roughly at the same level?

**Deepak Ahuja**

*Chief Financial Officer*

Doug, would you like to take that on?

**John Douglas Field**

*Senior Vice President of Engineering*

Well, with respect to welding, the rate is controlled by -- are you specifically asking about the video? Or do you have another...

**Joseph Robert Spak**

*RBC Capital Markets, LLC, Research Division*

I'm sorry. In the letter, it said body shop welding is listed as a constraint.

**John Douglas Field**

*Senior Vice President of Engineering*

Yes, it was not the same constraints.

**Deepak Ahuja**  
*Chief Financial Officer*

It wasn't listed as a constraint. Yes.

**John Douglas Field**  
*Senior Vice President of Engineering*

It's not the same level of constraint as the Gigafactory, but it is one of the more complex parts of the overall assembly line. So to reach our overall production goals, that has to ramp significantly. But again, it's not at the same level of constraint as modules. And it's really driven just by the sheer number of robots in the body shop. It's the highest concentration of robots anywhere in our overall production line. But it is coming up well. The bodies that we're building are of excellent quality. We've had fantastic crash results in testing them. And we're building more and more every day. We're ahead of the rest of the production curve.

**Joseph Robert Spak**  
*RBC Capital Markets, LLC, Research Division*

Okay. And then as a follow-up on the capital question, I mean, Elon, I think, a year ago on this call, you said to go from 5,000 to 10,000 was -- would require a fair amount of capital, but you were confident that it'd be less than you're going 0 to 5,000. And now that you have some real-world experience with the ramp, I'm wondering if you have any different views there, if you could put a little bit of a finer point on that comment.

**Deepak Ahuja**  
*Chief Financial Officer*

Yes. I don't think -- I mean, we actually feel even more strongly that our efficiency of CapEx on the next phase will be significant compared to the first phase.

**Elon R. Musk**  
*CEO, Product Architect, Chairman & Co-Founder*

Yes, absolutely. Some elements will require almost no CapEx. It's -- really come to realize that the -- you really want to make a factory go incredibly fast. Like really -- I think speed is the ultimate weapon when it comes to innovation or production, and we're pushing robots to the limit in terms of the speed that they can operate at, and asking our suppliers to make robots go way faster. And that they're shocked because nobody's ever asked them that question before. It's like if you can see the robot move, it's too slow. We should be carrying about air friction, like things moving so fast. It should be -- you should need a strobe light to see it. And that's incredibly critical to CapEx efficiency. And also we're going to be designing a lot of the robotic elements and automation on it internally. So yes, because plenty of suppliers are just too slow to respond in some cases.

**Jeff Evanson**  
*Vice President of Investor Relations*

Okay. We have 10 more questions in the queue, so we're obviously not going to get to everybody. Elon, do you want to take just a couple more?

**Elon R. Musk**  
*CEO, Product Architect, Chairman & Co-Founder*

Sure.

**Operator**

The next question comes from Colin Rusch from Oppenheimer.

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**Colin William Rusch***Oppenheimer & Co. Inc., Research Division*

Could you talk about the percentage of sales that are coming from these loaners to the fleet vehicles? We're trying to reconcile the MSRP declines that you implemented and what, it looks like, is a little bit more severe ASP decline. And then also, if you could talk a little bit about why you felt that it was necessary to add value to the Model S and Model X while lowering price. It seems like you should be able to drive volumes with one or the other.

**Deepak Ahuja***Chief Financial Officer*

Yes, I think, to the first question, I would say it's roughly about 5% of [ total sales ]

**Jonathan McNeill***President of Global Sales & Service*

Yes. Very -- yes. Very low single digits in terms of service loaner sales as a percentage of total units.

**Elon R. Musk***CEO, Product Architect, Chairman & Co-Founder*

Yes. We -- as far as the prices, it was -- Model X was always -- it was really the one that saw more of a price reduction than other things. And then the 100-kilowatt hour pack, which was -- 100-kilowatt pack cars was artificially priced high because we were production -- like really production-constrained on that pack. It was never our intention to price it quite that high, so we reduced it a little bit and then added some content as to both. So we just sort of split it between some price reductions where we thought things were a little overpriced, and then added some content just to have a clear differentiation. We weren't quite sure what the response would be to the Model 3. So maybe we might have overcorrected a little bit, but that's kind of where it is.

**Colin William Rusch***Oppenheimer & Co. Inc., Research Division*

Okay. And then just moving to the China strategy. Obviously, with the permanent magnet requirements for the DC motor for the Model 3 and what we've seen historically with export restrictions in China and improved environmental enforcement in terms of mining practices, how important is that to the strategy of moving into China and maintaining your supply lines for the growth of the Model 3?

**Jonathan McNeill***President of Global Sales & Service*

I think we think about China more from a demand side than anything. We're building complete cars and shipping them. We're shipping them across the ocean and into the largest electric vehicle market in the world. So what really pulls us into China primarily is to be able to supply that market and to make the cars more affordable, as Elon said, so that we're not forcing consumers to experience tariffs as we bring those cars in. That's a much bigger impact than any of the supply chain or sourcing materials issue.

**Operator**

The next question comes from Rob Cihra of Guggenheim.

**Robert George Cihra***Guggenheim Securities, LLC, Research Division*

Great. I recognize it's not the biggest focus right now, but I'm just curious on solar declining as you expected, but just wondering when you think that can start growing again. Is that a function of Solar Roof? Or is that sort of moving past your sales changes? And then, I guess, similarly on energy storage, the ramp looking -- sort of exiting this year into 2018, is that constrained by the Model 3? Or is that on its own separate track?

**Elon R. Musk***CEO, Product Architect, Chairman & Co-Founder*

Yes, we are -- we do expect the solar demand to rebound as we move solar sales into all of our stores, which is a much more efficient channel for demand generation. And that's just what's sort of conventional solar. The Solar Roof stuff, we expect, is going to be at -- or well, we're confident it's going to have extremely high demand. And we're just going through the validation process for the solar trials. It does -- and they're working right now, I should point out. So I have the Solar Roof tiles on my house. So -- and I don't even notice that they're there because they blend in so well. But they -- so they look really good but a roof is expected to last a long time. So at least 25, 30 years. And so there's some rate at which we can do accelerated life testing on -- for the rest of the component. So we can maybe try to accelerate life testing on a 30-year roof in sort of 6 months, but it's hard to do it in less than about that 6 months. So and then we're going to pack that into the production process. So I have no doubt that this will be a very significant part of the business down the road, it just takes a little while to get this behemoth rolling. But once it gets rolling, it's going to be a behemoth.

**Jeffrey B. Straubel***Chief Technology Officer*

And we continue to install pilot engineering, early customer homes. We continue the cadence of that.

**Elon R. Musk***CEO, Product Architect, Chairman & Co-Founder*

Yes. You have one in your house in the woods.

**Jeffrey B. Straubel***Chief Technology Officer*

Yes, this is J.B. I installed one, and quite a few others at this point more than 10. And we still are on track to turn on some -- most of the production line in Buffalo at the end of this year to start ramping final actual production versus this in the final factory.

**Elon R. Musk***CEO, Product Architect, Chairman & Co-Founder*

Yes.

**Jeffrey B. Straubel***Chief Technology Officer*

And maybe to your point about the separation from Model 3, those production areas are largely separate.

**Elon R. Musk***CEO, Product Architect, Chairman & Co-Founder*

That's right for the pack side.

**Jeffrey B. Straubel***Chief Technology Officer*

Yes, storage versus vehicles. The energy storage production is actually growing at a really -- actually doing really well by our ability to complete the South Australia project or be on track to complete that. That's...

**Elon R. Musk***CEO, Product Architect, Chairman & Co-Founder*

In Puerto Rico.

**Jeffrey B. Straubel***Chief Technology Officer*



As well -- yes, as well as the deployments in Puerto Rico and elsewhere in the Caribbean. That's been running at nominal rate and doing quite well. So those are quite separate.

**Elon R. Musk**

*CEO, Product Architect, Chairman & Co-Founder*

And down the road, there will be some cell conflict. I mean, I think if you sort of fast-forward a year or 2, we really need to think about cell production as being a constraint. And some of the [indiscernible] going into cell production so they can go a couple of years out, making sure that we have a secure supplies of lithium hydroxide, cobalt. There's actually more amount of cobalt. I mean to say nickel, but yes, sort of...

**Jeffrey B. Straubel**

*Chief Technology Officer*

Nickel, graphite, copper or aluminum.

**Elon R. Musk**

*CEO, Product Architect, Chairman & Co-Founder*

Yes. The separator like line.

**Jonathan McNeill**

*President of Global Sales & Service*

The module ones that we're operating to assemble the cells into modules are totally separate. So that -- it's this Model 3 module line in that order that we're focused on right now and improving quickly, but the energy module line, in the same building, coincidentally, but it is a totally separate line.

**Elon R. Musk**

*CEO, Product Architect, Chairman & Co-Founder*

Yes.

**Jeff Evanson**

*Vice President of Investor Relations*

Okay. I think that's, unfortunately, all the time we have today. Appreciate all your great questions, and we look forward to talking to you next quarter. Goodbye.

**Operator**

Ladies and gentlemen, this concludes today's conference. Thank you for your participation and have a wonderful day.

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