



TOYOTA HYBRID EXCELLENCE

NOVEMBRIS 2023, RVT





WHY HYBRID?



TOYOTA GLOBAL VISION

VIENMĒR LABĀKAIS VEIDS/CEĻŠ/RISINĀJUMS

“Toyota rādīs ceļu uz mobilitātes nākotni, bagātinot dzīvi visā pasaulē ar visdrošākajiem un atbildīgākajiem cilvēku pārvietošanas veidiem.”



TOYOTA: ELEKTRIFIKĀCIJAS EKSPERTS

WE LAUNCHED ELECTRIFIED VEHICLES DECADES BEFORE COMPETITORS



24

gadu pieredze
hibrīda jomā



20

miljons hibrīdu
pārdoti visā
pasaulē



44

Toyota un Lexus
Hybrid modeļi visā
pasaulē



120

million tons
of CO₂ saved



TOYOTA VIDES IZAICINĀJUMS 2050

6 DROSMĪGI IZAICINĀJUMI ILGTSPĒJĪGAI SABIEDRĪBAI

CHALLENGE 1

Reduce the average CO₂ emissions of new vehicles by 90% vs. 2010 levels.



2030

At least 35% CO₂ emissions reduction compared to 2010

CHALLENGE 2

Eliminate CO₂ emissions at every stage of the vehicle's life cycle.



2030

At least 25% CO₂ emissions reduction compared to 2013

CHALLENGE 3

Eliminate CO₂ emissions from production plants in the operating cycle



2030

35% CO₂ emissions reduction from global plants compared to 2013

CHALLENGE 4

Reduce the quantity of water used in vehicle production plants



2030

Full assessment of water quality at 22 plants around the world

CHALLENGE 5

Contribute to the creation of a recycling-based society



2030

At least 25% CO₂ emissions reduction compared to 2013

CHALLENGE 6

Contribute to the creation of a society in harmony with nature



2030

35% CO₂ emissions reduction from global plants compared to 2013





TOYOTA ELEKTRIFIKĀCIJAS STRATĒGIJA



ILGTSPĒJĪGAS MOBILITĀTES VĪZIJA

HIBRĪDS PAMATĀ

Dažādām elektrificētām tehnoloģijām un degvielām būs nozīme ilgtspējīgas mobilitātes nodrošināšanā.

Toyota Hybrid Electric arhitektūra būs galvenā.

Visus elektrifikācijas veidus (BEV, PHEV un FCEV) var atvasināt no Toyota hibrīda sistēmas pamata arhitektūras.

FULL HYBRID AS A TECHNOLOGY BENCHMARK

Energy
diversification

CO₂
reduction

Air
quality

HYBRID ELECTRIC TECHNOLOGY

Gasoline
Diesel

Gaseous
fuels

Biofuels

Synthetic
fuels

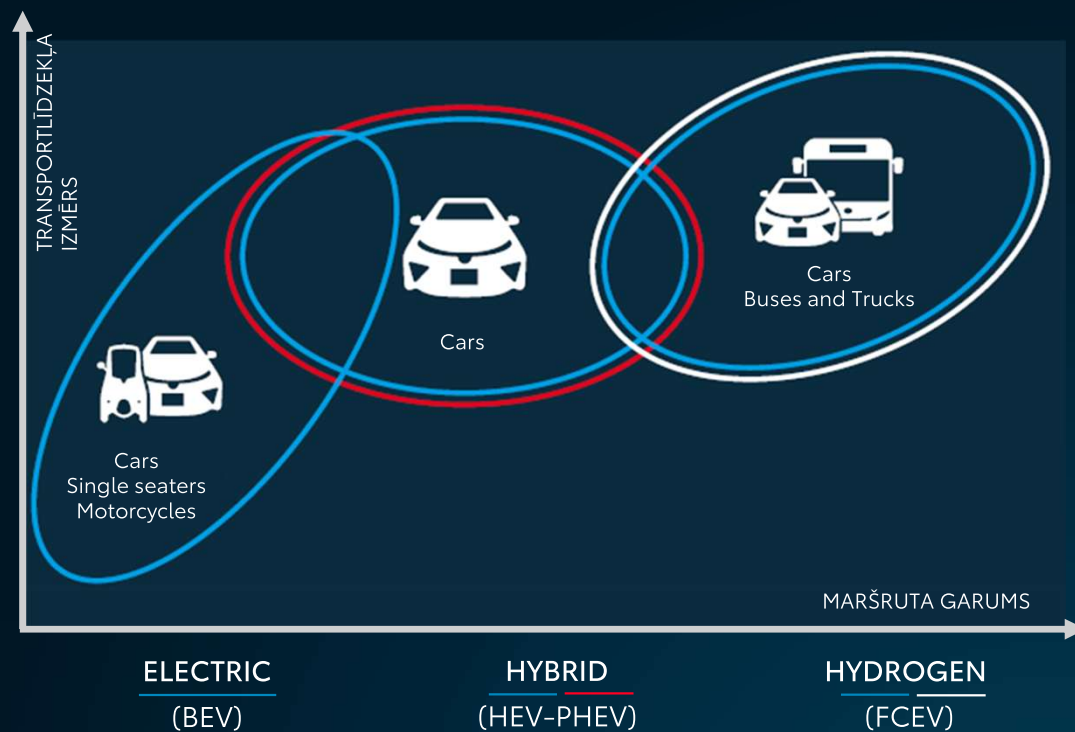
Electricity

Hydrogen



TOYOTA'S ELECTRIFICATION SOLUTIONS

DAŽĀDU TEHNOLOĢISKO ARHITEKTŪRU LĪDZĀSPASTĀVĒŠANA

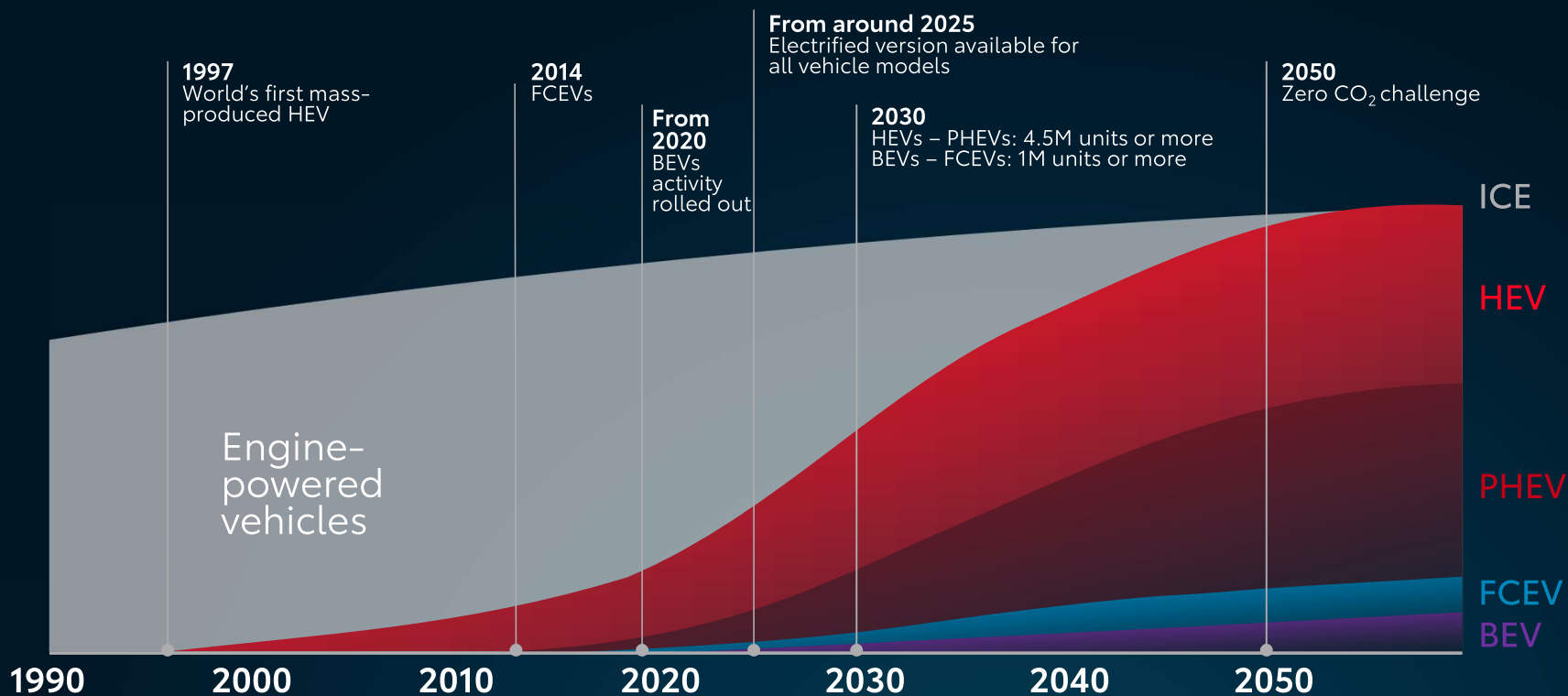


Mērķis ir piedāvāt piemērotākos pārvietošanās veidus, īstajā laikā un par pareizo cenu



GLOBĀLA SPĒKA AGREGĀTA EVOLŪCIJAS PROGNOZE

POPULARIZING ELECTRIFIED VEHICLES



HIBRĪDS KĀ CEĻŠ UZ CO2 UN NOX SAMAZINĀŠANU

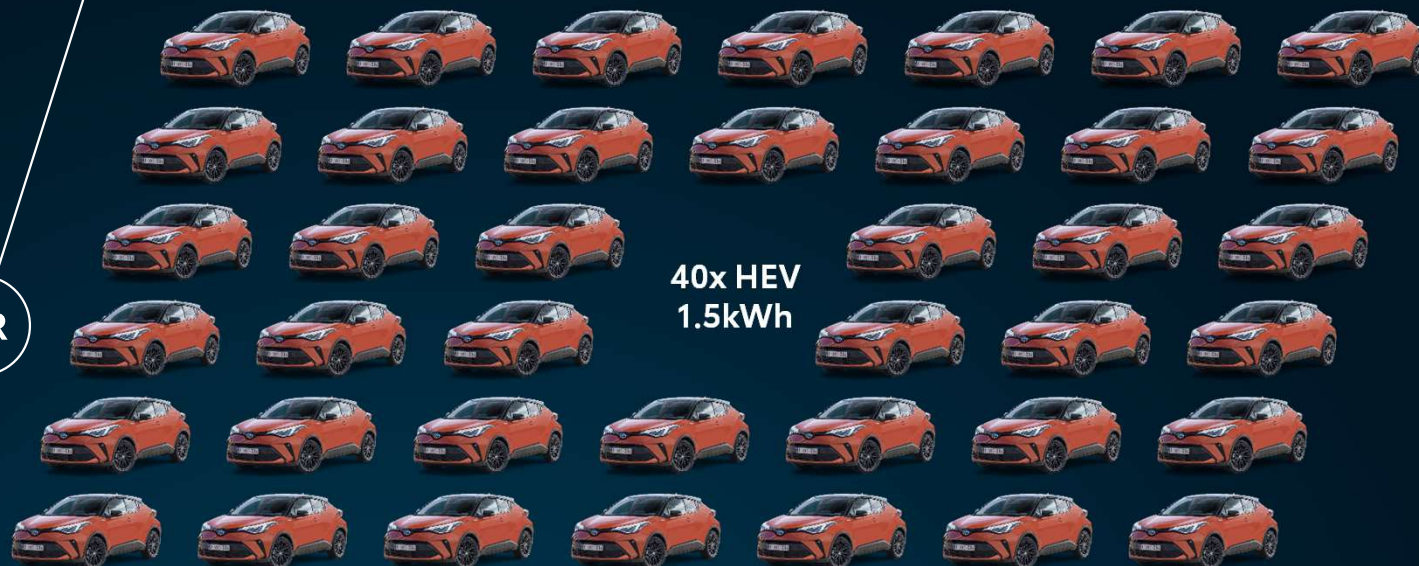


1x BEV
60kWh

-125g / km

Stratēģisks lēmums izstrādāt hibrīdu masveida, pamatojoties uz akumulatora izmaksām, uzlādes infrastruktūras prasībām un elektroenerģijas ražošanas reģionālajām atšķirībām

OR



40x HEV
1.5kWh

$-(0.3 \times 125) \times 40 = -1,500 \text{ g/km}$





TOYOTA ELEKTRIFICĒTI MOBILITĀTES RISINĀJUMI

3 ELEMENTI VISU ELEKTRIFICĒTO RISINĀJUMU PAMATĀ



ELECTRIC MOTOR

pilnībā vai daļēji
veicina
transportlīdzekļa
piedziņu



BATTERY

uzglabā enerģiju
elektromotoram

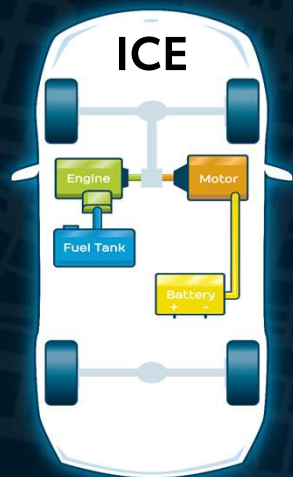


POWER CONTROL UNIT

kontrolē jaudas
plūsmu hibrīda
sistēmā

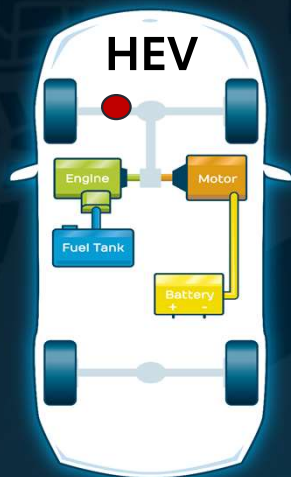


ELEKTRIFICĒTIE TRANSPORTLĪDZEKĻI: GALVENĀS SASTĀVDAĻAS



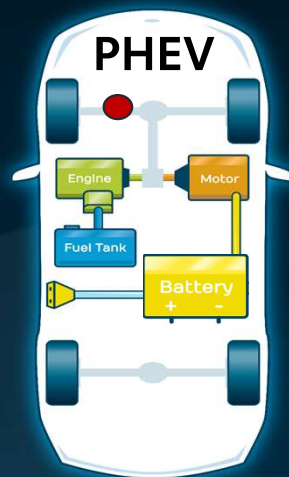
Benzīna dzinējs
Degvielas tvertne
Mehāniskā transmisija
[Ietver "vieglu" hibrīdu]

ICE VEHICLE & MILD HYBRID



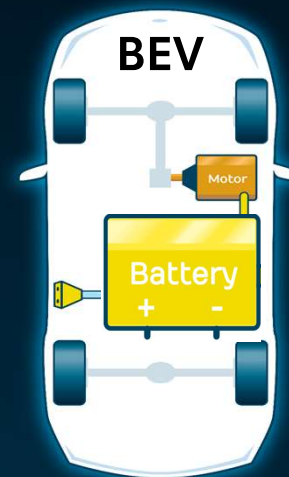
+ Akumulators (1-2 kWh)
+ elektromotors
+ Strāvas vadības bloks
+ Jaudas sadalīšanas ierīce

HYBRID ELECTRIC VEHICLE



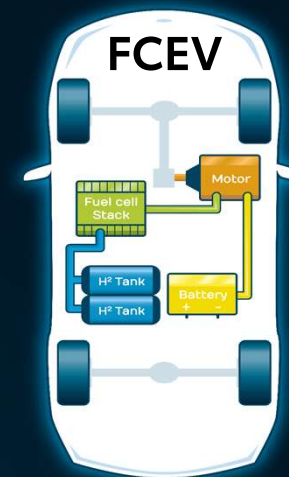
+ Lielāks akumulators (8-18kWh)
+ Lielāks elektromotors
+ Iebūvēts 220V lādētājs
+ Ārējā lādēšana

PLUG-IN HEV



- Benzīna dzinējs/degviela
- Mehāniskā transmisija
- Jaudas sadalīšanas ierīce
+ Liels akumulators (>60 kWh)
+ Līdzstrāvas ātra uzlāde

BATTERY ELECTRIC VEHICLE



- Mazāks akumulators (1-2 kWh)
- Ārējā maksa
+ Degvielas elementi
+ Ūdeņraža tvertne (700 MPa)

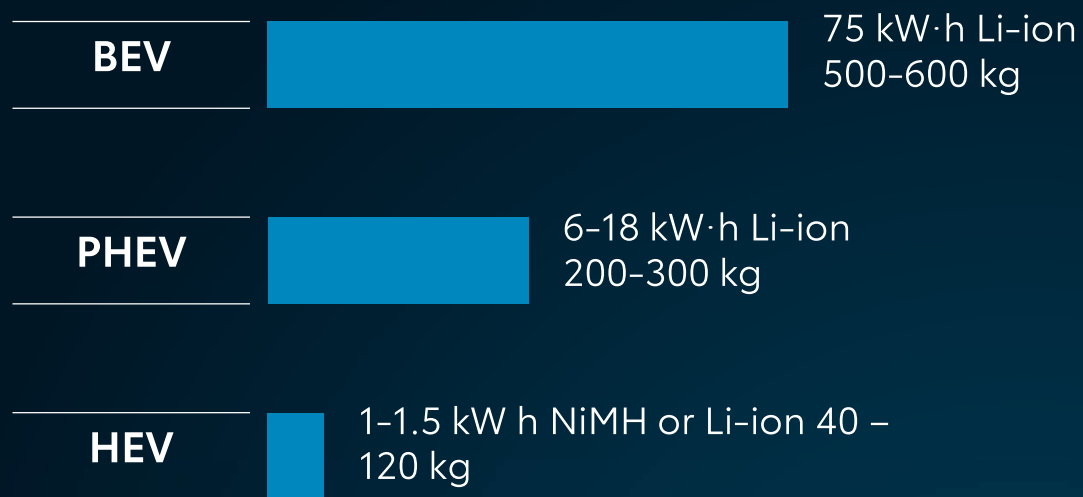
FUEL CELL ELECTRIC VEHICLE



BATERIJU VEIDI

KATRAI SISTĒMAI ATBILSTOŠĀ AKUMULATORA IZVĒLE

BATTERY WEIGHT

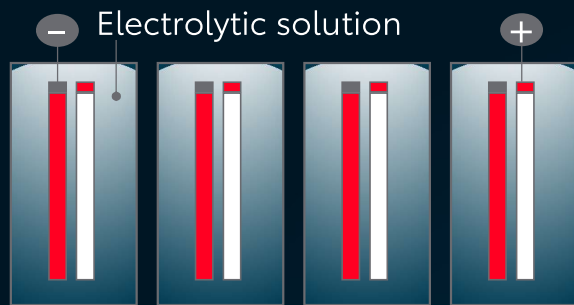


N.B. The weight can differ depending on model and EV range



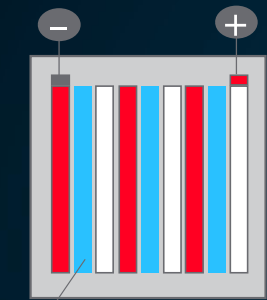
TOYOTA - PANASONIC PARTNERSHIP

DEVELOPING NEW GENERATION OF HIGH-PERFORMANCE BATTERIES



LITHIUM-ION BATTERY

SOLID-STATE BATTERY



Solid electrolyte

- » Better performance
- » Smaller and safer
- » Faster charging times





TOYOTA HYBRID TECHNOLOGY



WHAT IS HYBRID?

Two power sources

WHAT IS HYBRID?

Hybrid technology is simple and offers an optimal balance of performance and economy



PETROL ENGINE

For high speed driving



ELECTRIC MOTOR

Powers the car at low speed



BATTERY

Recharges itself during driving



HYBRID

Efficient
at high speed

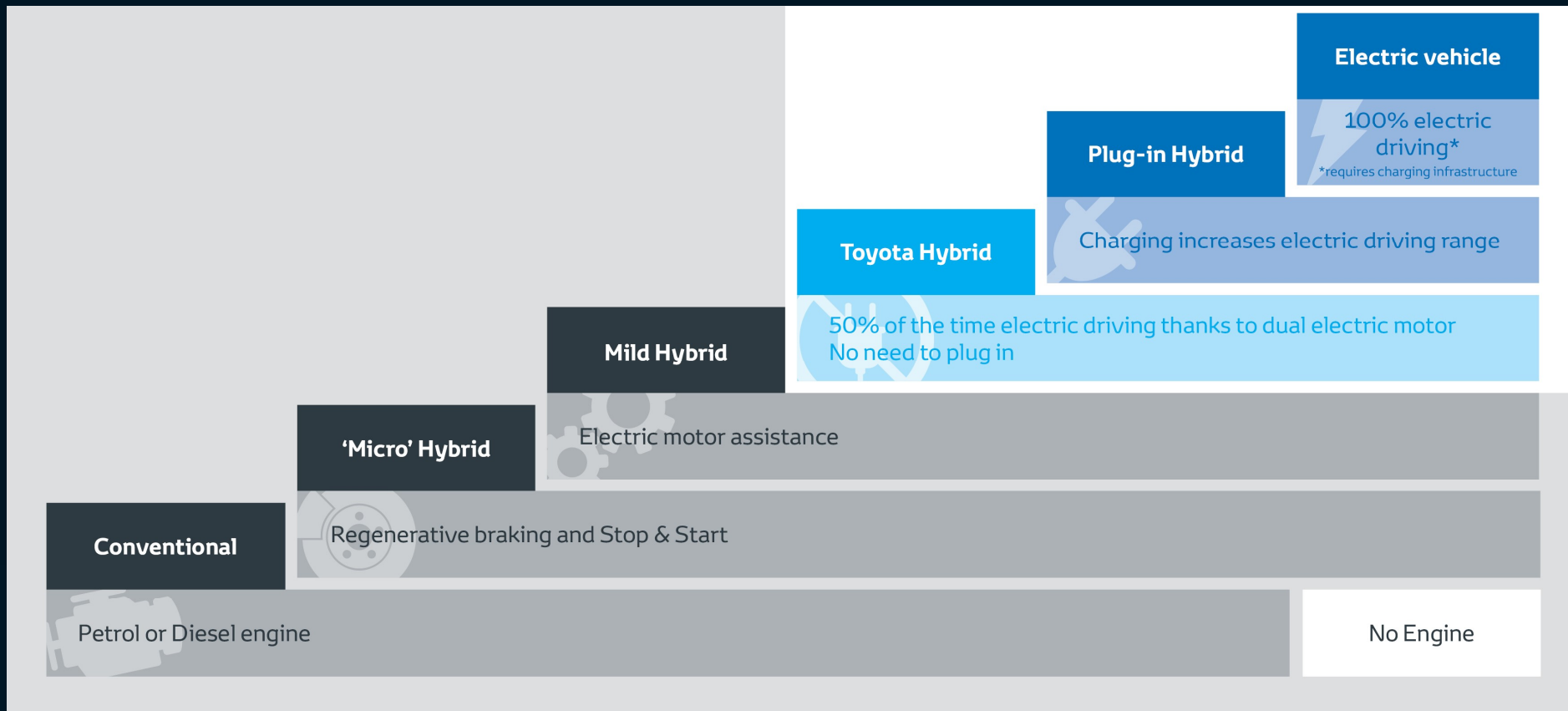
Efficient
at low speed and
acceleration

To store and reuse
otherwise wasted
braking energy
and energy leftovers

For maximum power



CLASSIFICATION OF HYBRID / ELECTRIC VEHICLES

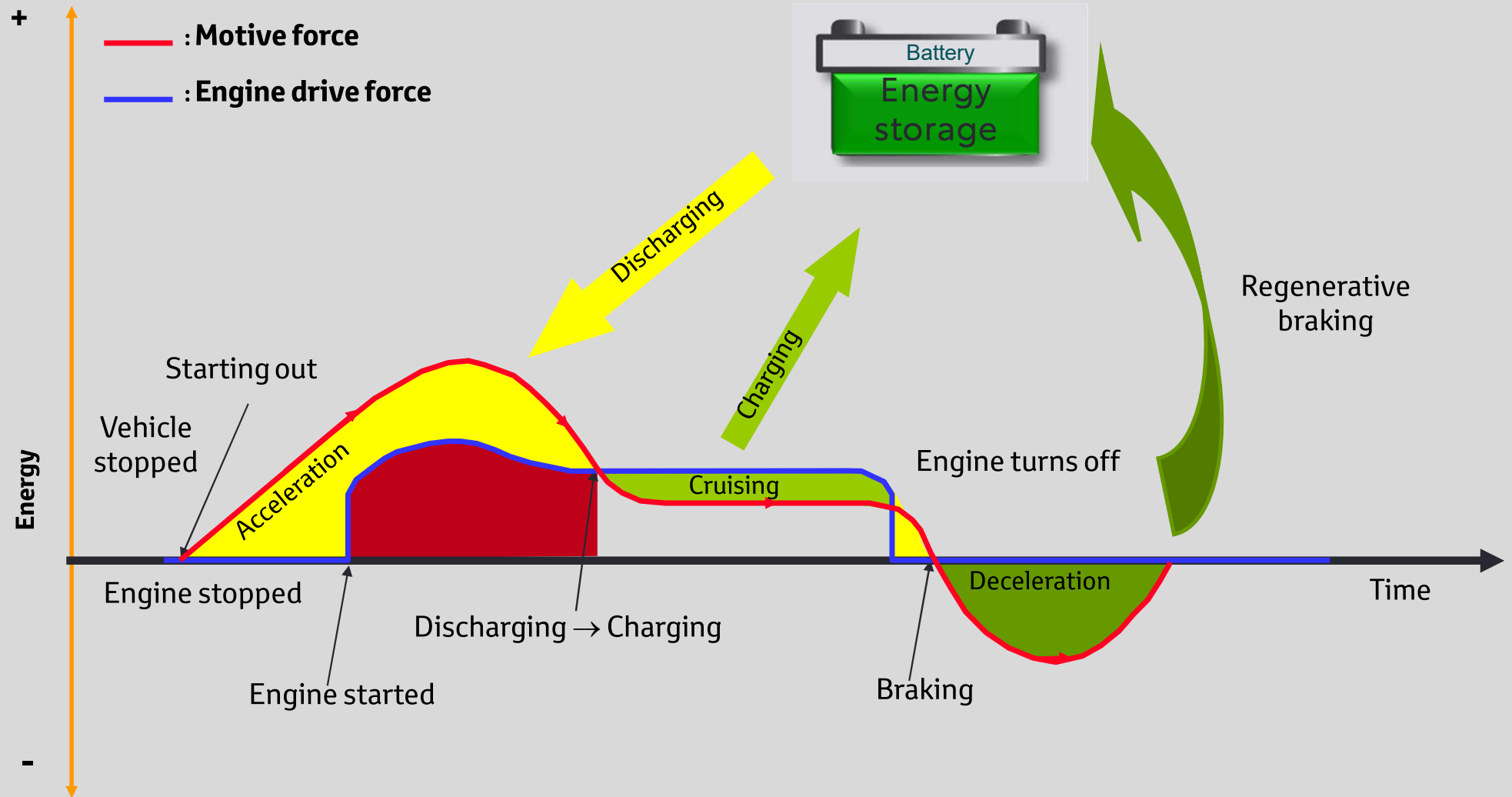




HOW TOYOTA HYBRID WORKS

TOYOTA HYBRID SYNERGY DRIVE®

Energy management

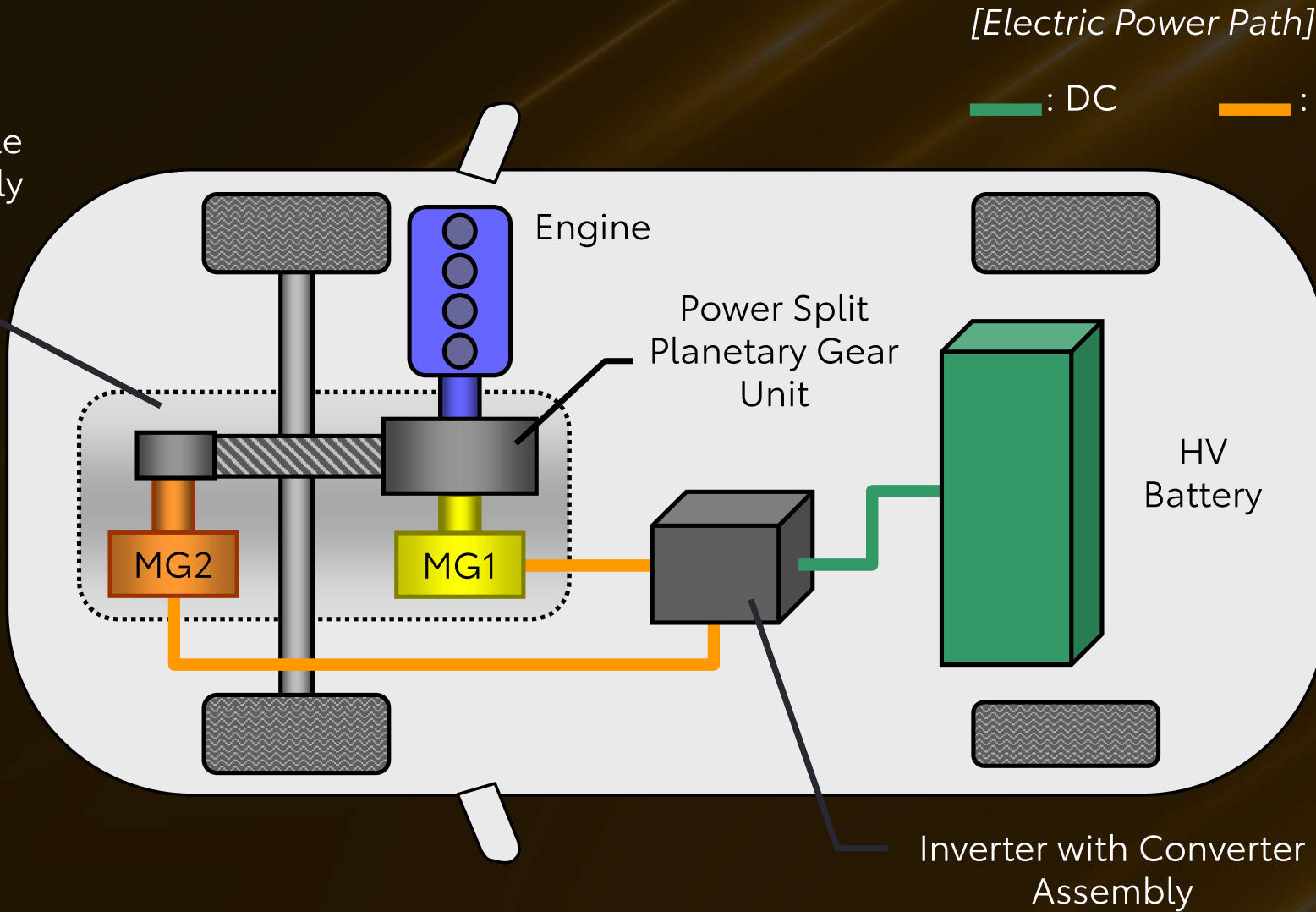




HYBRID TRANSAXLE 4TH GEN. LAY-OUT



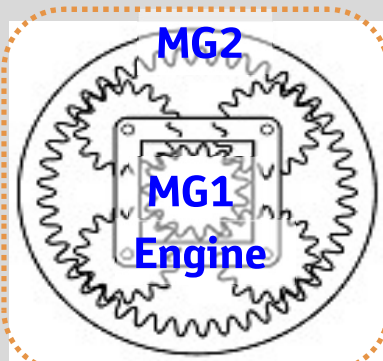
Hybrid Transaxle Assembly



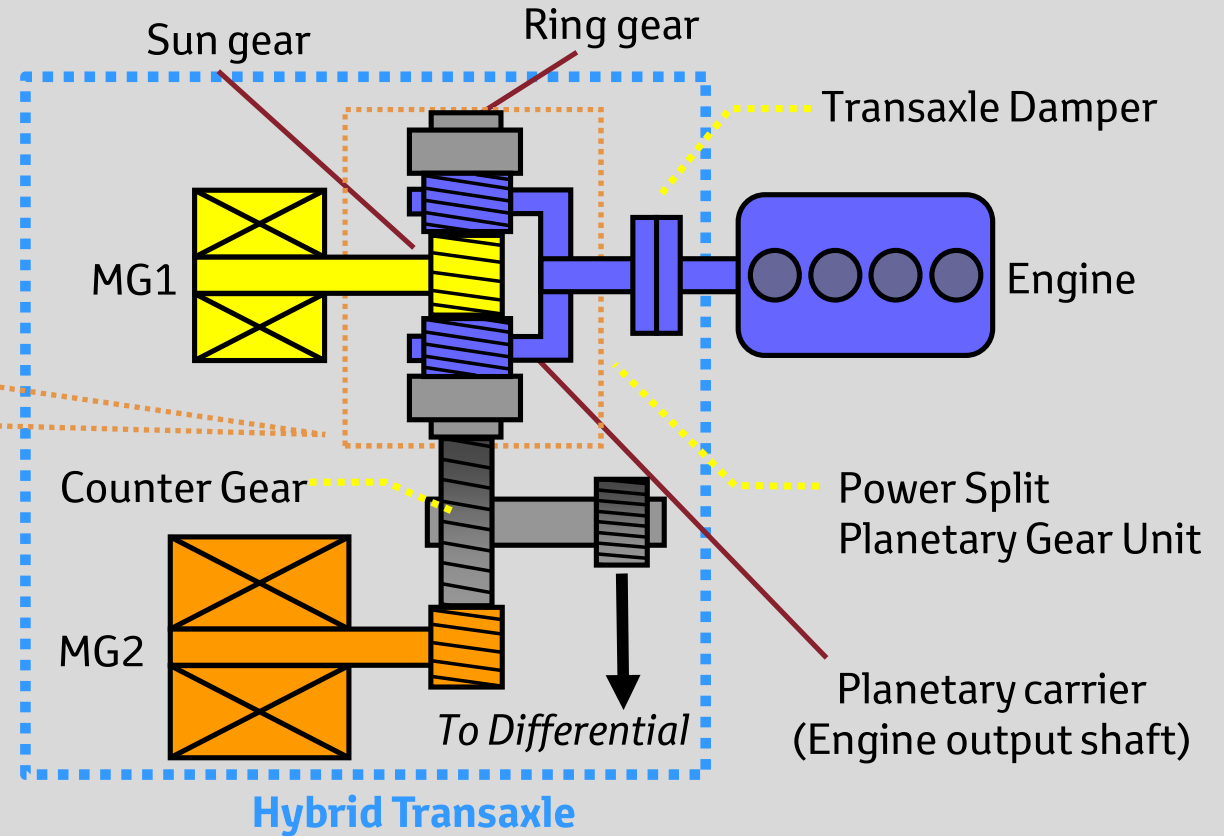
HYBRID TRANSAXLE



Power split device



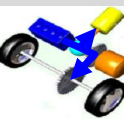
**Planetary
Gear unit**



Sun Gear: MG1 (Generator)

Ring Gear: MG2 (Motor)

Carrier: Engine output shaft



HYBRID TRANSAXLE



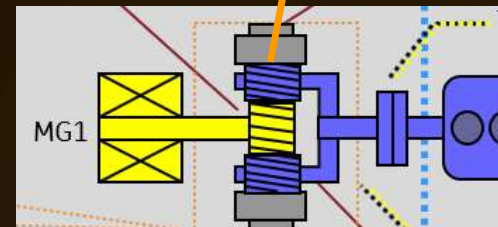
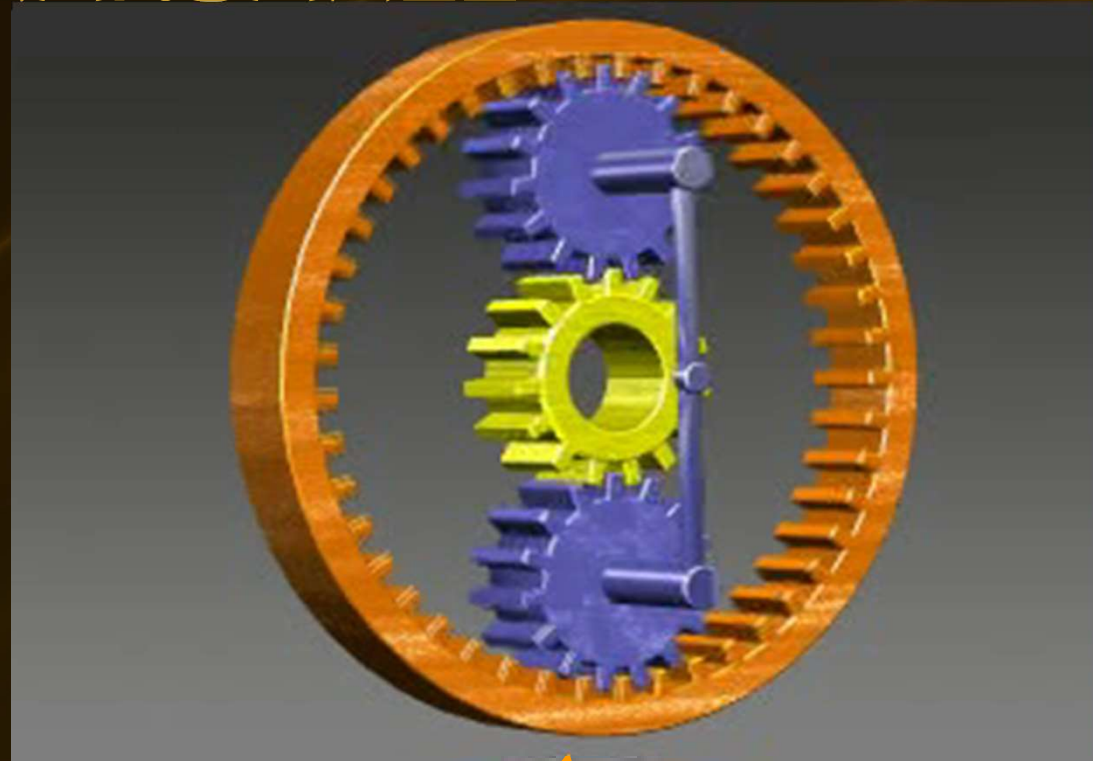
Power Split device

1. Sun gear BLOCKED

- Carrier is driving force
- High rpm ring gear
- = High wheel speed

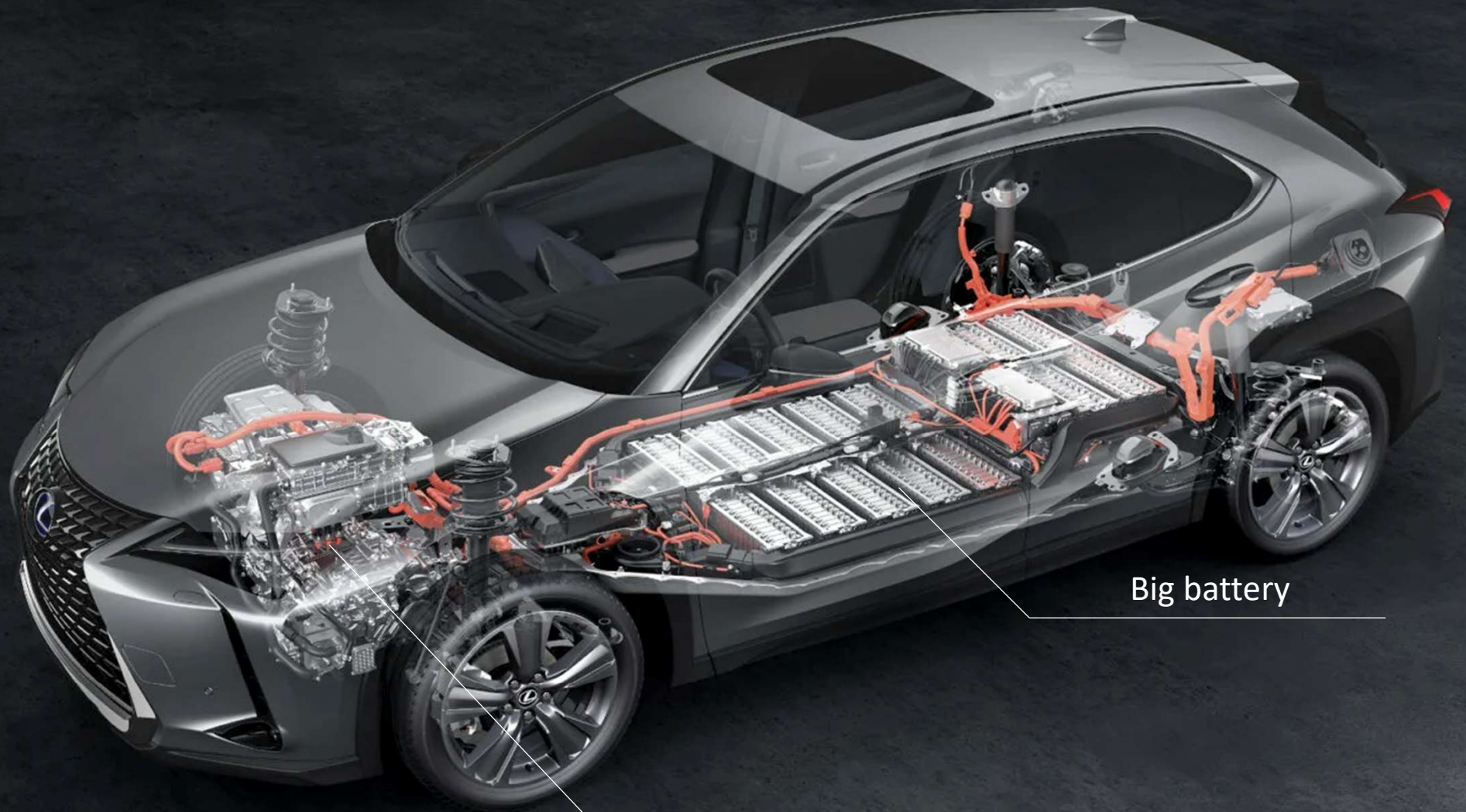
2. Sun gear spinning

- Reduction rpm ring gear
- = lower wheel speed





BEV



Big battery

Electric motor

BATTERY GENERAL KNOWLEDGE:

- TEMPERATURE DEFINES RANGE

	WLTP combined	Winter combined (-15C)	Winter combined (+1C)	Summer Combined, Warm (+15C)	Summer City slow driving speeds, Warm (+15C)	Highway only (100 km/h +), Warm (+15C)
Range	350	200	230	350	400	200
Vs. WLTP		-40%	-30%	0%	+14%	-43%

DATA TO BE CONFIRMED FOR
Table with example data to illustrate impact



FCEV

MIRAI



FCEV System Overview

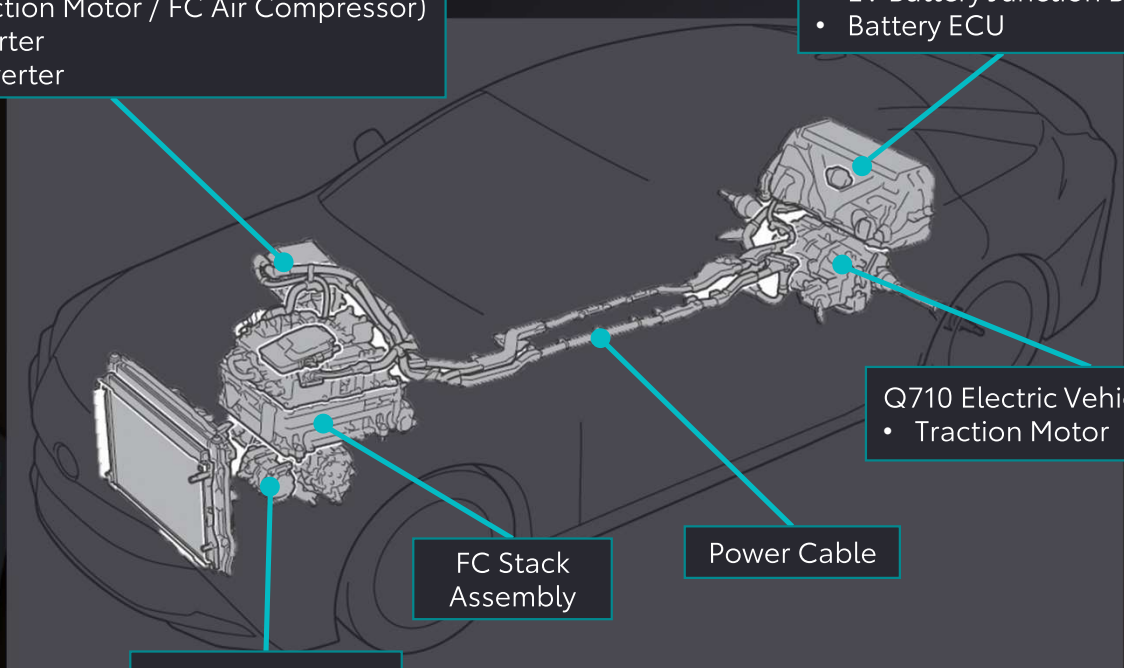
Hybrid system

Inverter with Converter Assembly:

- MG ECU
- Inverter (Traction Motor / FC Air Compressor)
- Boost Converter
- DC/DC Converter

HV Battery Assembly

- Battery Stack
- EV Battery Junction Block
- Battery ECU



Q710 Electric Vehicle Transaxle

- Traction Motor

FC Stack Assembly

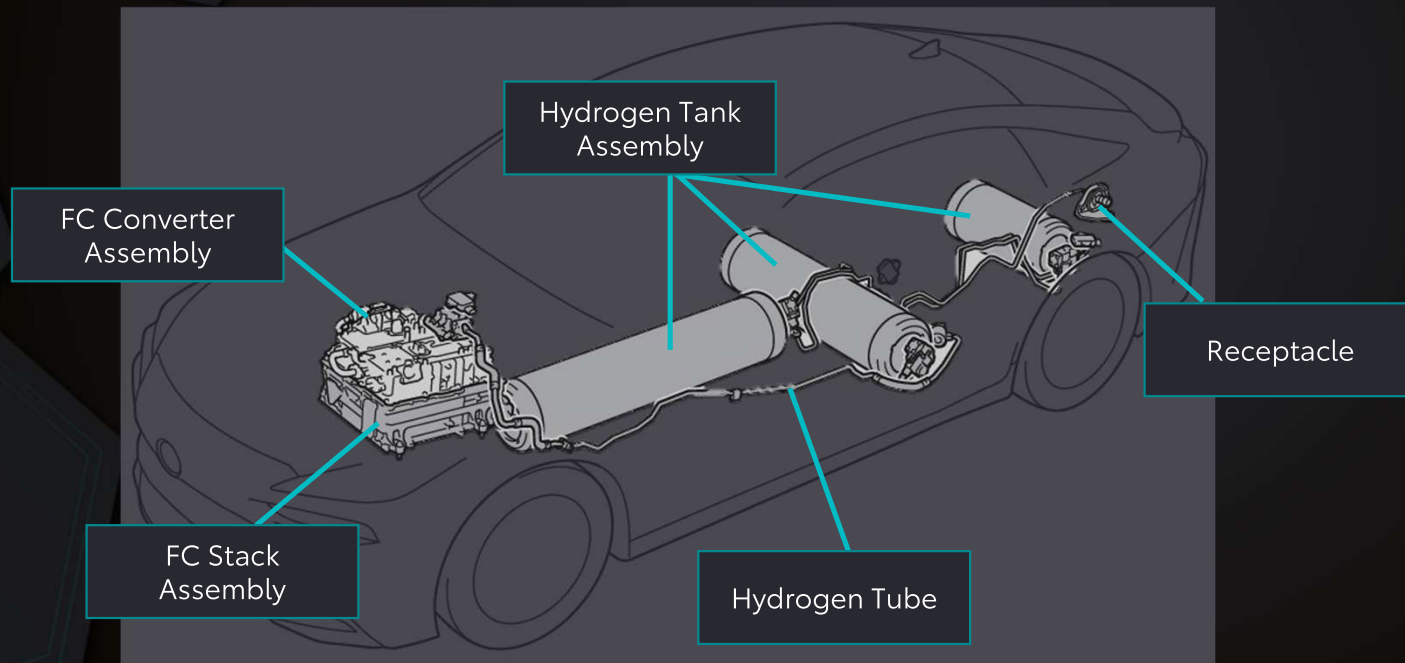
Power Cable

Compressor with Motor Assembly

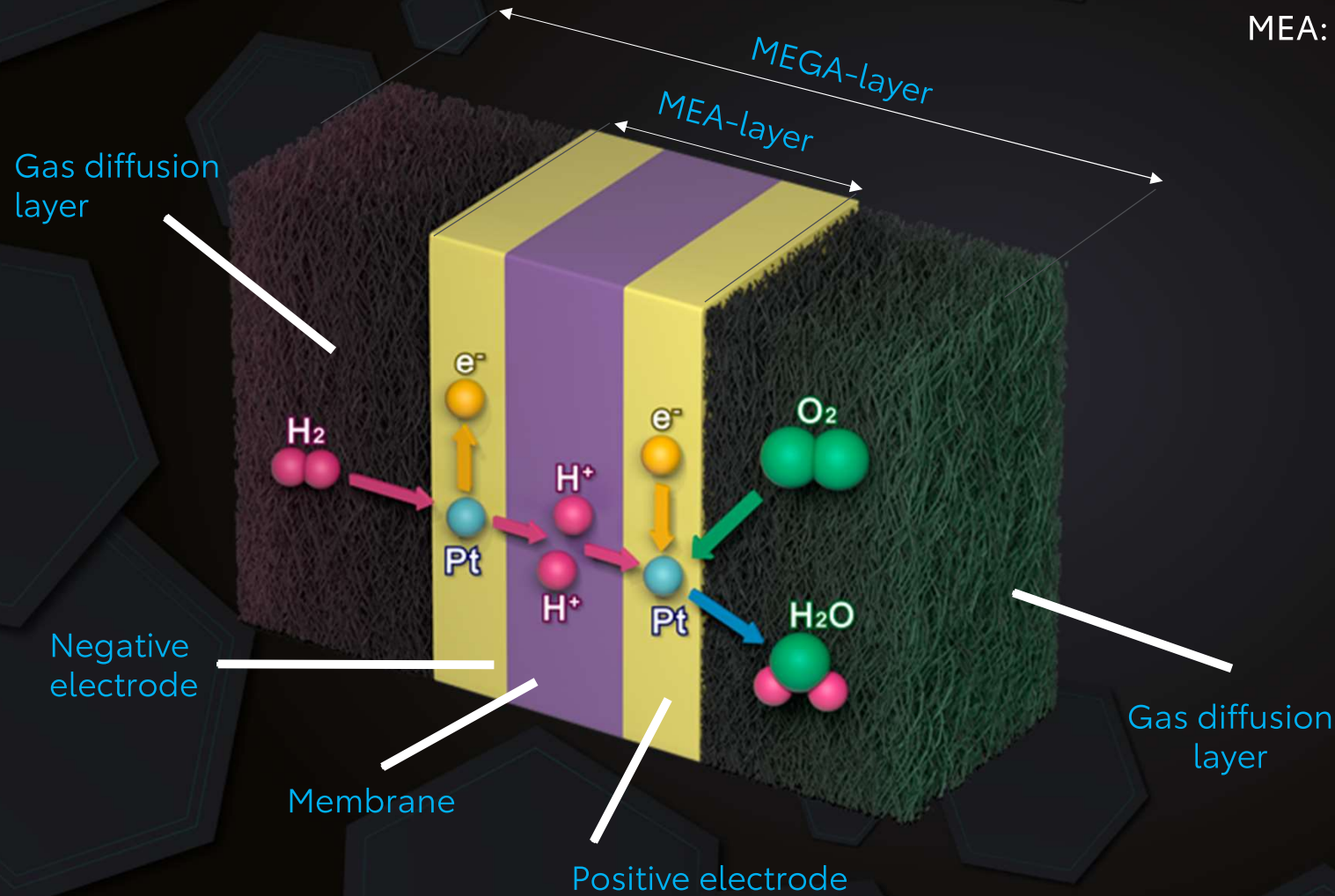


FCEV System Overview

- FC system



Fuel Cell Design



MEGA: Membrane Electrode Gas Diffusion Assembly

MEA: Membrane Electrode Assembly with Catalyst



Fully redesigned FC system

2nd Generation Toyota Fuel Cell System



Prototype shown. Production model to be introduced in your region and country may vary.

TOYOTA OFFICIAL PARTNER OF ENERGY OBSERVER



*Picture from: global.Toyota/en/newsroom





Toyota Times, LUNAR CRUISER



Jul. 21, 2023

**Development Status
Toyota's Manned
Pressurized Rover and...**

Beyond Zero, Presentation, LUN...



Sep. 18, 2020

**Tackling challenges is in
the "DNA of Toyota
people"**

Toyota Times, LUNAR CRUISER



Sep. 11, 2020

**"Toyota should be
involved in space" The
catalyst to joint...**

Toyota Times, LUNAR CRUISER



Sep. 04, 2020

**Why Toyota is targeting
space: An interview with
Executive Mr. Terashi &...**

Toyota Times, LUNAR CRUISER

*Picture from: global.Toyota/en/newsroom



LIQUID HYDROGEN-POWERED COROLLA AND GR86 (CARBON-NEUTRAL FUEL) TO PARTICIPATE IN SUPER TAIKYU AT AUTOPOLIS



Hydrogen-powered Corolla



GR86 (carbon-neutral fuel)

*Picture from: global.toyota/en/newsroom



Toyota Motor Corporation



HySE-X1 * Mockup image for illustration purposes only

The HySE (Hydrogen Small mobility & Engine technology) research association will enter our hydrogen engine vehicle, the HySE-X1, in the "Mission 1000" Challenge of the "Dakar 2024" (Dakar Rally*1) set to be held in Saudi Arabia from January 5 to 19, 2024.

*Picture from: global.Toyota/en/newsroom

Beyond Zero, News Release,

Jul. 31, 2023

Toyota Accelerates Lo Development of Intelligence and...



Beyond Zero, News Release,

Jun. 26, 2023

Toyota, Toyota Tsushc and Mitsubishi Kakok Introduce Thailand's f



Beyond Zero, News Release,

May 30, 2023

Joint Press Conferenc Daimler Truck, Mitsub Fuso, Hino, and Toyot:



Beyond Zero, Presentation, I

May 30, 2023

Daimler Truck, Mitsub Fuso, Hino and Toyota





THANK YOU!

