CARMAKERS ELECTRIC VEHICLES’ STRATEGIES: PLATFORMS, MARKETING AND CHARGING

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CONSUMER NEEDS IN ELECTRIC VEHICLES MARKET

**Cost**
- Price of EV compared to ICEV, after govern. incentives
- Price of Gasoline compared to Electricity

**Mobility**
- Vehicle’s Electric Range
- Charging Infrastructure/Availability
- Charging Time

**Product Diversity**
- Market Segment Availability
- Diversification of Models and Brands
HOW CARMAKERS ARE POSITIONING THEMSELVES?

Type of EV
- HEV
- PHEV
- BEV

Market Segment
- Compact?
- Mid-Size?
- Etc.

Manufacturing Strategy
- Product Architecture
- Degree of Modularity and Commonality
- Economies of Scale and Scope
- Platform shared with ICEVs or Dedicated Platform?

Battery Pack and Powertrain
- Powertrain Engineering
- Battery Capacity
- Insource? / Outsource?

Charging Facilities
- Home Facilities
- DC Fast Charging
- Move into Automotive Matrix?

Regulatory Issues
- Meet to EPA and NEDC Regulations
- Taxes and Incentives
ELECTRIC PLATFORM STRATEGIES
PLATFORM IN THE AUTOMOTIVE INDUSTRY

• Although the concept of platform, in a broader definition, is related to a common use of assets, modules and/or components, the platform concept in automotive industry is strictly related to a vehicle’s chassis, even in flexible platforms.
• Internal Combustion Engine Vehicles (IC EVs)

• Types of Electric Vehicles (EVs):
  • Hybrid Electric Vehicles (HEVs)
  • Plug-In Hybrid Electric Vehicles (PHEVs)
  • Battery Electric Vehicles (BEVs)
ALTERNATIVE PLATFORM STRATEGIES

Underpin the EVs on the same ICEVs platforms

Develop a new dedicated platform for EVs
Develop BEV on the same ICEV platform?

YES

AEP

Can Reduce Costs, by Commonality, Economies of Scale & Scope

Range Limitation

Can compromise the Dynamics of the vehicle

Limitations on interior Space/Comfort

NO

NEP

Higher Costs associated to a new dedicated platform

Conceive an BEV on a new basis

limitations on interior space/comfort
PROPOSED CONCEPTS:

- Electric Vehicle’s Platforms:
  - Adapted Electric Platform (AEP)
  - New Electric Platform (NEP)

- Electric Vehicle’s Design:
  - New Electric Vehicle Concept Design (NEVD)
  - Adapted Electric Vehicle Design (AEVD)
Could share some components e.g. electric/electronic systems
FORD’S EV PLATFORM STRATEGY

• Strategy: develop their electric vehicles (EVs) on the same Internal Combustion Engine Vehicles (ICEVs) platforms + offer a considerable range of electric vehicles

• “We are basing our EV products on our highest-volume global platforms. This approach offers tremendous opportunities for production economies of scale (...)” (Ford Sustainability Report, 2012)

• The EVs Design are the same as those of ICEVs.

• Ford provides in-vehicle communications technology for their vehicles in order to find the nearest locations of charging stations, such as MyFord Mobile™ app, MapQuest®, and PlugShare.
VOLKSWAGEN-AUDI GROUP

MB (Modular Matrix) & MPB (Modular Production Toolkit)
MQB

- Launched in 2012 for all VW Group brands, including Volkswagen, Seat, Audi and Škoda (planned for Porsche).
- Global Platform covering the A0 segment to the C segment;
- Flexible Platform in terms of powertrains and vehicle’s chassis.

Drive systems in MQB

- Conventional:
  - TSI petrol EA211
  - TDI diesel EA288

- Alternative/renewable:
  - EcoFuel CNG
  - BiFuel LPG
  - FlexFuel ethanol
  - Plug-In
  - e-DRIVE
THE MEB PLATFORM

• The MEB (Modular Electric Toolkit) was launched by Volkswagen Group in 2015.

• It is a multi-brand architecture - for all VW brands - designed to different market segments.

• It is an all-new platform for the manufacturing of new all-electric (BEV).

• Herbert Diess: “We have enough scale to dedicate one of our platforms to electromobility”.

• New BEVs with appropriate space for electric components and large batteries without compromising the driving dynamics and interior space/comfort.

• The first vehicle projected to run in this platform is the BUDD-e, which can reach up to 373 miles based on the New European Drive Cycle (NEDC), or 233 miles when based on the EPA drive cycle, thanks to its flat-floor type 101 kWh battery.
GENERAL MOTORS

• Goals: reduce Platforms world-wide;

• Volt:
  • New generation of Volt (PHEV): pure electric range improved to 53 miles;
  • Volt is under D2XX Platform (compact cars - C-segment and crossover/CUV).

• Chevrolet Bolt (BEV)
  • electric range more than 200 miles + affordable price ($30,000 after tax incentives in USA);
  • Bolt is under the Gamma G2SC Platform;
  • “For most people, this will be their everyday driver”, said GM CEO Mary Barra
• Nissan Leaf (BEV): 107 miles range; Based on Versa/Tiida;

• **Common Modular Family (CMF)**
  - Announced in 2012
  - Modular architecture strategy
  - Core modules allows a variety of combinations to produce a variety of models at the same platform.
  - The goal is to increase common modules to a wide range of models and car segments;
  - “Alliance parts bank” + increasing economies of scale.

• **New EV Platform:**
  - The Company announced in April, 2016 they are preparing to launch new electric platform to include new CUVs and SUVs models, probably one sport car, besides their next-generation Leaf.
THE NISSAN LEAF

Battery-mounting frame
Rigidity improvement of the platform by implementing structure to mount batteries and adding frame on battery pack itself.

Inverter-mounting members
A center frame member at the front joins the left and the right frames, and the inverter mounted on it, creating a highly efficient package and improving rigidity of the platform.
RENAULT-NISSAN COMMON MODULAR FAMILY (CMF)
RENAULT-NISSAN COMMON MODULAR FAMILY (CMF)
BMW

• Models: BMW i3 (BEV), BMW i8 (PHEV) and Mini-e
• BMW creates in 2011 the “i” brand for their electric vehicles (i3 & i8)
• i3: already available in 50 countries
  • was the third electric car best sold in US in 2015.
  • can reach 80 to 100 mi range (NEDC), and up to 81 mi (EPA).
• New Electric Platform: BMW will be developing a new electric car platform, called **FSAR (Flat Battery Storage Assembly)** and will be closely associated with BMW’s new **CLAR (Cluster Architecture)**, the new RWD architecture.
Currently offer 4 models in USA: B-Class (BEV), C-Class Sedan (PHEV), GLE SUV (PHEV), S-Class Sedan;

Mercedes announced will concentrated their ICEV models in only four new platforms and more recently, the company announced their fifth new platform, for their electric vehicles: the EVA (Electric Vehicle Architecture) with the first model built on it will be launched on 2018 or 2019;

Plans to base at least four electric vehicles models on this platform: two sedans and two SUVs;

They will be powered by an electric motor at either axle, enabling all-wheel drive;

This is a “multi-model vehicle architecture”, that enables various bodystyles;

The Mercedes plans to produce its owns batteries.
• The Model S ranked as the best sold car in US in 2015 and world’s second best sold.

• Tesla 3 has a 65 kwh battery, which allows 215 miles (344 km) range.

• The Model S and the Model X shares the same platform, but the Tesla Model 3 created a new vehicle platform that will include a sedan and will also be the basis for the Tesla’s next generation Crossover.

• 2016 Prius (PHEV): more interior space + more cargo space (increased by 56 litres) + lower center of gravity, thanks to more energy density of the battery pack, making it more compact.

• 2016 Prius is based on Toyota New Global Architecture (TNGA) concept, a worldwide modular architecture.

• At TNGA concept, many platforms will be created, as long as new models will be developed.
• Offered Chrysler Pacifica (PHEV) and Fiat 500-e to US market;
• The goal is to reduce platforms and increase commonality of parts and components among models and FCA brands (Fiat, Chrysler, Alfa Romeo, Dodge, RAM and Jeep);
• Improve Architectural Convergence and Synergies: common systems/components & unique modules;
• In 2013, 95% of total volumes came from 12 architecture families; in 2018 it will come from 9.
• PSA announced on May, 2016 2 new electric vehicle platforms on which the company will base 4 new BEVs and 7 new PHEVs by 2019-2021.

• The PHEVs will be based on a PSA’s ‘Efficient Modular Platform-2’ by 2019 and will allow for up to 38 miles (60 km).

• EMP2 and CMP “offers a low-carbon solution for each body style without sacrificing space and optimal performance” (PSA website)

• The Common Modular Platform (CMP) was developed with DFM (Dongfeng) and has a variant compatible to BEVs compact city cars, sedans and compact SUVs.

• The platform is expected to allow for a range of up to 280 miles (450 km) for BEVs.

• The CMP will offer a spacious, multi-purpose electric vehicles with a high driving range and ultra-fast charging solutions.
EMP2
The new Efficient Modular Platform by PSA Peugeot Citroën

A new modular platform combining competitiveness and a diversified product range

- Standardisation
- Diversity

&

- Plug & play modules
- Short rear end
- Long rear end
- Low driving position
- High driving position
- Flexible transverse beam
- Multilink rear end
- Installed powertrain
- Powertrain

Fixed front end

Compact and long axioms
Coupsés
MPVs
SUVs
LCVs
AUTOMAKERS WHO ARE MOVING TO THE DEDICATED ELECTRIC PLATFORMS

- **Volkswagen** launched in 2015 the MEB (Modular Electric Toolkit), all-new platform for the manufacturing of new all-electric (BEV) small-to-medium vehicles, for all VW brands.

- **Mercedes** will launch EVA, the new modular platform for electric cars, a “multi-model vehicle architecture,” using a similar layout to the Tesla’s platform. At least, for 4 new models: 2 sedan + 2 SUVs.

- **BMW** will be developing a new electric car platform, called FSAR (Flat Battery Storage Assembly) and will be closely associated with BMW’s new CLAR (Cluster Architecture), for their RWD models.

- **Nissan’s** CEO announced in April, 2016 they are preparing to launch new electric platform to include new CUVs and SUVs models, probably one sport car, besides their next-generation Leaf.
Charging Strategies by Carmakers

- Technical Support for installation & maintenance of an EVSE
- Establishing partnerships for supplying an EVSE
- Ultra-fast Charging Systems
- Alliances with local governments to amplifying the public charging networking
- Installing Electric Charging Stations and Outlets (DC fast charging)
- Wireless Charging System
INFRASTRUCTURE - USA

- 13,957 Electric Stations
- 34,522 charging outlets

- Compared to about 170,000 gas stations in US
Thank You !!

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