



CO₂ REGULATORY COMPLIANCE

MARK CHERNOBY | CHIEF TECHNICAL COMPLIANCE OFFICER

CATEGORICAL IMPERATIVE OF AUTOMOTIVE INDUSTRY

WE UNDERSTAND WE ARE PART OF THE PROCESS



BOTH INDUSTRY AND GOVERNMENT HAVE A ROLE

INDUSTRY

TECHNOLOGY TO REDUCE CO₂ EMISSIONS

MIX OF TECHNOLOGIES TO COMPLY ACROSS DIVERSE SET OF REGULATIONS

APPLY MIX TO COMPLY IN AN ECONOMICALLY SENSIBLE MANNER

EV TECHNOLOGY



mHEV



HEV



PHEV



BEV

GOVERNMENT

ESTABLISH A REGULATORY FRAMEWORK

SUPPORT DEPLOYMENT OF INFRASTRUCTURE

HELP DRIVE CONSUMER DEMAND

REGULATION



COMPLIANCE
FRAMEWORK



TRANSPARENCY



RULES



PROCEDURE

CHRYSLER PACIFICA eHYBRID

A TYPICAL DAY IN THE LIFE OF A MINIVAN DRIVER



DAILY DRIVE



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"

edmunds

"IT'S JUST A FLAWLESS EXECUTION, AND AN EXAMPLE OF HOW BRIGHT OUR ELECTRIFIED AUTOMOTIVE FUTURE CAN BE"

AUTOWEEK

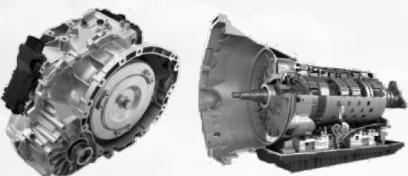


CO₂ REDUCTION TECHNOLOGIES

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



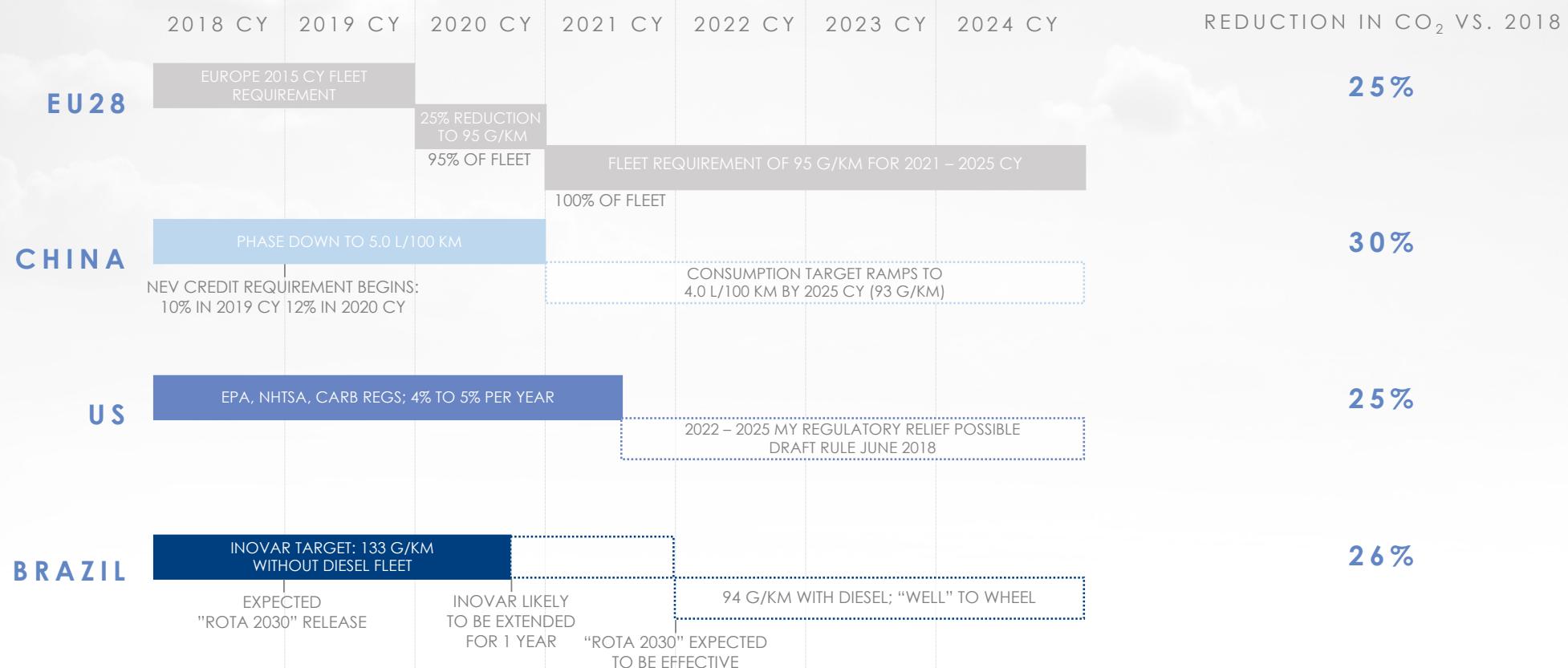
TIRE ROLLING RESISTANCE

REGULATORY ENVIRONMENT AT A GLANCE

FOUR PRIMARY MARKETS



TEST CYCLES/CALCULATIONS VARY, BUT YIELD SIMILAR OBJECTIVES



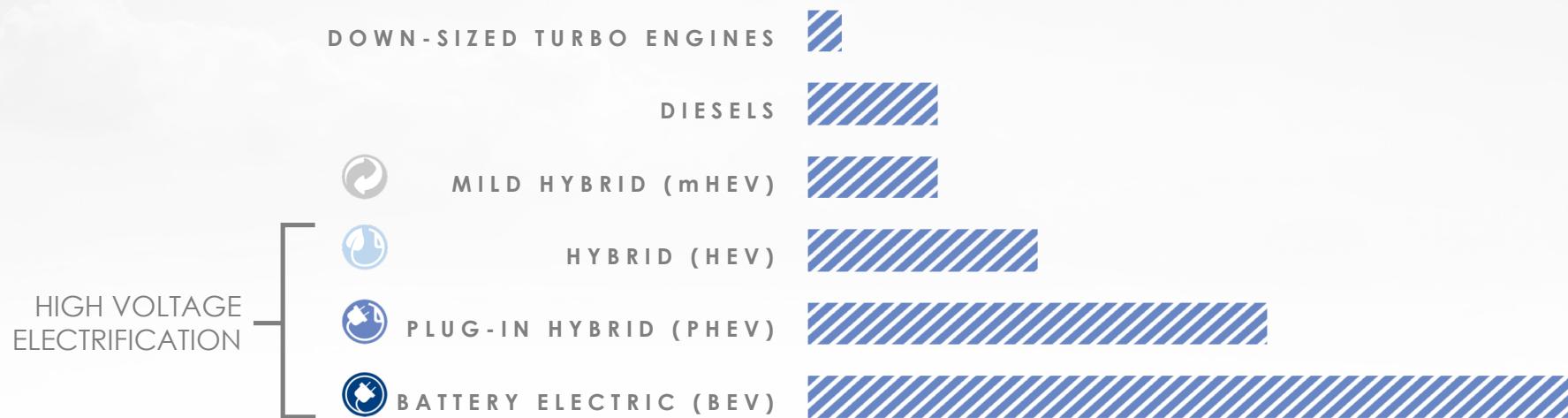
TECHNOLOGY PORTFOLIO

A MIX OF TECHNOLOGIES WILL BE REQUIRED



MIX WILL VARY BY MARKET

REDUCTION IN CO₂ VS. TRADITIONAL ICE POWERTRAIN



ELECTRIC PROPULSION DEVICE TERMS

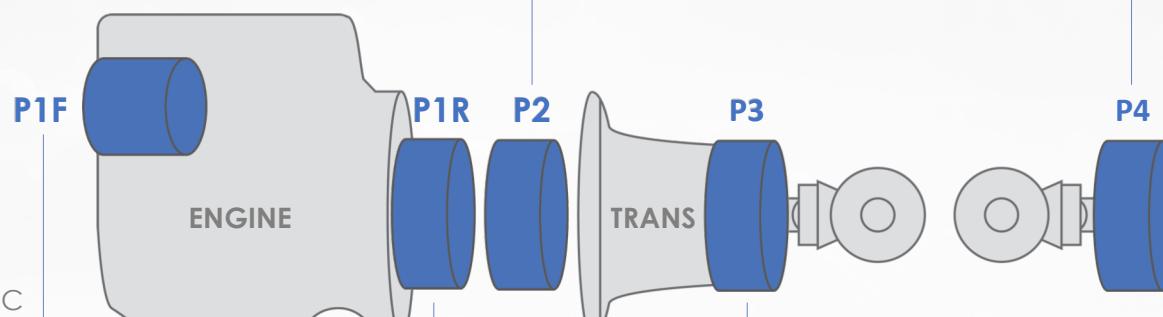
FIVE ELECTRIC MOTOR APPLICATIONS



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

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



EV SYSTEMS	SMALL	COMPACT/MID	LARGE
mHEV (3)	P1F 12V BSG FWD P2 48V FWD/RWD		P1F 48V BSG RWD/4WD
HEV (1)			P1P2 RWD/4WD
PHEV (4)		P1P4 AWD P2P4 PERFORMANCE	P1P2 RWD/4WD P2P3 FWD
BEV (4)	P4 CITY CAR	P4 MAINSTREAM FWD/AWD P4 PERFORMANCE	P4 PREMIUM

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



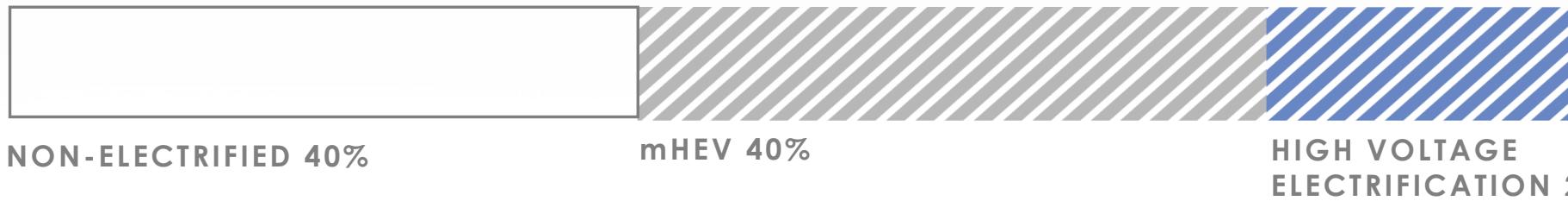
CONSUMERS

CONTINUED NEED FOR LOW
COST OF OWNERSHIP

ELECTRIFICATION REPLACES
DECREASING DIESEL DEMAND

ACCESS TO CHARGING STATIONS
NEEDS DEVELOPMENT

TECHNOLOGY IMPLEMENTATION RATE IN EU28



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



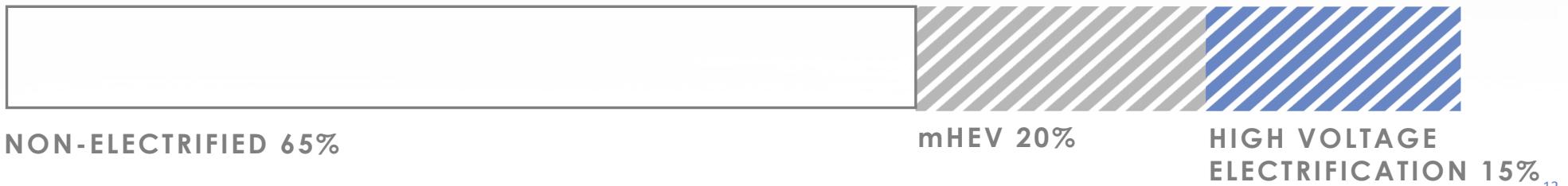
CONSUMERS

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



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 CO₂ – 2022

BRAZIL – CO₂ 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



CAPITAL MARKETS DAY
BALOCCO - JUNE 1, 2018

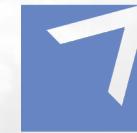
EV SYSTEMS

		2017	2018	2019	2020	2021	2022	
mHEV	P1F 12V BSG FWD P2 48V FWD/RWD P1F 48V BSG RWD/4WD				500			3
HEV	P1P2 RWD/4WD			1500		RENEGADE		11
PHEV	P1P2 RWD/4WD P2P3 FWD P1P4 AWD P2P4 PERFORMANCE		PACIFICA			GRAND CHEROKEE		2
BEV	P4 CITY CAR P4 MAINSTREAM FWD/AWD P4 PERFORMANCE P4 PREMIUM				500e			14
					GRAND COMMANDER			2
					ALFIERI			6
					QUATTROPORTE			3
								2
								4
								2
								2

NOTE: MULTIPLE EV SYSTEMS CAN BE DEPLOYED ON ONE NAMEPLATE

FCA AND CO₂ REDUCTION

PREPARING FOR A RANGE OF POTENTIAL FUTURES



FCA
CAPITAL MARKETS DAY
BALOCCO - JUNE 1, 2018

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