

[Dialogue with J.B. STRAUBEL, CTO of Tesla Motors]

Revolutionary Changes EVs Will Bring to Our Lives

Jeju Special Self-Governing Province / Jeju Peace Institute

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WON Heeryong

Tesla is pushing for the popularization of electric vehicles with its affordable Model 3 and even investing in self-driving cars. My understanding is that Tesla's Gigafactory now under construction will be powered completely by renewable energy sources, such as solar, geothermal and wind energy. Would you tell us about Tesla's plans for the future (the renewable energy and EV market of 2030) and basic strategies to carry out the plan?

The future Tesla is envisioning seems to be almost the same as Jeju has. Mr. Straubel, you have noted the crucial impacts of climate change and emphasized the importance of the mission to reduce carbon dioxide emissions. Jeju Island is also pursuing "energy for peace." As a pioneer of the Green Big Bang, would you give us advice on the Green Big Bang and Carbon-Free-Island projects and how to make the island a smart one with clean technology? Did you know about Jeju's plans? What are your views on reducing carbon emissions on Jeju and in Korea?

We now see the fourth industrial revolution taking more concrete shape with the remarkable development of artificial intelligence. What do you expect about cars with artificial intelligence? What do you

think about the self-driving cars of Google and Apple? Can it bring a revolutionary change to our lives? And how can Jeju and Korea adapt to this new age? How will it influence the evolution of cars and automobiles? Is full automation possible? The Model 3 has an autopilot function – can you comment on strategies Tesla has and its relationship with Google?

Tesla is known to have received more than 400,000 pre-orders for the Model 3. I know that Model S and Model X are soon to be introduced in Korea. The Korean government and the Jeju Provincial Government are making strenuous efforts to distribute electric vehicles and expecting concrete results, soon. As a global pioneer of the EV market, what kind of policies would you like to suggest to the Korean government and Jeju Island for the wider distribution of EVs?

To my understanding, Tesla is using batteries supplied by the Panasonic Corporation. I guess that Tesla has a great demand for batteries. In connection with battery supply, do you have any plans for cooperative ties with Korean firms such as LG Chem and Samsung SDI?

I think Tesla and Jeju Island have a lot to collaborate on in the future. What would you say if I sug-



J. B. STRAUBEL



WON Heeryong

gest Jeju Island as a Northeast Asian hub of Tesla's EVs? Do you have anything planned for cooperation with Jeju?

In March every year, Jeju Island holds the International Electric Vehicle Expo (IEVE), in which EV producers discuss new possibilities and ideas, and exchange information. Many people look forward to an opportunity to find out about the new products of Tesla and its futuristic high technologies at the Expo. Do you have an intention to join the fourth Expo in 2017?

J. B. STRAUBEL

CO₂ levels are now the highest they have been for a million years and 2016 is the hottest year on record. This is not a deviation but a worrying trend that is caused by burning fossil fuels and leading to not only rising temperatures but many currently unknown negative consequences.

Tesla is directly involved in how we can decarbonise and this is what inspires Tesla. We want to accelerate the world's transition to sustainable transportation and energy. We defined our brand from the beginning by our focus on performance - we have convinced people that EVs could compete head to head with gasoline on handling, range and power. That changed people's perceptions leading to the resurgence of interest in EVs around the world.

The advances were based on battery and technology development. In the mid-2000s, battery energy was 330 watt-hours per litre, but ten years later it had roughly doubled to provide twice the energy in the same space. This enabled EVs to compete with gasoline, increase EV range from 100 to 200 miles and improve handling and performance.

Our innovations includes being the first to use lithium ion batteries in the Roadstar, a consumer



electronics technology we were told would never work in vehicles. Our Model S has the battery as the core component creating a low center of gravity, improving handling and safety significantly. The Model S has a touchscreen in the cockpit to control windows, seats and lights as well as maps and music like a consumer electronics device. Wireless software updates means we can add features to improve performance and remotely service problems. The Model S surprised even us - we set out to build the best car in the world and achieved it.

We want to change energy use and bringing the cost down is essential to that. The Model S was half the Roadstar cost, and the Model 3 is half again at US\$35,000 with a 215 mile range. The launch reception has been amazing with unprecedented

interest showing that there is massive demand for EVs as people want clean and green tech.

Key to lowering costs is the Gigafactory 1.0 which will have 50 gigawatt-hours in annual battery production by 2020, enough for 500,000 Tesla cars. The factory is powered by renewables and has net zero carbon emissions. The Gigafactory enables production from supply scale raw materials to finished battery packs in one factory, reducing logistics and overheads.

It is the largest in the world and will contribute towards creating a new economy for new energy products. We have already adapted this technology to different energy storage products such as the Powerwall (residential) and Powerpack (Commercial and industrial) which enables people to store

unused energy at home rather than sell it back to the grid and use fossil fuels at night. We can also do that with cars by intelligently storing energy and feeding back to the grid. This is not science fiction. It exists today.

As the process costs for renewables decline, we are seeing renewables contracts that are cheaper than coal and electricity. In Kauai, Hawaii, we are developing a utility scale solar storage system to deliver fixed energy at times of low solar energy to the grid at a cheaper cost than fossil fuels equivalent. Solar plus battery is cheaper than incremental fossil fuel generation. There is no reason we cannot scale this up. We can eliminate 100 percent of US fossil fuel use just by using this amount of land for solar energy. This is an exciting time even com-

pared to five or ten years ago. Storage technology has allowed this to happen.

Jeju's carbon-free vision is compelling and the island is a unique case of a test-bed that can be replicated across the world. Improvements in energy storage mean there is massive potential in renewable energy and we have to combine renewable energy, storage and electric vehicles as you can't do it with just one piece of the puzzle.

AI and self-driving are going to have a huge impact on society. Computers have not done very well historically at interpreting images, but the software is improving at an incredible rate as algorithms allow us to look at large data sets. Perhaps one of the biggest benefits is safety as automated driving can alert people to accidents. We already see a 50 percent improvement in safety and the end vision is a vehicle that does not allow itself to crash. It is natural that software companies are jumping into AI and there is definitely a race, but it is an exciting time. Progress is even faster than in renewable energies.

In Korea, there is fairly good and growing EV infrastructure, but I cannot say much more about Tesla's plans in the Korean market for now. We work with a diverse supply base across the world and there is great capability in Korea. We have companies all across the world seeing how they can get involved. They have the same vision and they want to participate in EV growth.

Policy Implications

- Improve charging infrastructure for more convenient EV use.
- Incentivise Tesla's entry into the Korean market.
- High performance and low cost are crucial to market success.
- Ensure smart energy infrastructures are fully integrated with EVs and renewable energies.
- Ensure EVs are running on renewable energies by installing latest energy storage systems.
- Provide subsidies for households and businesses to take advantage of renewable technologies.