Decarbonizing the automobile:
A lifecycle roadmap

LEVI TILLEMANN: Alright, welcome to this briefing on the Circular Cars Initiative and the Race to Zero Carbon Mobility. I'm Levi Tillemann. I lead the World Economic Forums Circular Cars Initiative.

Just a few years ago, there was a lot of debate about what the care of the future would, indeed, look like. Today, that picture is coming into ever sharper focus. Going forward, cars must not only be electric, but circular. The circular cars initiative is a joint effort by the World Economic Forum, the World Business Council for Sustainability Development, EIT Climate-KIC, Systemic, Accenture Strategy and McKinsey & Co, as well as a community stakeholders from up and down the automobility value chain.

Since our kickoff in January, the circular cars intiative has grown into a diverse community of leaders and sustainability from around the automobility ecosystem. That is one of the elements that is so special about this community. It's diversity.

We have harnessed the insights of our auto manufacturers, materials, companies, mobility as a service providers and various industry analysts to capture a unique and holistic perspective on the transition towards a zero-carbon automobile.

Today, we've invited a group of experts on automotive circularity to explain the what, the why and the how of circular cars. I'm going to introduce them briefly. Let's start with Alexander Holst, Managing Director for Sustainability and Utility Strategy at Accenture Strategy. Alexander, thanks for joining us.

ALEXANDER HOLST: Thank you very much, Levi. Kind of the last few months were very exciting, indeed, working with the diverse group of companies and bringing the insight all the way to this point today.

LEVI TILLEMANN: Fantastic. Alexander, your team has done great work clarifying what circularity means within an automotive concept. Perhaps you can tell us a little bit about it?

ALEXANDER HOLST: Thank you very much, Levi. And the work, when we started, we basically had two sort of steps to do and we came up with one key results. Now, what we did in the beginning was widening the discussion, opening up what circular business means in the automotive industry. Because, obviously, this industry has been doing parts of circularity, e.g., recycling, e.g., remanufacturing for decades. The singular topic wasn't really new for that industry.

Now, I think we want to widen it, not just for the production side or the recycling, but also the use phase business model, so material aspects as well as business model aspects. And then, the second step was to close it. To close that discussion to a definition, what does a circular car looks like, as you mention in the beginning of the introduction.

Now, what we want to propose today is a taxonomy, a five-level taxonomy to guide the progress to circular cars. This taxonomy in our view is intended to establish a common understanding of the level of circularity of the car and how it can be improved. To get a common understanding of discussion when we talk about what a circular car might look like. And this is very relevant and rather urgent for the industry and for all the ecosystem partners of the automotive industry.

Because, well, the targets on C02 say 50% reduction in absolute numbers by 2030 to hit 1.5 degree. Now, in that same period, everyone expects the car-based mobility to increase and not just a little bit to increase, but actually to increase 70% globally. And that in the context of a 50% need of absolute reduction, I think surely emphasize the need for action now. As we all know, that changes in the automotive industry are not taking place from one day to another. There's an entire supply chain, entire planning process, reduction processes that might need to be changed.

Now, let me give two, three examples of what level one or level three or level five really means. Level one, that's what we're seeing today. This is the car industry is operating at their level, slowly but surely increasing circularity for silent optimization, such as switching to renewable energy, for example, in vehicle assembly. That is the scope to emission discussion that many carmakers have been tackling over the last years.

Level three, for example, looks at the full life cycle of a vehicle and needs to be optimized. Together, maybe with better aligned incentives through the business model shift, especially fleet based ones. We see that that could be more broadly reached by 2030.

Now, on level four, the full value chain will be optimized, e.g., with high value recycling and purpose-built vehicles. Also, likely for this, the vehicles are operating in an as a service model. This could be the case around for many vehicles by 2035. And we all know and appreciate that topics such as autonomous driving are not coming or might not be coming as far as we maybe have thought five years ago.

On level five, that can be achieved through optimization of the whole mobility system. Even envisioning which is a true vision that being mobile actually contributes positively to this planet. Even in an environment of poor consent, so being net positive impact. What a vision that could be.

Now, to the question of how we measure these type of progress? We would measure it to support a quantitative assessment. And can you go back one slide, please. Thank you. We would measure this as a quantitative assessments of the circularity progress of a car. We propose two outcome-oriented measures.

The first is carbon efficiency, where we all look at it today, carbon the key focus. But circularity is not just about carbon. It is about resource efficiency and that would be our second measurement.

Carbon efficiency, we measure by dividing the lifecycle greenhouse gas emission, equivalent, of course, by passenger kilometers driven during the life cycle. Life cycle emissions include both CO2 linked to the product by CO2 from materials, component productions, assembly and of life management, as well as CO2 from the use phase, like the classical tail pipe emission and emissions from the provision of energy such as fuel or electricity.

Now, passenger kilometer per life cycle is the product of the average vehicle of full capacity and the kilometer driven over the life cycle. The other piece, the resource efficiency is measured by dividing non-circular resource consumption for passenger kilometers. What do we mean by non-circular resource consumption?

Well, this considers the material that is in the car, including replacement components during the life cycle and material scrap from production. In a simplified way, we find non-circular resource consumption as inflow and outflow that are not remanufactured or recycled.

Well, as you see on those two lines, as the progression of those two curves show, carbon efficiency will initially decrease more rapidly caused by the switch from internal combustion engine to an electric battery. Decarbonizing, of course, the tier pattern emissions along with the (inaudible) decarbonization. You have that free flow.

From then on, both outcomes measures follow a relatively similar path, as a major amount of the CO2 emissions can be avoided by replacing virgin materials with recycled or remanufactured ones.

So what are these pathways to take for that transition?

LEVI TILLEMANN: And, Alexander, I'm going to urge you to go swiftly through this next slide.

ALEXANDER HOLST: Absolutely, I will do very much, Levi. Now what are we seeing here is, of course, four pathways on the two trends, the usage transformation on the top and the product transformation on the very right. and the energy material, lifetime and utilization and the key point is that these optimization pathways are all connected to each other to a certain degree.

And that's, I believe, sort of really emphasized the need for the various four pathways, whether it's the energy, the material and pathways that we need to go through. And back to you, Levi.

LEVI TILLEMANN: Great, thank you very much, Alexander. And, as you know, I'm a big fan of your team and the analysis that you've done as part of the Circular Cars Initiative. And we're a little over time, but I just want to ask you one quick question, which is were there any conclusions that you came to as part of your research here that was surprising?

ALEXANDER HOLST: Well, maybe in hindsight we would say, well, that's not really surprising, but when you go through the analysis, you found surprising that how much of the different solutions that we all talk about, whether it's the material pieces, whether it's the business model pieces, that are truly interlinked and that they have combined different solutions, substantial synergies can be generated.

To give you just an example. We all know the as a service model vehicles, e.g., subscription based ownership, provides an incentive for the lifetime improvement. Now, on the normal car, there were basically just mean maybe in the tip of a maybe 10, 20-year lifetime, that car would maybe run out of lifetime up to two, three years, if it is being utilized 80%, 90% of the time, instead of 3, 4, 5. But if you then change the materials, the way the car has constructure, you could actually increase the lifetime of that. So that is the interlink of those solutions that is really surprising.

LEVI TILLEMANN: Great. Well, thank you very much for those opening comments, Alexander. And I'm sure we'll hear more from you in Q&A.