

STRATEGIC PLANNING AND MARKET COMPETITION – ASSIGNMENTS – MAY 1ST

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EXPLORE AND REGISTER A FEW SCENARIOS FOR THE EV MARKET

First of all and in general terms, the EV market is a global, fast-growing and highly competitive market. EVs are vehicles that are either partially or fully powered on electric power. Electric vehicles have low running costs as they have less moving parts for maintaining and also very environmentally friendly as they use little or no fossil fuels (petrol or diesel).

The global electric vehicle market was valued at \$162.34 billion in 2019, and is projected to reach \$802.81 billion by 2027, registering a CAGR of 22.6%. Asia-Pacific was the highest revenue contributor, accounting for \$84.84 billion in 2019, and is estimated to reach \$357.81 billion by 2027, with a CAGR of 20.1%. North America is estimated to reach \$194.20 billion by 2027, at a significant CAGR of 27.5%. Asia-Pacific and Europe collectively accounted for around 74.8% share in 2019, with the former constituting around 52.3% share. North America and Europe are expected to witness considerable CAGRs of 27.5% and 25.3%, respectively, during the forecast period. The cumulative share of these two segments was 40.1% in 2019, and is anticipated to reach 51.0% by 2027.

EV Scenario 1: The ‘most realistic’ estimates of WP 1-5

This scenario is intended to provide the ‘most realistic’ outlook of EV developments

The main assumptions in this scenario can be described as follows.

- Input parameters regarding cost, energy use and oil price are all estimated as realistically as possible, using the best estimates of the project team, as determined in the earlier work phases of the project and presented in WP 4 (see Annex A of that report).
- Government incentives for EVs are assumed to continue roughly as currently in place. A number of EU countries provide significant subsidies or tax exemptions, others do not.

- ICEV development is roughly in line with expectations from the Vehicle Emissions project by Ricardo/TNO. ICEV fuel efficiency improvements are in line with the CO₂ and cars regulation until 2015, after that real-life improvements are expected to remain somewhat lower than the test cycle improvements required by the regulation. This results in efficiency improvements of 18% between 2015 and 2020, which is lower than the 27% that would correspond with meeting a test cycle value of 95 g/km². After 2020, it is assumed that ICE efficiency improves with 5% every 5 years.
- Most consumers are reluctant to switch to EVs, as long as the total cost of ownership (TCO) is higher and drive ranges are lower:
 - We assume that only the 'innovators' will be interested, as long as the TCO of the EVs is higher than that of comparable ICEVs. This group of users represents about 5% of the car buyers. This group is, however, still price sensitive, which is modelled using a price elasticity.
 - We distinguish between urban innovators that are mainly interested in FEVs and EREVs, and non-urban innovators that are mainly interested in PHEVs and EREVs.
 - The rest of the consumers will only start buying EVs once their TCO can compete with that of ICEVs. They will also be price sensitive: the larger the cost benefit, the larger the market share.
- Production capacity and charging opportunities will be limited at first, and increase over time. It is assumed that it will take until 2025 before production capacity and charging can be fully developed and do not provide limitations on market uptake.
- Energy prices (diesel, petrol and electricity) are assumed to develop in line with the price trends depicted in 'EU Energy Trends to 2030' (EC, 2010i).
- It is assumed that EVs replace ICEVs, i.e. that the number of vehicles sold and their annual mileage will be the same as in the baseline

EV Scenario 2: ICE breakthrough

The key storyline of this scenario is as follows.

- Costs of batteries reduce less fast than anticipated in Scenario 1, there is relatively limited technological progress.
- Successful further development of ICEVs, leading to significant CO₂ efficiency improvements at reasonable cost. Fuel efficiency of ICEVs is expected to reduce in line with the CO₂ and cars regulation (appr. -10% between 2010 and 2015 and 27% reduction between 2015 and 2020). Between 2020 and 2030, efficiency is assumed to increase further, by 10% every 5 years.
- Government incentives for EVs reduce of time, insufficient to compensate the higher total cost of ownership compared to ICEVs.
- Consumer interest remains limited to a relatively small market (innovators and some niche markets).
- TCO of FEVs remains high compared to ICEVs, resulting in a low market uptake:
 - Batteries remain expensive.
 - Oil price and electricity price as in baseline scenario.
 - Governments provide some subsidies and tax exemptions in many EU countries, but not enough to achieve competitive TCO.
- PHEVs will successfully enter the market, but their electric range remains limited and consumer interest as well, due to limited charging possibilities.
- EREVs will not enter the market, as they will remain expensive and offer little advantage over other types of vehicles.
- Energy prices are assumed to develop in line with the price trends depicted in 'EU Energy Trends to 2030' (EC, 2010i) – as in Scenario 1.

EV Scenario 3: EV breakthrough

This scenario is the most optimistic one, from the EV development perspective.

The story line is as follows:

- R&D leads to a rapid decrease of battery cost and increase of battery lifetime, from 2015 onwards.
- From that time onwards:
 - TCO of medium-size PHEVs becomes almost competitive with ICEVs in part of the urban transport, and in non-urban transport

(equal TCO is achieved around 2020). The share of electric driving with PHEVs increases compared to the baseline, as their electric range increases.

- In parallel, FEVs become competitive in the small vehicle segment and urban transport. After 2020, their market share also increases in the medium-size vehicles sales as the ranges of FEVs increase and cost decrease.
- In the larger vehicle market and non-urban vehicle use, PHEV and EREVs gain quite rapid market share from 2020 onwards, as their TCO also gets competitive. The driving range of EREVs also increases over time.
- From 2025 onwards, fast charging will be offered throughout the EU, practically removing all range anxiety and range limitations.
- Apart from cost issues, in the first decade, 2010-2020, market share increases are limited by production capacity, scepticism of consumers, electricity infrastructure bottlenecks, etc.
- Government incentives for EVs are high at first in some countries and will be rapidly reduced after 2015 as costs go down.
- ICE development (regarding fuel efficiency and cost) and energy costs are assumed to be the same as in Scenario 1.

REGISTER THE MISSION AND VISION STATEMENTS, AND THE VALUES / PRINCIPLES OF THE COMPANY YOU'RE RESEARCHING, IF AVAILABLE. IF THIS INFORMATION IS NOT AVAILABLE, PLEASE CREATE IT.

Lordstown Motors

Vision

designs and manufactures electric vehicles that revolutionize the way work gets done.

Mission

Our mission: Build the most cost-effective, safest, zero emission work trucks ever made.

Values

- Customer Experience.
- Integrity.
- Innovation
- Quality