

# OPEL Ampera - Drive The Future - Now !



# Application Map

FCEV



High load



E-REV

Stop-and-go (city)



BEV

Duty cycle

Drive cycle

Continuous (highway)



Light load



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# E-REV as a New Propulsion Category

**PHEV**

Plug-in Hybrid Electric Vehicle  
Limited Performance in EV-Mode

**BEV**

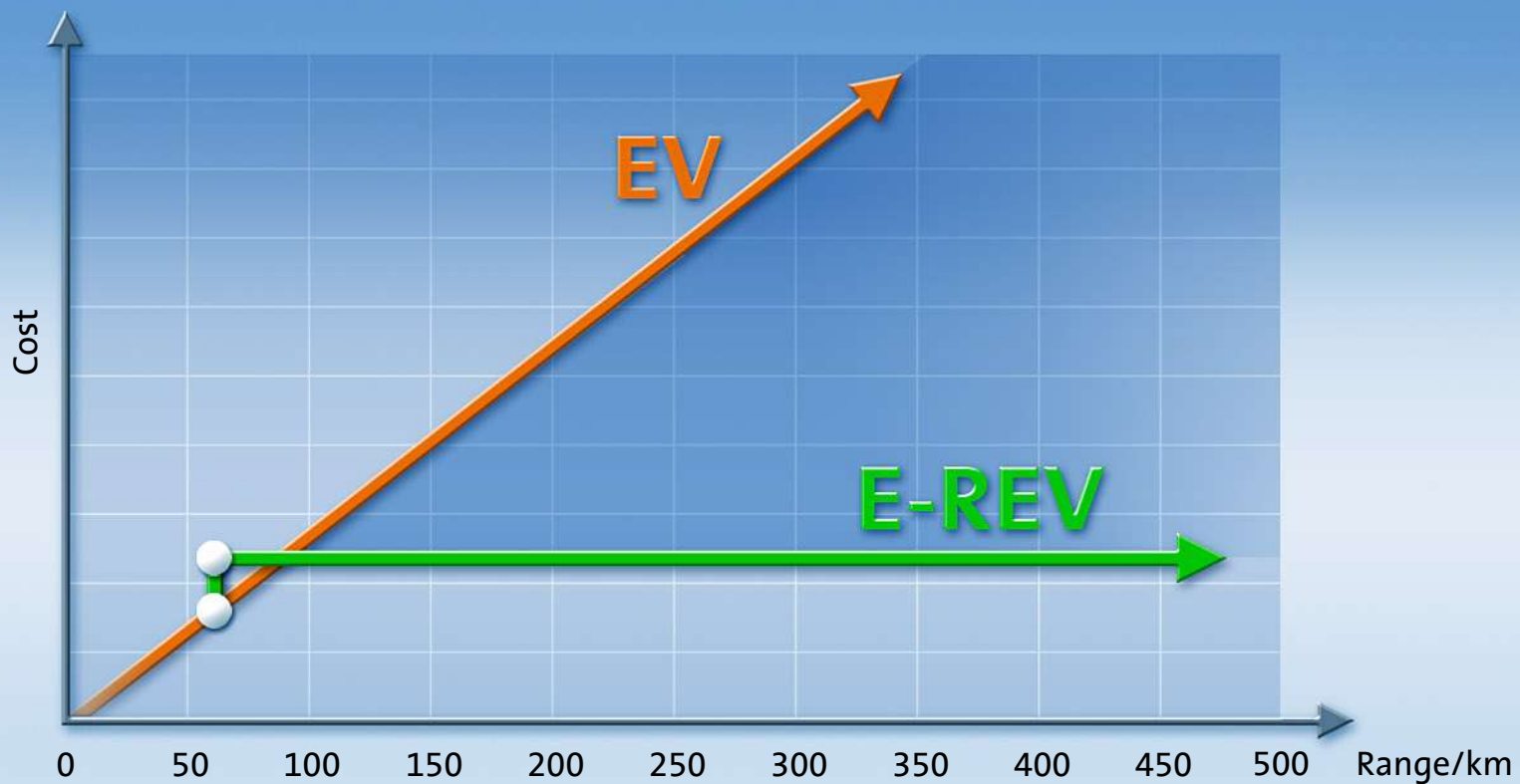
Battery Electric Vehicle  
Limited Range

**E-REV**

Extended-Range Electric Vehicle  
Full Performance in EV-Mode

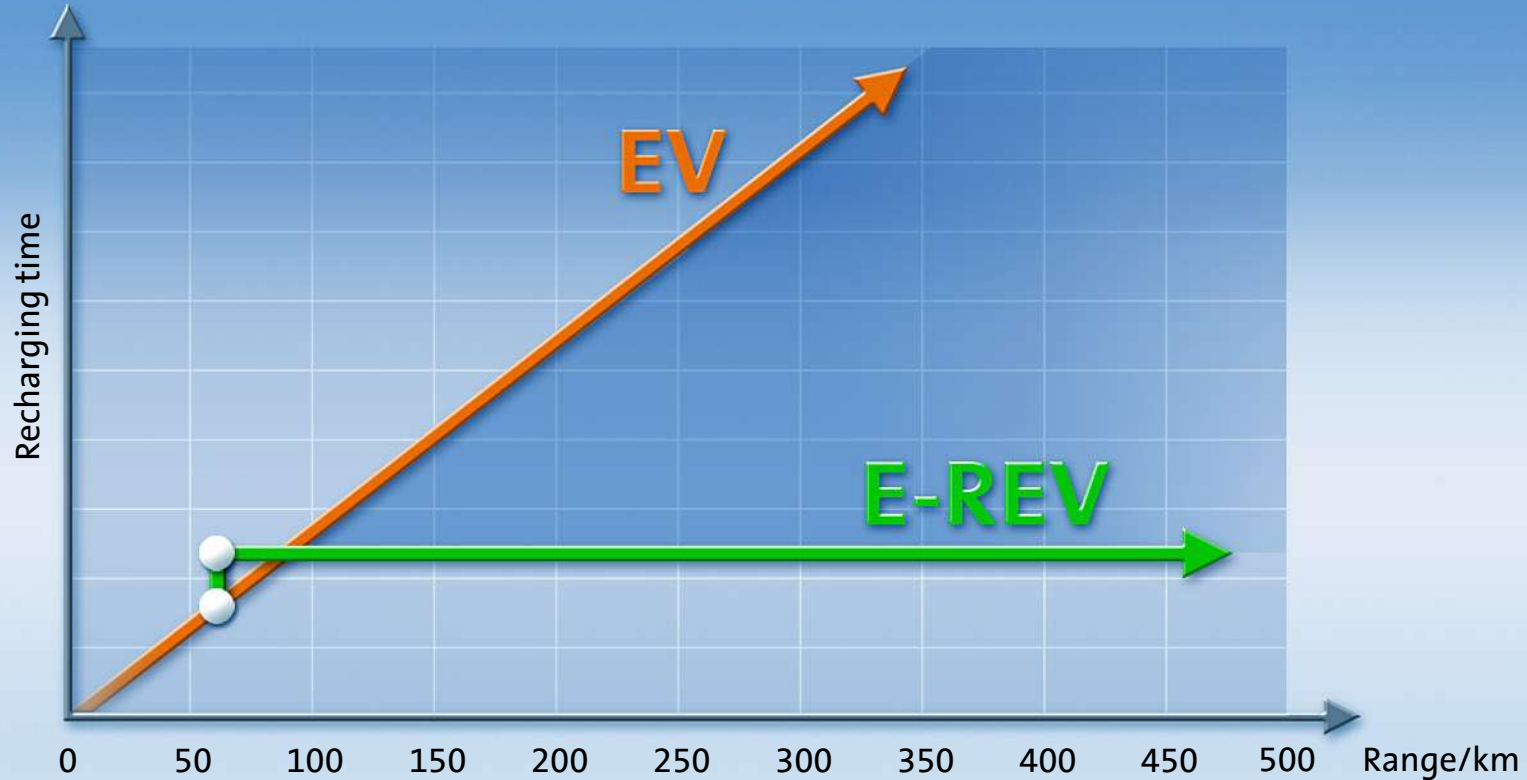


# Range and Cost





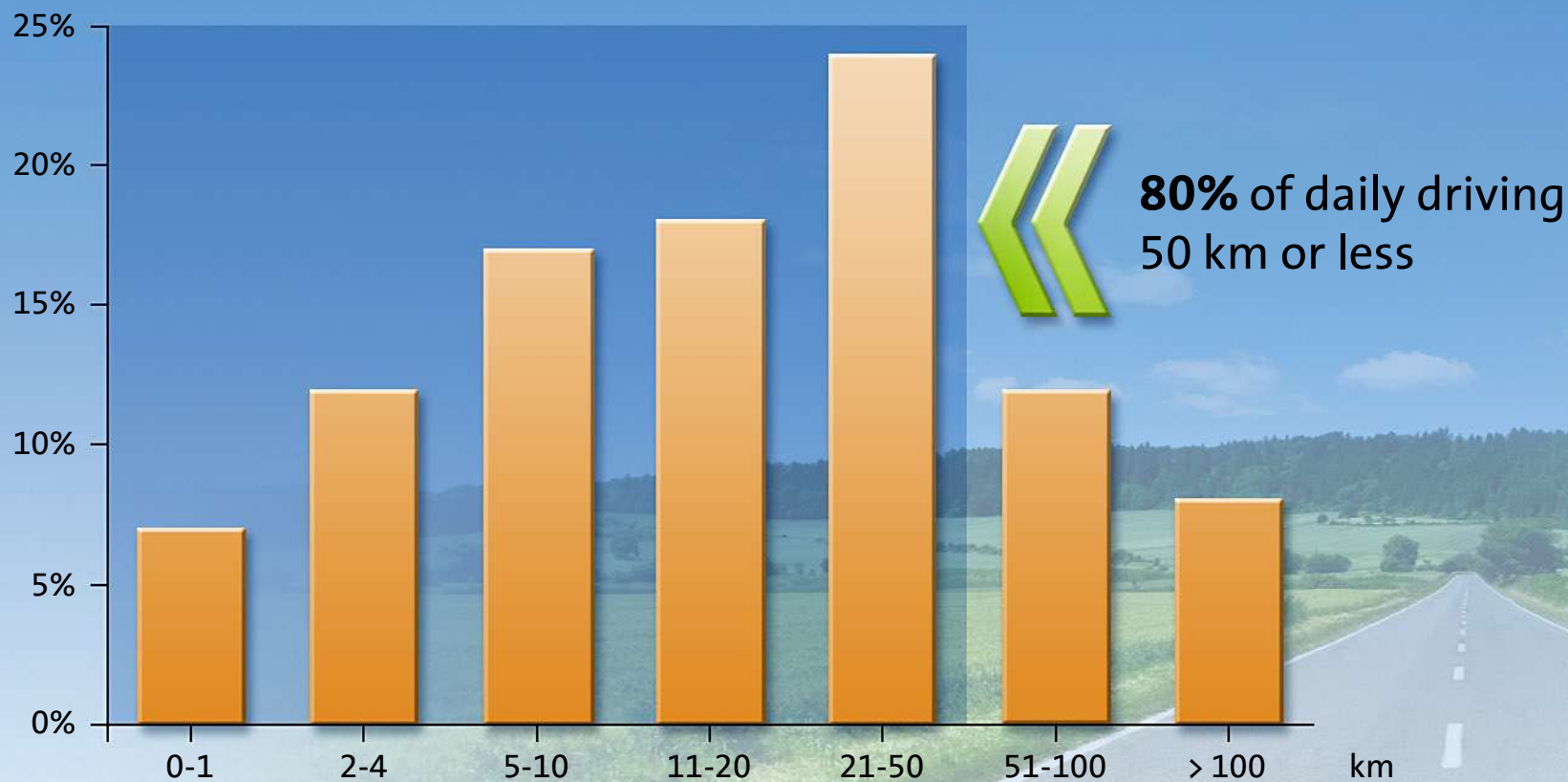
# Range and Recharging Time



➔ The same is valid for mass and volume



# Typical Daily Mileage



Source: Mobilität in Deutschland, 2002

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# Opel Ampera

## A Fully Capable Electric Vehicle

**40–80 km**

Battery-electric driving



**Full usability:**

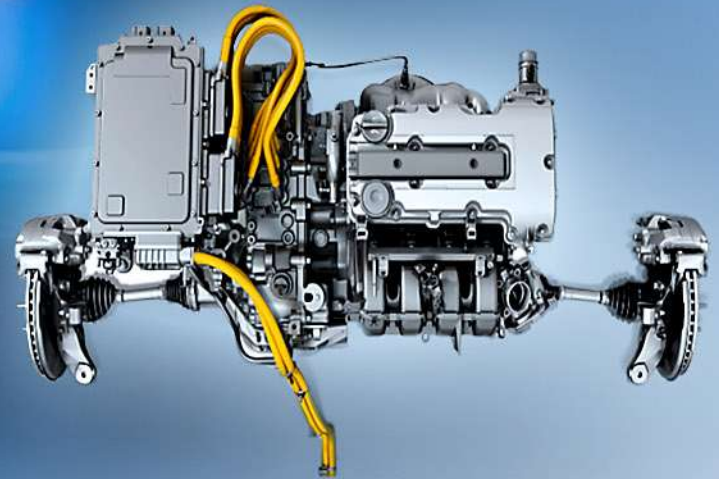
Performance and refueling  
like conventional vehicles



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# Ampera Electric Drive System



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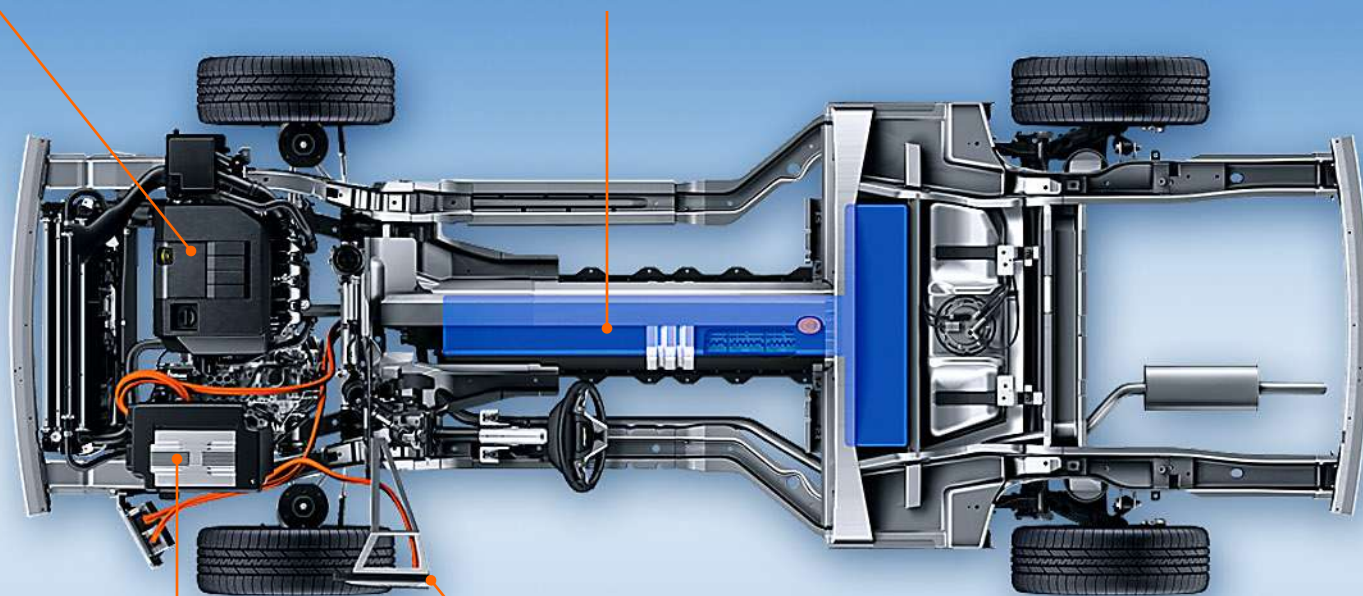




# Opel Ampera Propulsion System

Engine generator

Lithium-ion battery



Electric drive unit

Charge port

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# Opel Ampera Battery

- Li-ion technology
- Pouch cells
- Liquid cooling
- 360 V nominal voltage
- 180 kg system weight

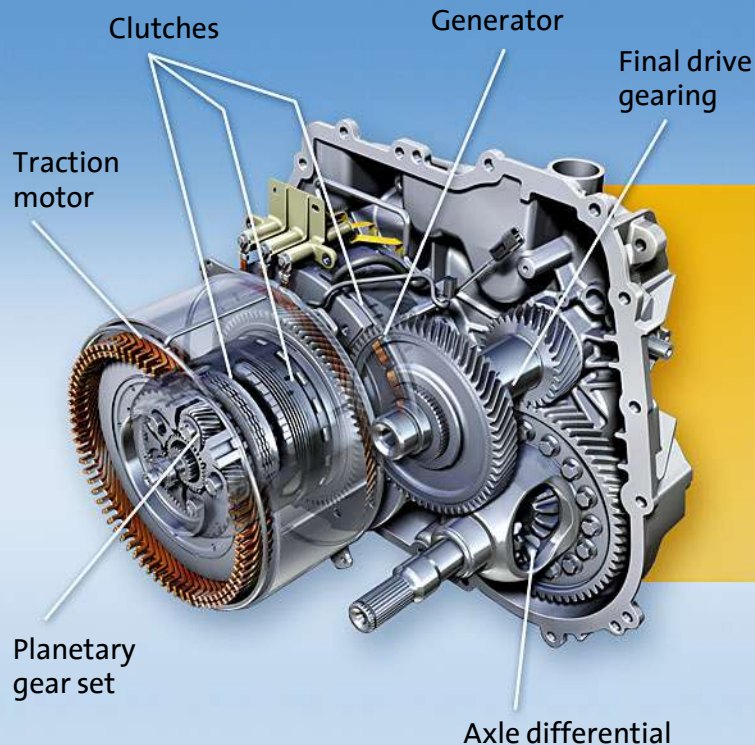


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# Opel Ampera Drive System

## On-axis electric drive



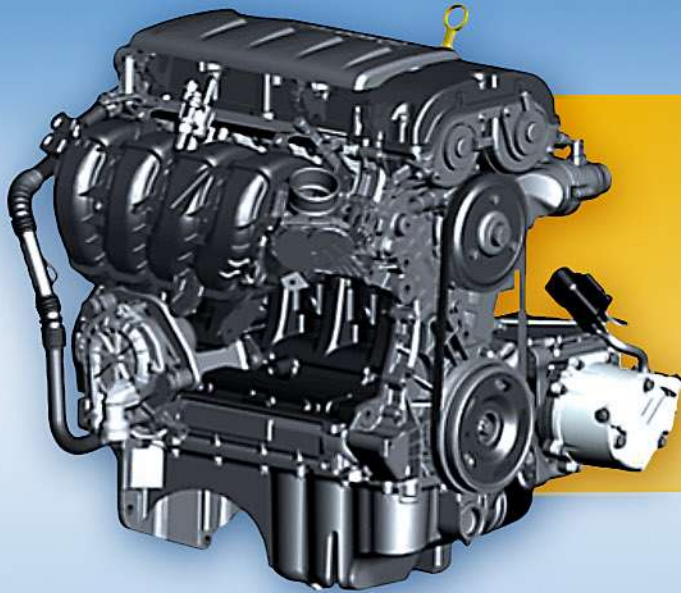
- Two electric motors  
Traction: 111 kW, 370 Nm  
Generator: 54 kW
- One planetary gear
- Geared final drive
- Three clutches





# Opel Ampera Drive System

## 1.4L DOHC I-4 engine



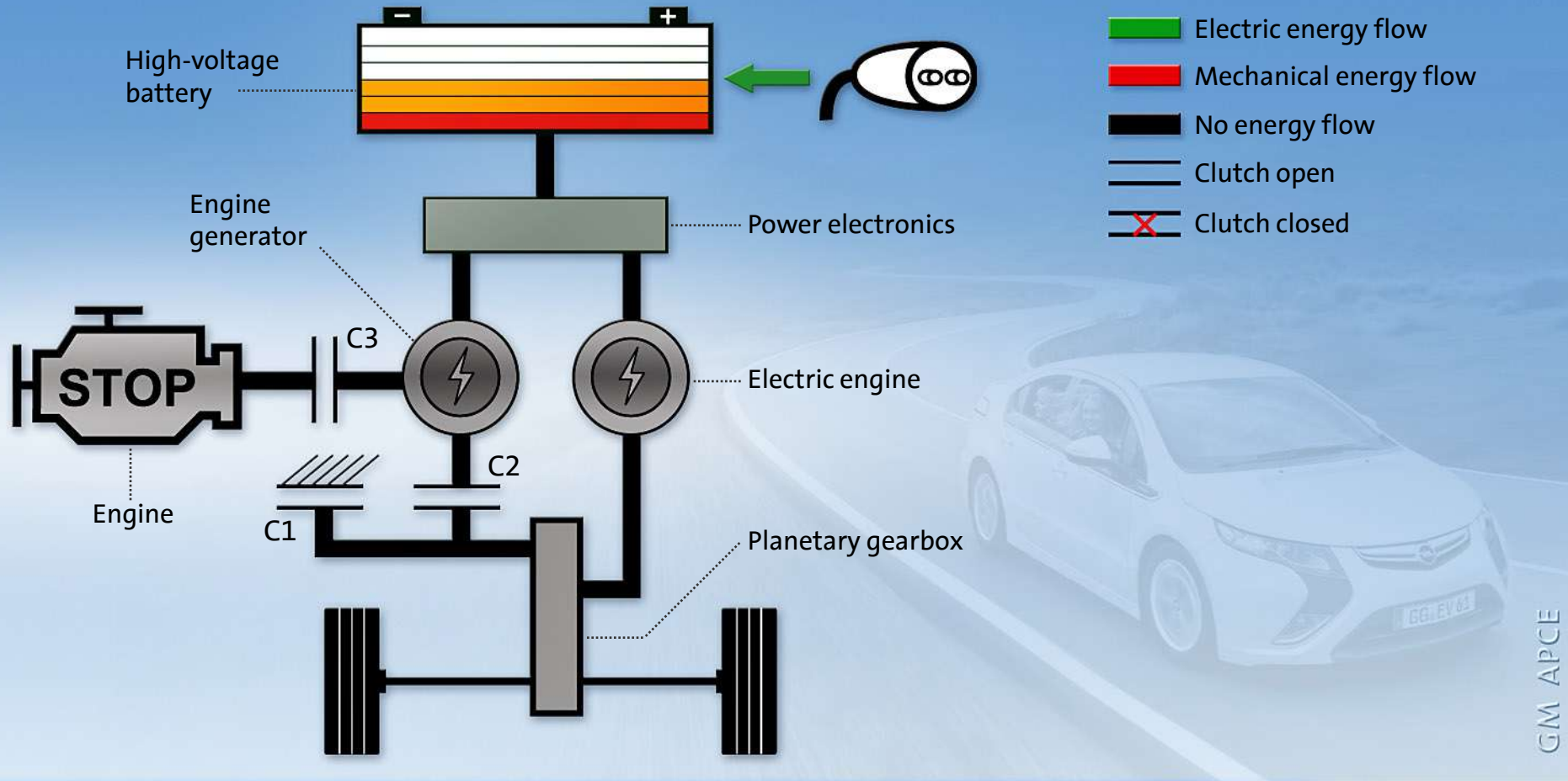
- Power: 63 kW @ 4800 rpm
- Max. engine speed: 4800 rpm
- Displacement: 1.4 L
- Compression ratio: 10.5 : 1





# Ampera Electric Drive System

## Charging



# Opel Ampera Electric Drive System

## Four different operating modes:

- **Electric driving**
  - low speed (1-motor)
- **Electric driving**
  - high speed (2-motor)
- **Extended-range driving**
  - low speed (1-motor series)
- **Extended-range driving**
  - high speed (2-motor combined)

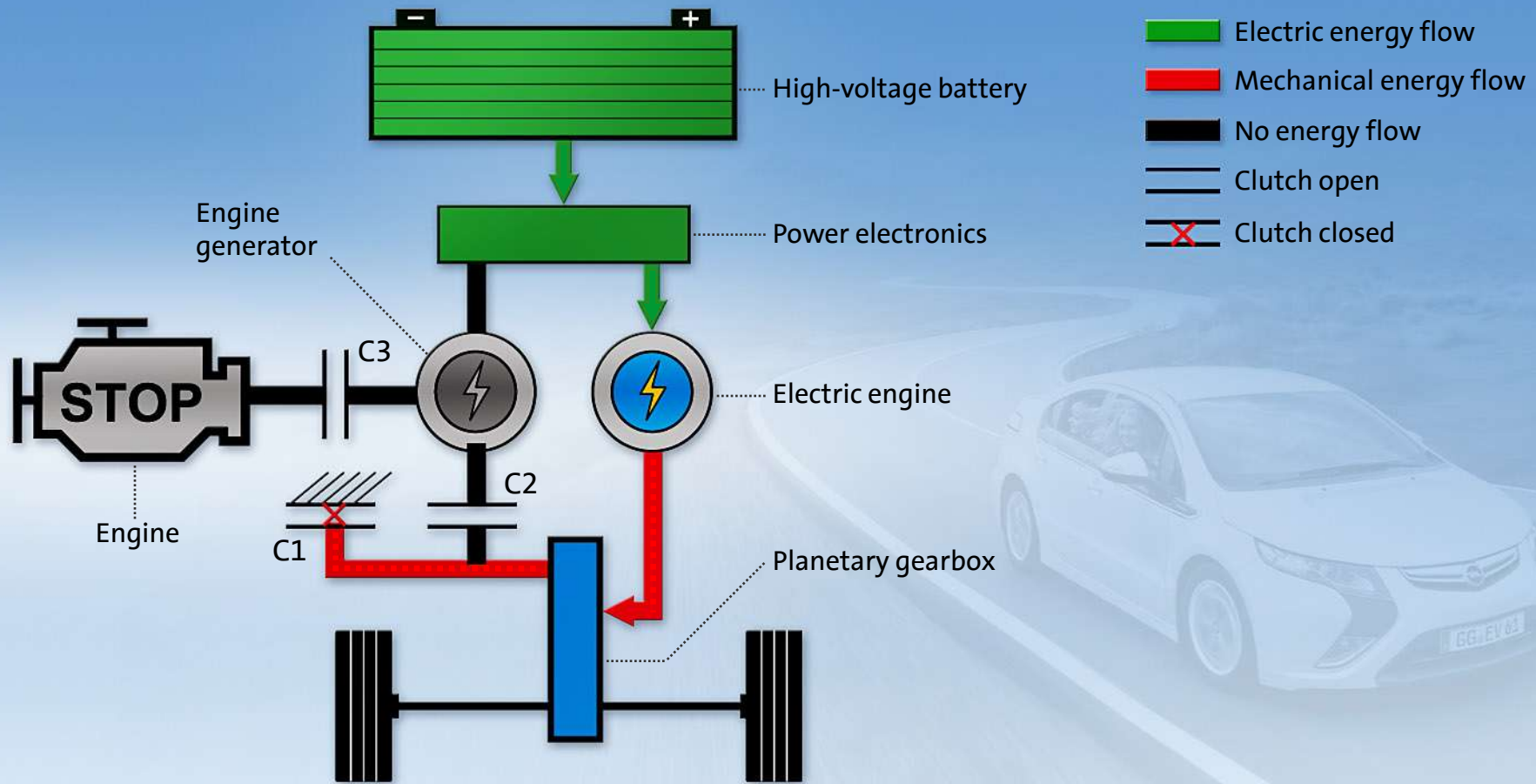
## Operation strategy:

- Maximum battery-electric range (electric driving)
- Maximum efficiency



# Ampera Electric Drive System

## Electric Driving (Low Speed)

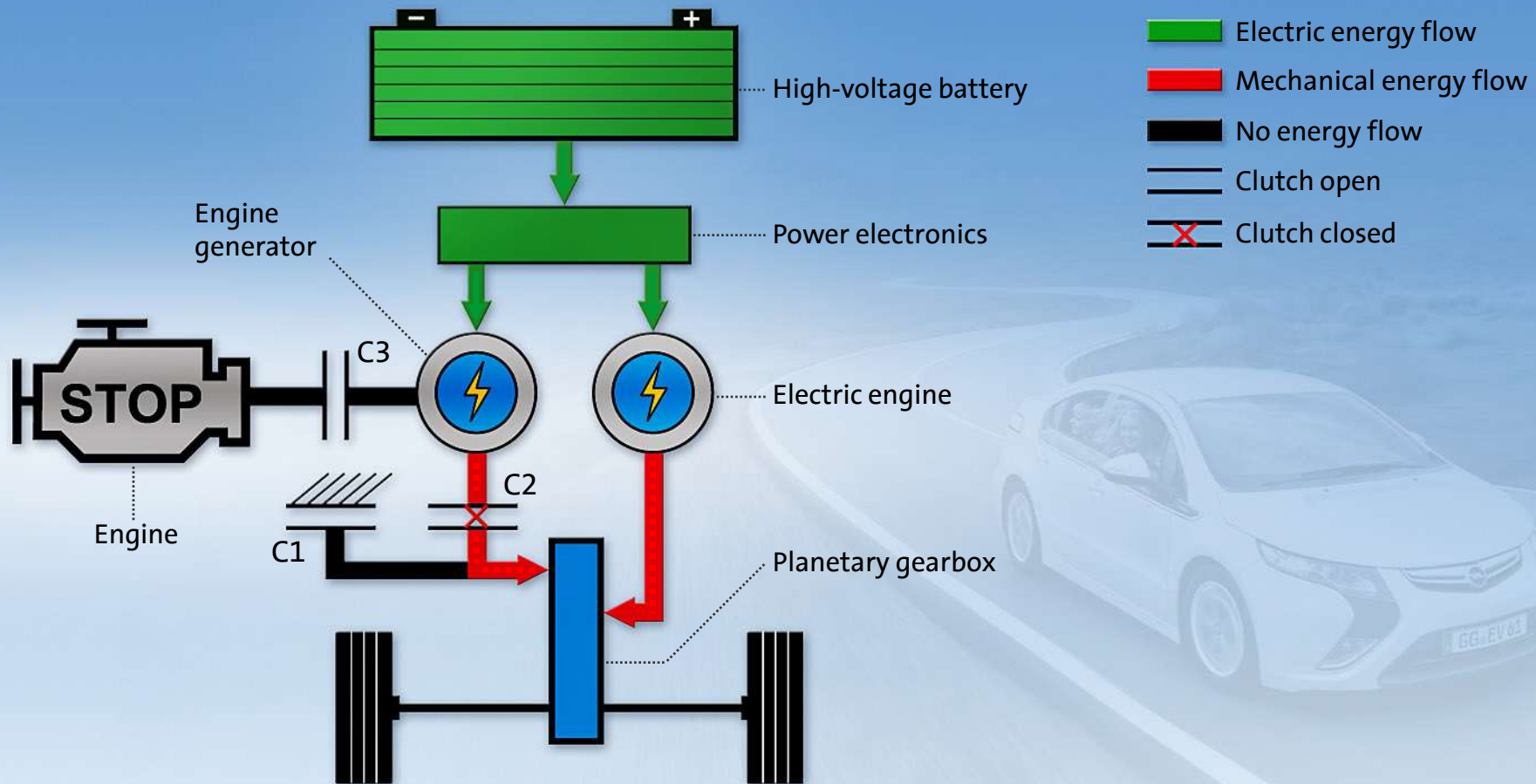


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# Ampera Electric Drive System

## Electric Driving (High Speed)



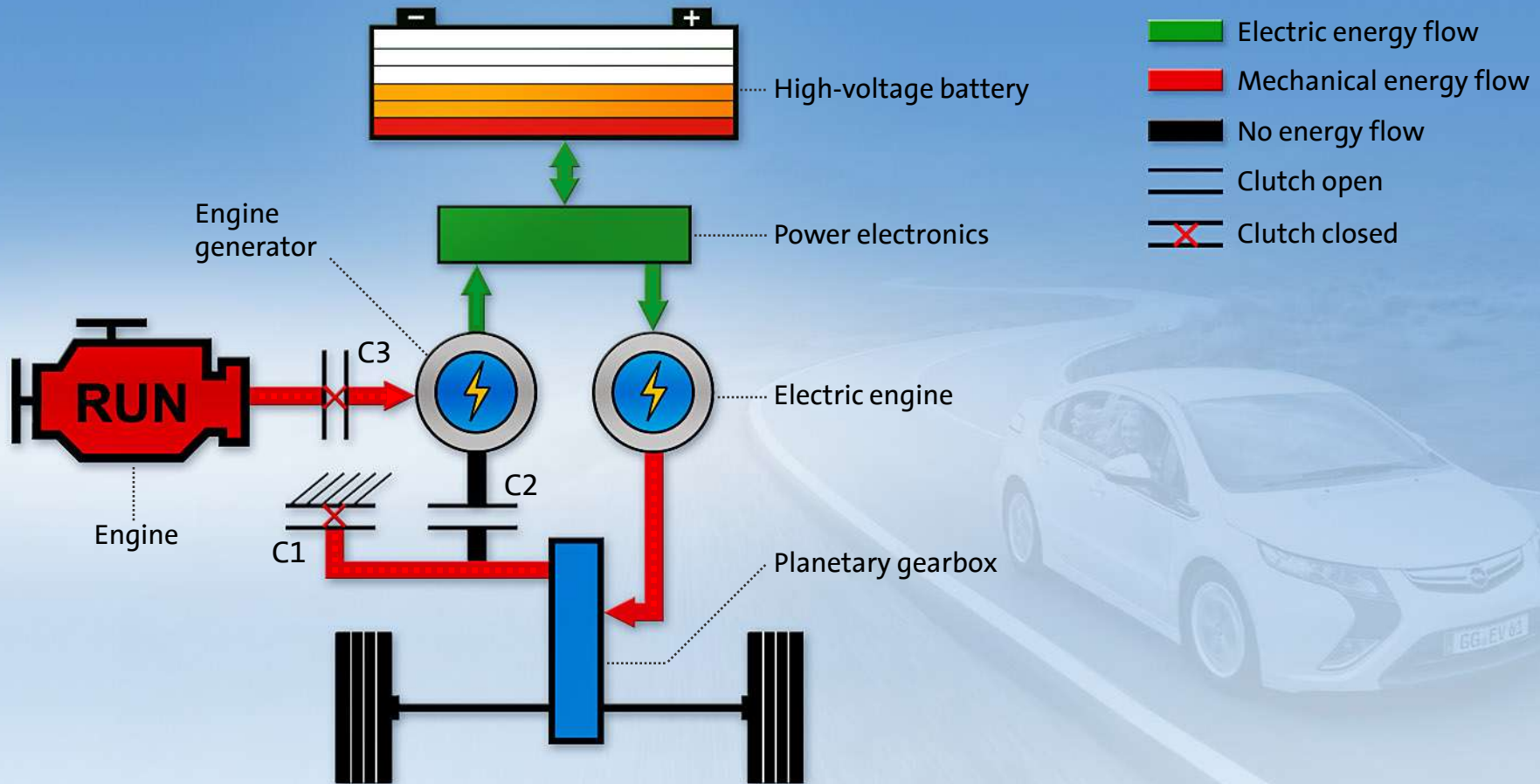
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# Ampera Electric Drive System

## Extended-Range Driving (Low Speed)

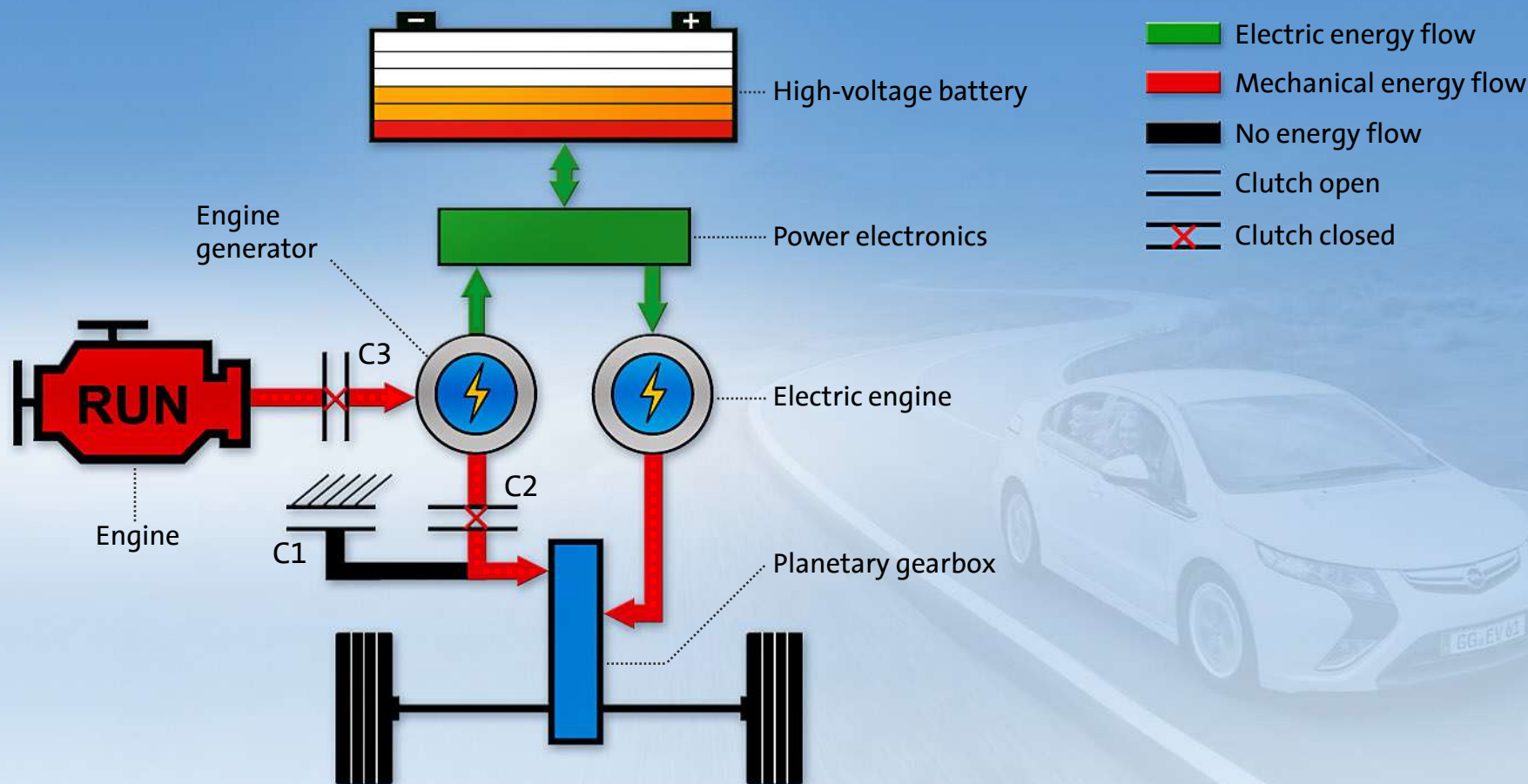


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# Ampera Electric Drive System

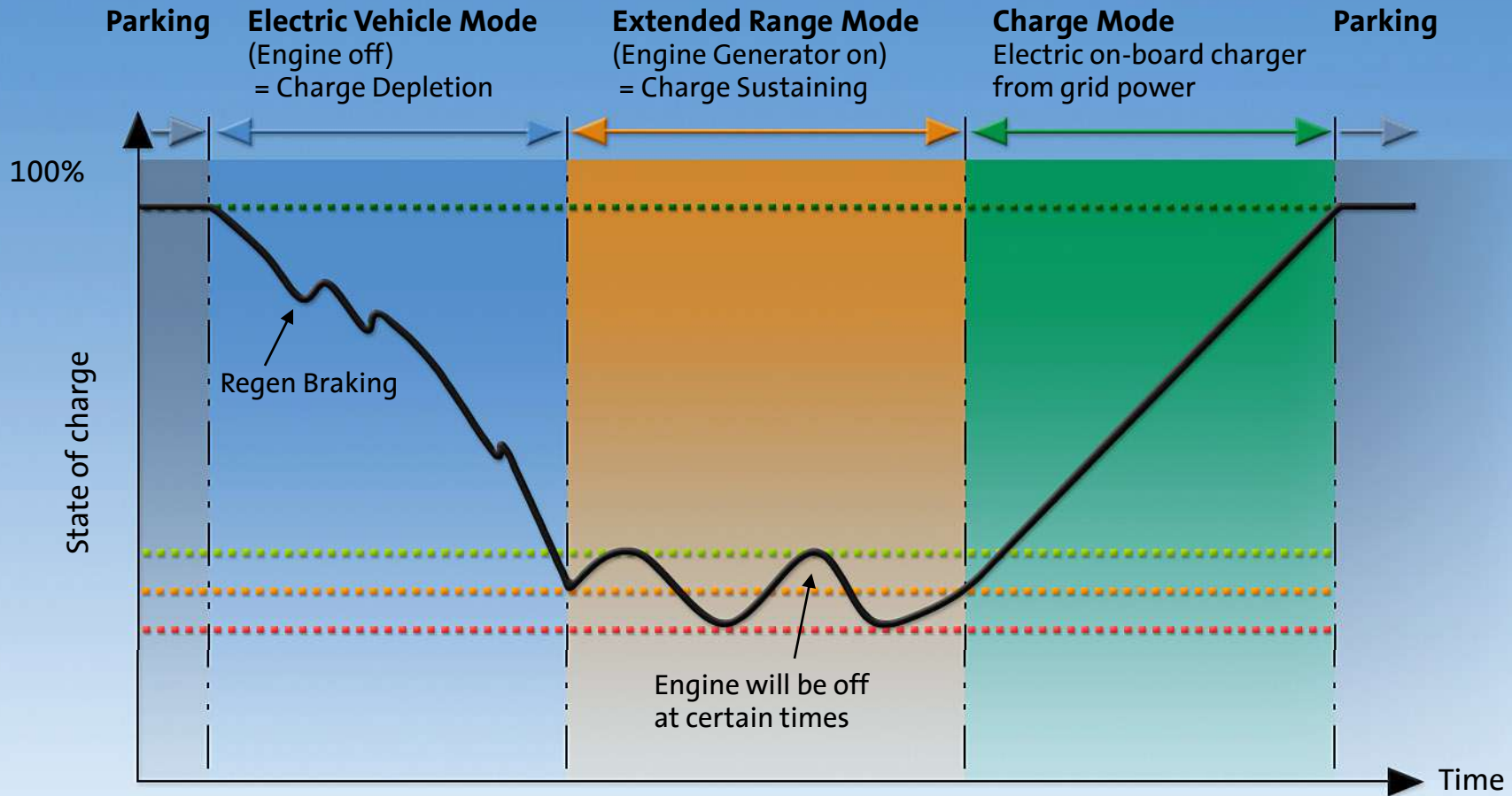
## Extended-Range Driving (High Speed)



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# Battery Operation Modes



# Important: Independence from Specific Infrastructure Solutions

- Recharging of Ampera possible at European power outlet (standard household installation)
- Recharging at home or workplace
  - ➔ Will account for more than 85% of all charging events in the future

230 V

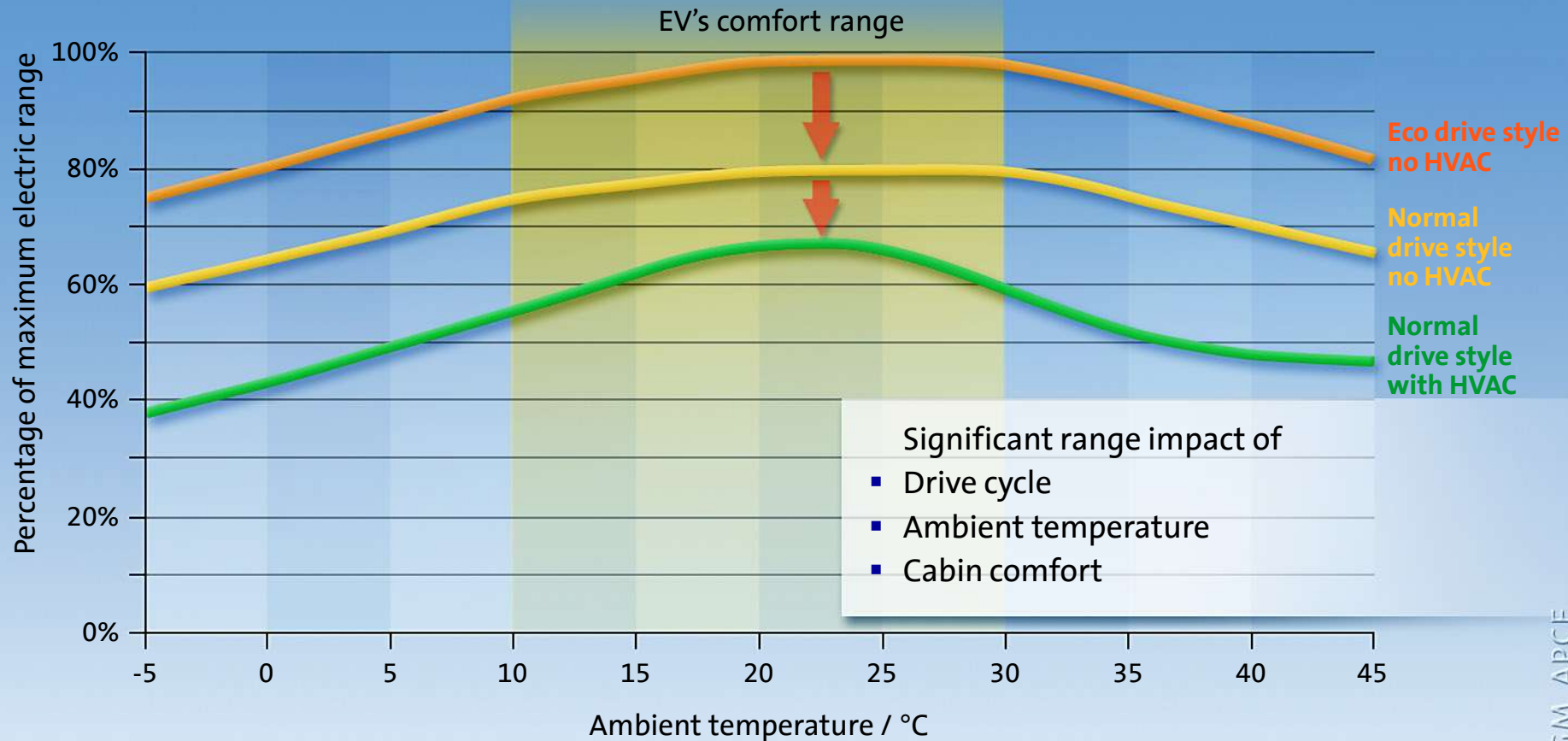




# Reliability in Daily Use



# EV Range: A “Reliable Uncertainty”





# Opel Ampera

## A Fully Capable Electric Vehicle

- Battery not greater than necessary → 4-seater + trunk → primary vehicle
- Opel as first German manufacturer of volume production electric vehicle
- Start of sales: End of 2011



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# Spirited Gas-Free Performance

- 111 kW of power
- 370 Nm of torque
- 160 km/h top speed
- 0-100 km/h in about 9 seconds

Breaking the paradigm ...  
Now **GREEN**  
and **FUN TO DRIVE**  
can go together





# Opel Ampera

## A Real Volume Product – Not a Demo Vehicle



# Opel Ampera – Making EVs Relevant

- Large volume production solution
- Capable of being first and only vehicle
- Independent of public charging infrastructure
- Predictable performance
- Fun-to-drive
- Affordable
- Safe



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