**CATEGORICAL IMPERATIVE OF AUTOMOTIVE INDUSTRY**

**WE UNDERSTAND WE ARE PART OF THE PROCESS**

**BOTH INDUSTRY AND GOVERNMENT HAVE A ROLE**

**INDUSTRY**
- Technology to reduce CO\(_2\) emissions
- Mix of technologies to comply across diverse set of regulations
- Apply mix to comply in an economically sensible manner

**GOVERNMENT**
- Establish a regulatory framework
- Support deployment of infrastructure
- Help drive consumer demand

**EV TECHNOLOGY**
- mHEV
- HEV
- PHEV
- BEV

**REGULATION**
- Compliance framework
- Transparency
- Rules
- Procedure
A TYPICAL DAY IN THE LIFE OF A MINIVAN DRIVER

**EVENING ACTIVITIES**
- FULLY CHARGED
- DROP OFF KIDS
- ERRANDS
- HOME CHARGE
- PICK UP KIDS
- ERRANDS
- EVENING ACTIVITIES

**NIGHT CHARGE**
- PARKED AT WORK
- DRIVE HOME
- EVENING ACTIVITIES

**DAILY DRIVE**
- WORK
- DRIVING TO WORK
- FULLY CHARGED
- DRIVING HOME

**HOME**
- HOMES
- EVENING ACTIVITIES

**84 MPGe**
- 30+ MILES ELECTRIC RANGE
- 500+ MILES HYBRID RANGE

“SINCE MOST MINIVAN DUTY INVOLVES SHORT HOPS AROUND CITY AND SUBURB, A MINIVAN IS AN IDEAL CANDIDATE FOR HYBRID TECHNOLOGY”

“It’s just a flawless execution, and an example of how bright our electrified automotive future can be”

-edmunds

- AUTOWEEK
CO₂ REDUCTION TECHNOLOGIES
IMPLEMENTED TO DATE

TECHNOLOGIES APPLIED SINCE 2014 REDUCED CO₂ BY 15% ACROSS MAJOR PRODUCT INTERVENTIONS

- 8 AND 9 SPEED TRANSMISSIONS
- AERODYNAMIC IMPROVEMENTS
- ENGINE STOP START
- DOWN-SIZED TURBO ENGINE FAMILIES
- AXLE DISCONNECT
- ACTIVE GRILLE SHUTTERS
- LIGHT WEIGHTING
- TIRE ROLLING RESISTANCE
## Regulatory Environment at a Glance

### Four Primary Markets

### Test Cycles/Calculations Vary, But Yield Similar Objectives

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</thead>
<tbody>
<tr>
<td>Europa</td>
<td></td>
<td></td>
<td>25% Reduction to 95 g/km</td>
<td>95% of Fleet</td>
<td></td>
<td></td>
<td></td>
<td>25%</td>
</tr>
<tr>
<td>China</td>
<td>PHASE DOWN TO 5.0 L/100 KM</td>
<td>NEV CREDIT REQUIREMENT BEGINS: 10% in 2019 CY 12% in 2020 CY</td>
<td>CONSUMPTION TARGET RAPS TO 4.0 L/100 KM BY 2025 CY (93 G/KM)</td>
<td>30%</td>
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<tr>
<td>US</td>
<td>EPA, NHTSA, CARB REGS: 4% TO 5% PER YEAR</td>
<td>2022–2025 MY REGULATORY RELIEF POSSIBLE</td>
<td>DRAFT RULE JUNE 2018</td>
<td>25%</td>
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<tr>
<td>Brazil</td>
<td>INOVAR TARGET: 133 G/KM WITHOUT DIESEL FLEET</td>
<td>INOVAR LIKELY TO EXTEND FOR 1 YEAR</td>
<td>94 G/KM WITH DIESEL: &quot;WELL TO WHEEL&quot;</td>
<td>26%</td>
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</tbody>
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**EU28**: EUROPE 2015 CY FLEET REQUIREMENT

**China**: PHASE DOWN TO 5.0 L/100 KM

**US**: EPA, NHTSA, CARB REGS: 4% TO 5% PER YEAR

**Brazil**: INOVAR TARGET: 133 G/KM WITHOUT DIESEL FLEET
TECHNOLOGY PORTFOLIO
A MIX OF TECHNOLOGIES WILL BE REQUIRED

MIX WILL VARY BY MARKET

REDUCTION IN CO$_2$ VS. TRADITIONAL ICE POWERTRAIN

HIGH VOLTAGE ELECTRIFICATION

DOWN-SIZED TURBO ENGINES
DIESELS
MILD HYBRID (mHEV)
HYBRID (HEV)
PLUG-IN HYBRID (PHEV)
BATTERY ELECTRIC (BEV)
ELECTRIC PROPULSION DEVICE TERMS
FIVE ELECTRIC MOTOR APPLICATIONS

ELECTRIC MOTOR LINKED DIRECTLY TO THE PRIMARY INPUT SHAFT OF THE TRANSMISSION WHICH CAN BE DECOUPLED FROM THE TRANSMISSION

ELECTRIC MOTOR CAN REPLACE TODAY’S MECHANICAL DRIVEN AXLE; IT CAN PROVIDE FULL ELECTRIC DRIVE OR AUGMENT AN ICE ENGINE

BELT DRIVEN ELECTRIC MOTOR INTEGRATED INTO THE ENGINE’S ACCESSORY DRIVE SYSTEM

ELECTRIC MOTOR CONNECTED TO THE ENGINE CRANKSHAFT

ELECTRIC MOTOR LINKED DIRECTLY TO THE OUTPUT SHAFT OF THE TRANSMISSION MOUNTED TO THE REAR OF THE TRANSMISSION – TYPICALLY DEPLOYED WITH A P2 MOTOR
### ELECTRIFICATION SYSTEM DEPLOYMENT

The EV systems are deployed across global vehicle architectures.

<table>
<thead>
<tr>
<th>EV SYSTEMS</th>
<th>SMALL</th>
<th>COMPACT/MID</th>
<th>LARGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>mHEV (3)</td>
<td>P1F 12V BSG FWD</td>
<td>P1F 48V BSG RWD/4WD</td>
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<tr>
<td>P1F 48V BSG RWD/4WD</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>HEV (1)</td>
<td>P2 48V FWD/RWD</td>
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<tr>
<td>P1P2 RWD/4WD</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>PHEV (4)</td>
<td></td>
<td>P1P4 AWD</td>
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<td>P1P2 RWD/4WD</td>
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<tr>
<td></td>
<td>P2P3 FWD</td>
<td></td>
<td></td>
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<tr>
<td>BEV (4)</td>
<td>P4 CITY CAR</td>
<td></td>
<td></td>
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<tr>
<td>P4 MAINSTREAM FWD/AWD</td>
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<td></td>
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<tr>
<td></td>
<td>P4 PERFORMANCE</td>
<td></td>
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<td>P4 PREMIUM</td>
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</table>

FWD – FRONT WHEEL DRIVE  RWD – REAR WHEEL DRIVE  AWD – ALL WHEEL DRIVE  4WD – FOUR WHEEL DRIVE
FCA ELECTRIFICATION
THE EV SYSTEMS ENHANCE CORE ATTRIBUTES FOR FCA BRANDS

IMPROVED FUEL ECONOMY
ACCELERATION
LOW SPEED TORQUE

Jeep
EMEA REGION CO₂ – 2022
EU28 – MOST CHALLENGING REGULATORY/CONSUMER ENVIRONMENT

REGULATIONS
- STEP FUNCTION SHIFT IN 2020
- METRO AREAS IMPLEMENTING LOW/ZERO EMISSION ZONES
- FINE AMOUNTS FOR NOT ACHIEVING CO₂ TARGETS ARE SIGNIFICANT

CONSUMERS
- CONTINUED NEED FOR LOW COST OF OWNERSHIP
- ELECTRIFICATION REPLACES DECREASING DIESEL DEMAND
- ACCESS TO CHARGING STATIONS NEEDS DEVELOPMENT

TECHNOLOGY IMPLEMENTATION RATE IN EU28

<table>
<thead>
<tr>
<th>Non-Electrified</th>
<th>mHEV</th>
<th>High Voltage Electrification</th>
</tr>
</thead>
<tbody>
<tr>
<td>40%</td>
<td>40%</td>
<td>20%</td>
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</tbody>
</table>
APAC REGION CO₂ – 2022
CHINA – DRIVING TOWARDS GLOBAL ELECTRIFICATION LEADERSHIP

REGULATIONS
MANDATING NEW ENERGY VEHICLES (NEV)
NEVs = BEV, PHEV AND FUEL CELL VEHICLES
CREDIT MULTIPLIERS AND INCENTIVES FAVOR BEVs
NEV LICENSE PLATE INCENTIVES ARE SIGNIFICANT

CONSUMERS
EMERGING CONSUMERS/1ST TIME BUYERS – NEW TO MARKET
DESIRE FOR PERSONAL SPACE AND ADVANCED TECHNOLOGY
URBAN LIVING, RELIANCE ON ACCESS TO PUBLIC CHARGING

TECHNOLOGY IMPLEMENTATION RATE IN CHINA

<table>
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<tr>
<th>Category</th>
<th>Percentage</th>
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<td>Non-Electrified</td>
<td>65%</td>
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<tr>
<td>mHEV</td>
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<tr>
<td>High Voltage Electrification</td>
<td>15%</td>
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NAFTA REGION CO₂ – 2022

US – REGULATION UNCERTAINTY WITH MID-TERM EVALUATION

REGULATIONS
COMPLEX BUT UNDER GOVERNMENT REVIEW
3 REGULATIONS – EPA CO₂, NHTSA CAFE, CARB ZEV
FLEXIBLE REGULATORY STRUCTURE
PLUG-IN TAX CREDIT AVAILABLE FOR FIRST 200K VEHICLES

CONSUMERS
RELATIVELY LOW FUEL PRICES
DEMAND FOR SUVs AND TRUCKS INCREASING
LONGER COMMUTES AND TRIPS FAVOR PHEVs
LOW TAKE RATE ON VEHICLES WITH HIGH VOLTAGE ELECTRIFICATION IN 2017

TECHNOLOGY IMPLEMENTATION RATE IN US

NON-ELECTRIFIED 65%
mHEV 15%
HIGH VOLTAGE ELECTRIFICATION 20%
LATAM REGION CO$_2$ – 2022
BRAZIL – CO$_2$ LEVELS ON PAR WORLDWIDE VIA SUGAR CANE ETHANOL USE

REGULATIONS
30% OF VEHICLE FUEL USAGE IS SUGAR CANE ETHANOL
SUGAR CANE ETHANOL FUEL IS 80% RENEWABLE
PROPOSED NEXT PHASE CREDITS ETHANOL FOR ITS WELL TO WHEEL BENEFITS

CONSUMERS
ETHANOL FUEL READILY AVAILABLE
VERY PRICE SENSITIVE ON VEHICLE PURCHASES
MOSTLY URBAN DRIVING
PHEV AND BEV FOR EMERGING ADOPTERS

TECHNOLOGY IMPLEMENTATION RATE IN BRAZIL

NON-ELECTRIFIED AND ETHANOL BASED 99%

HIGH VOLTAGE ELECTRIFICATION <1%
CO₂ REDUCTION TECHNOLOGY CADENCE
OVER 30 NAMEPLATES TO UTILIZE ONE OR MORE OF THESE EV SYSTEMS BY 2022

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<th>FIRST APPLICATION SHOWN</th>
<th>NAMEPLATES</th>
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<tr>
<td>mHEV</td>
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<td>2017</td>
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NOTE: MULTIPLE EV SYSTEMS CAN BE DEPLOYED ON ONE NAMEPLATE.
PROVEN COMPETENCY IN DEVELOPING EV TECHNOLOGY

LEVERAGING SYNERGIES AND VOLUME EFFICIENCIES ACROSS A GLOBAL INDUSTRIAL FOOTPRINT

EV SYSTEMS DEPLOYED TO UNIQUELY ENHANCE THE CORE ATTRIBUTES OF FCA’S POWERFUL BRANDS

PORTFOLIO OF EV TECHNOLOGIES WILL BE LAUNCHED TO ENSURE COMPLIANCE IN EACH REGION