



THE BENEFITS OF THE HINO HYBRID

Wednesday, 28th July 2010



PRESENTATION OVERVIEW

WHAT IS A HYBRID VEHICLE

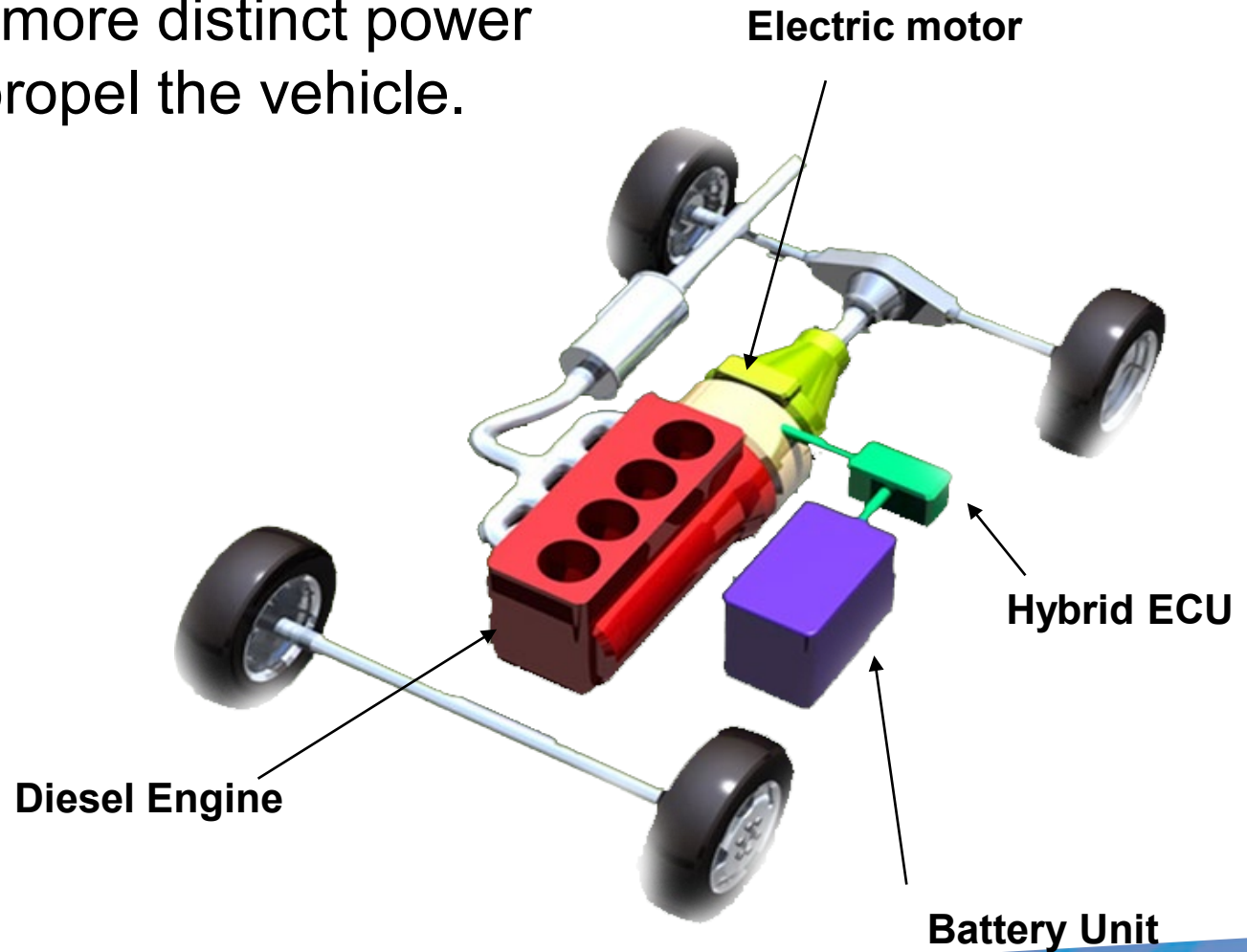
HISTORY OF HINO HYBRID VEHICLES

THE HINO 300 SERIES HYBRID

BENEFITS OF THE HINO HYBRID

WHAT IS A HYBRID VEHICLE?

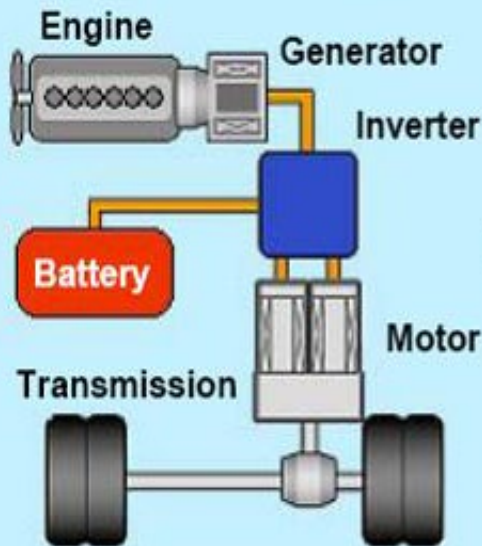
A hybrid vehicle is a vehicle that uses two or more distinct power sources to propel the vehicle.



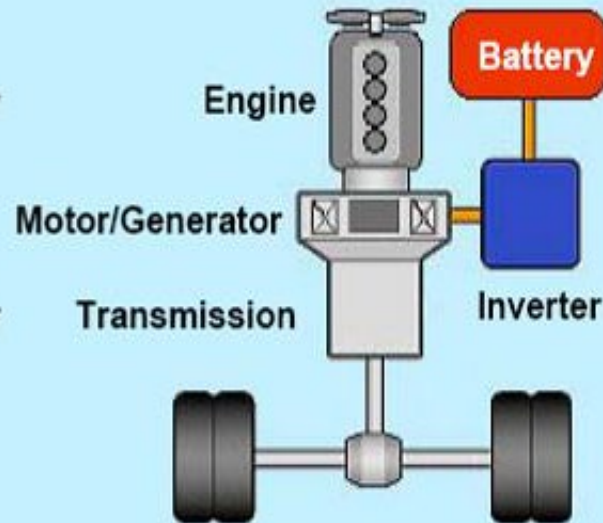
WHAT TYPE OF HYBRID?

A Diesel Electric Hybrid can fall into one of three Hybrid Electric Vehicle categories.

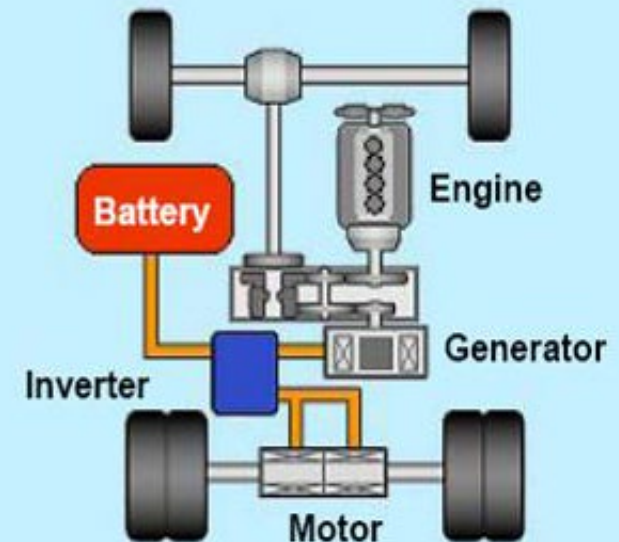
Series System



Parallel System



Series/Parallel System



PARALLEL HYBRID

- Both the engine and the electric motor generate the power that drives the wheels.
- A computer controls how these components work together.
- Parallel hybrids can use a smaller battery pack and therefore relies mainly on regenerative braking to keep it recharged.
- When power demands are low or when braking, parallel hybrids also utilise the drive motor as a generator for regenerative charging of the batteries.
- The engine is connected directly to the wheels eliminating the inefficiency of converting mechanical power to electricity and back, which makes these hybrids quite efficient on the highway as well as stop start operations.



SERIES HYBRID

- The simplest hybrid configuration.
- The electric motor is the only means of power to get the wheels turning.
- The motor receives electric power from a secondary source.
- The engine/generator and regenerative braking recharge the battery pack.
- The engine is typically smaller in a series drive train because it only has to meet average driving power demands and works within its optimum fuel efficiency and power band.
- The battery pack is generally more powerful than the one in parallel hybrids in order to provide peak driving power needs.
- This larger battery and motor, along with the generator, add to the cost, making series hybrids more expensive than parallel hybrids.



SERIES/PARALLEL HYBRID

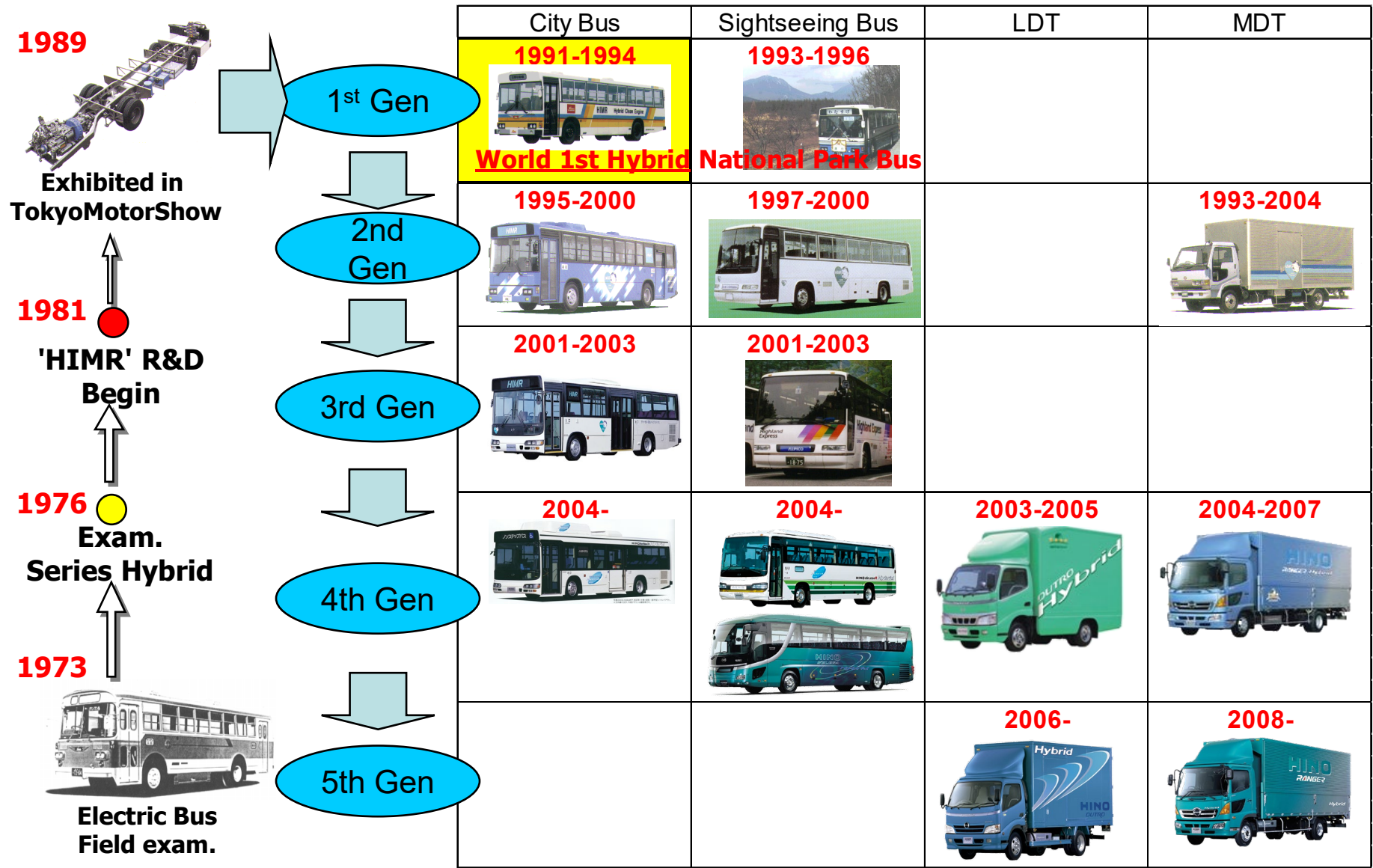
- Merges the advantages and complications of parallel and series Hybrid.
- The engine can drive the wheels directly and be effectively disconnected from the wheels so that only the electric motor powers the wheels.
- The engine operates at near optimum efficiency more often than a parallel.
- At lower speeds it operates mostly as a series hybrid whilst at higher speeds where the series drive train is less efficient the system switches to parallel mode.
- This system incurs higher production costs than a parallel hybrid as it needs a larger battery pack and more computing power to control the dual system.
- The series/parallel drive train has the potential to perform better than either of the parallel or series systems alone.



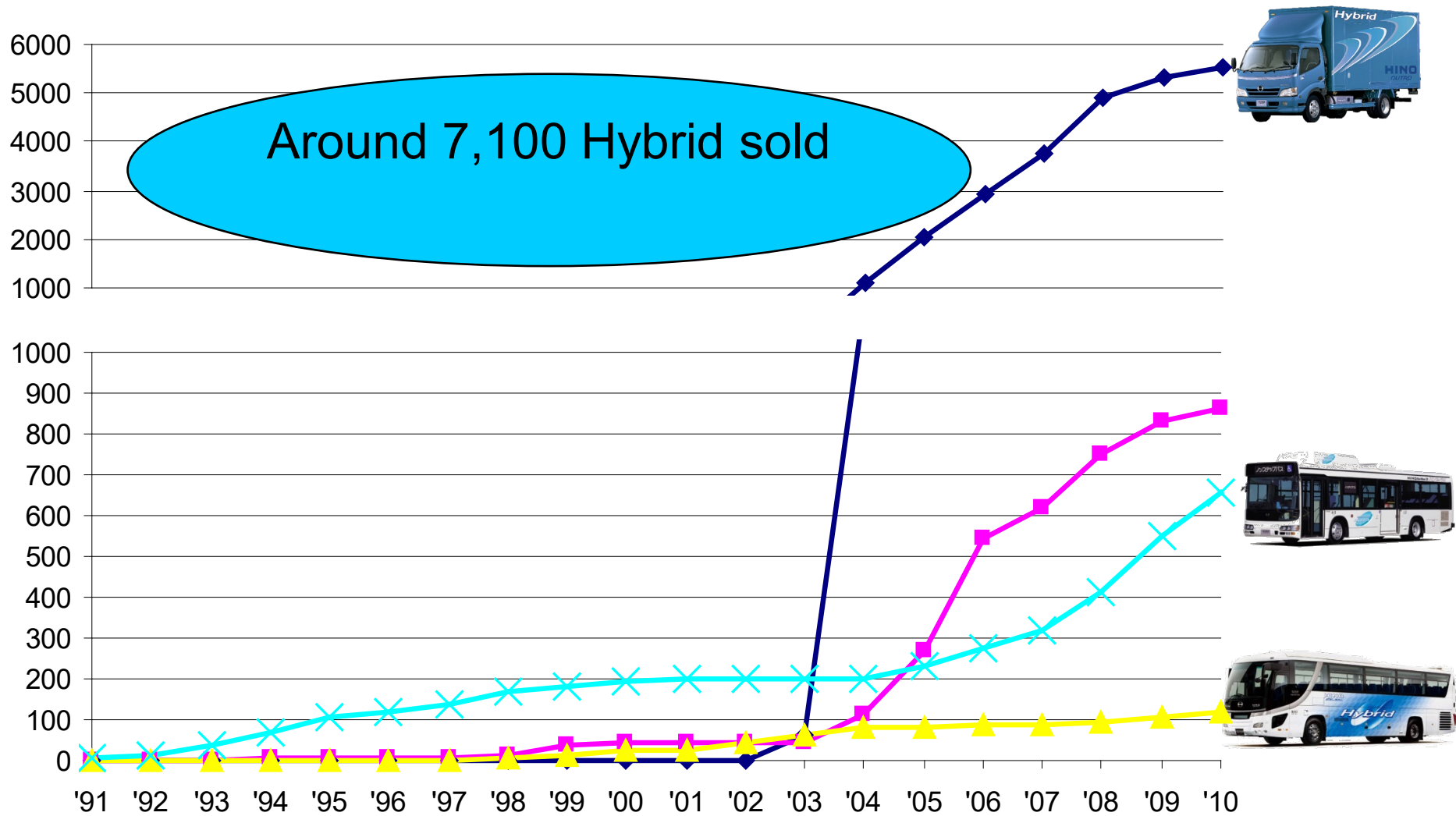


HISTORY OF HINO HYBRID

HISTORY OF HINO HYBRID VEHICLES DEVELOPMENT



HINO HYBRID SALES HISTORY GLOBALLY





THE HINO

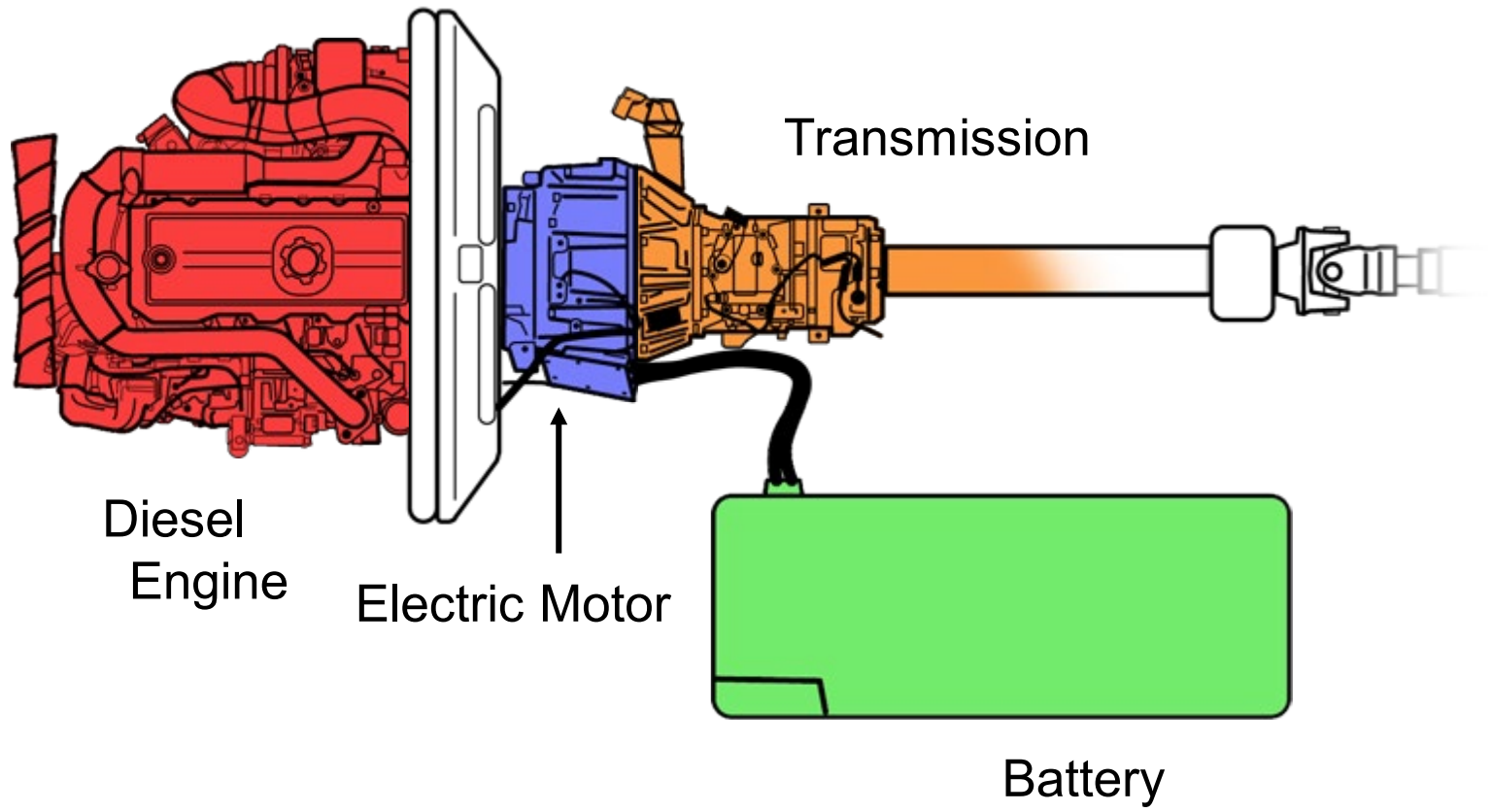
300 SERIES HYBRID

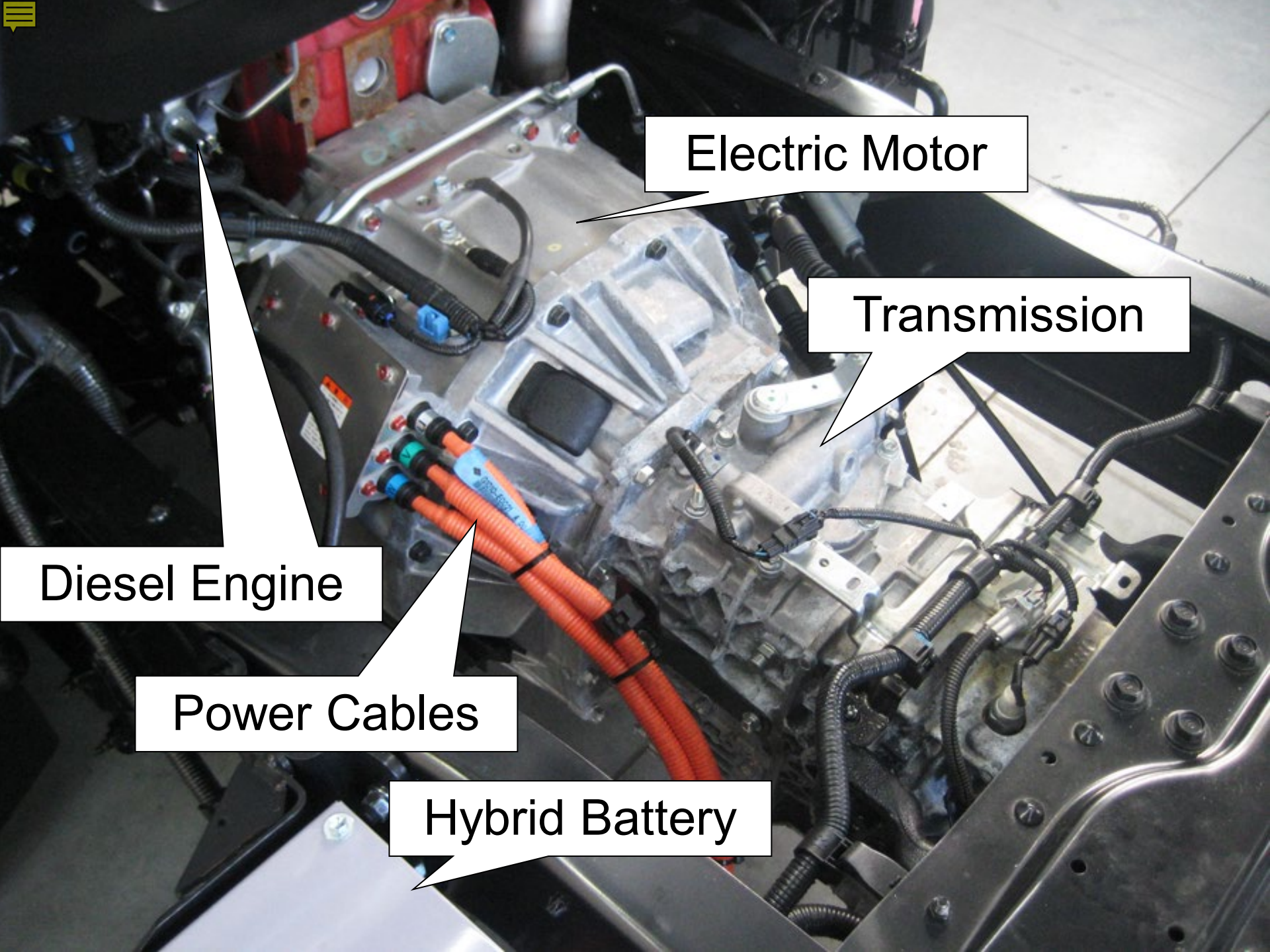
HINO 300 SERIES 714 HYBRID





PARTS OF THE HYBRID DRIVE LINE





Electric Motor

Transmission

Diesel Engine

Power Cables

Hybrid Battery



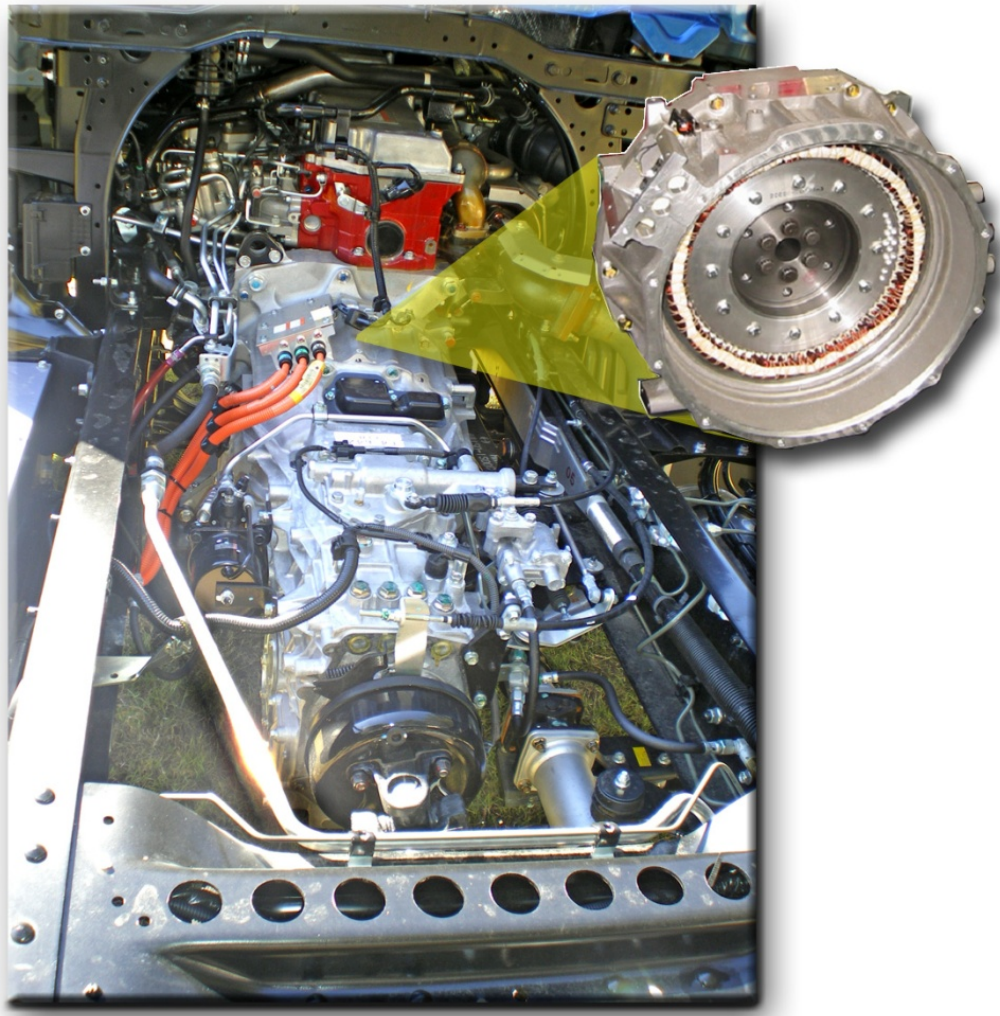
ELECTRIC MOTOR

The electric motor in the series 300 Hybrid has a number of functions

- Starter function
- Assist function
- Regenerative function
- Retarder function
- Idle-stop function



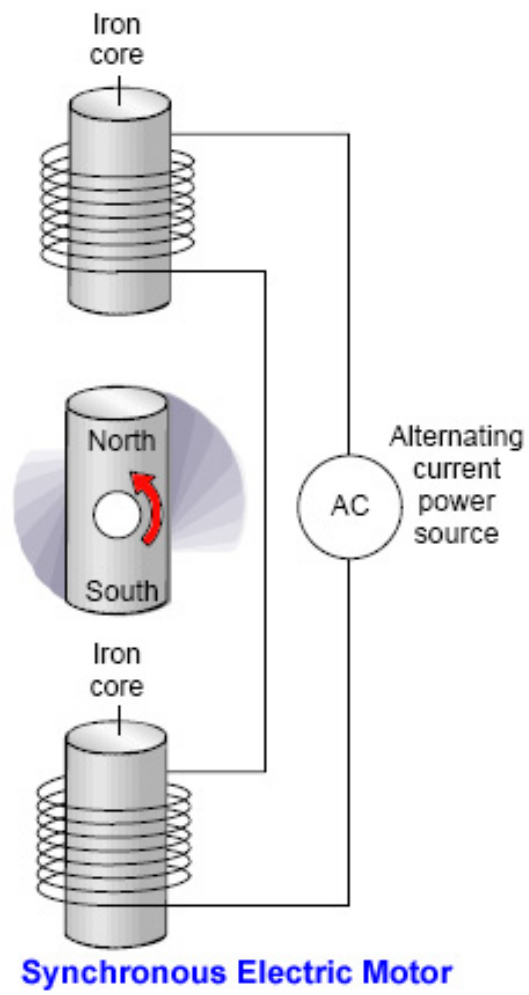
SYNCHRONOUS PERMANENT-MAGNET ELECTRIC MOTOR





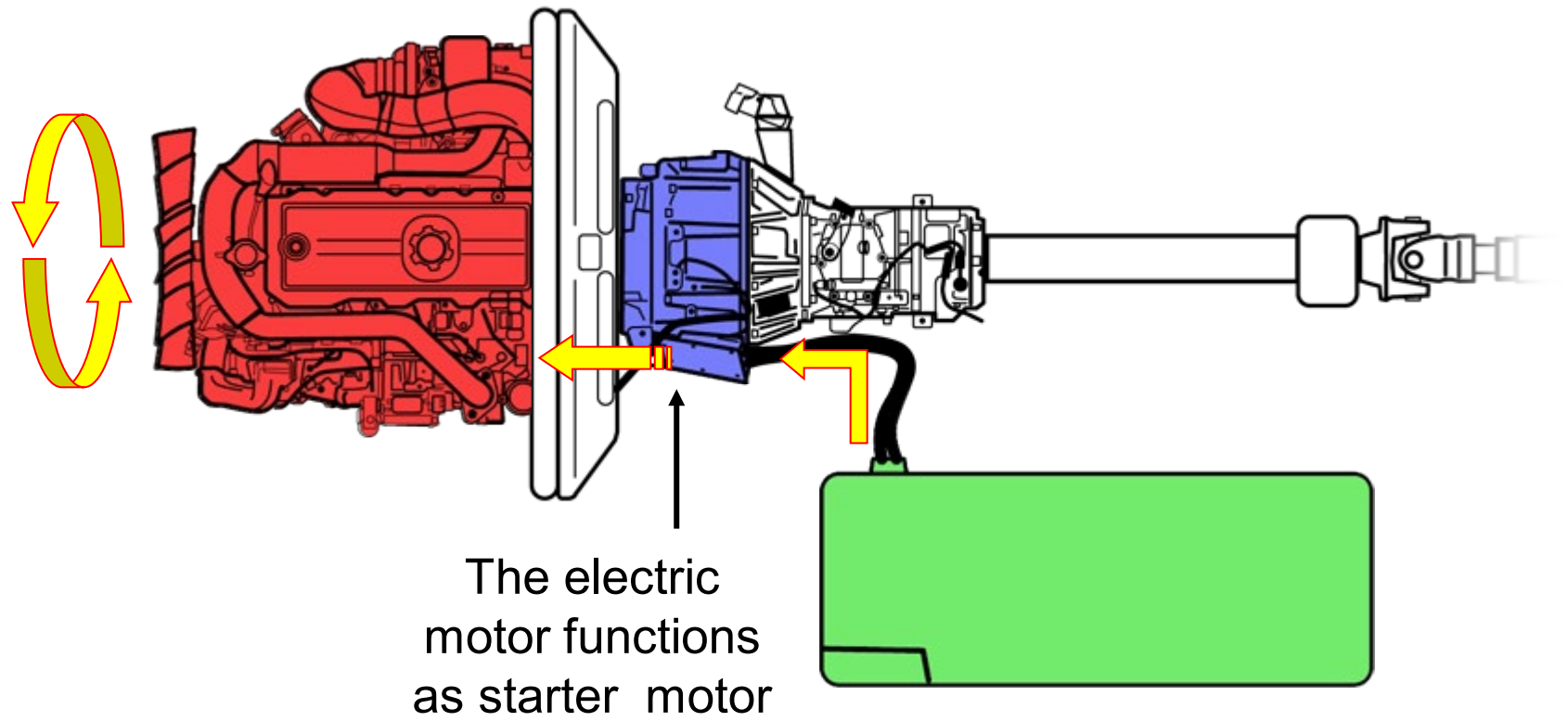
SYNCHRONOUS PERMANENT-MAGNET ELECTRIC MOTOR

- What is a **Synchronous Permanent Magnet** electric motor?





STARTING FUNCTION



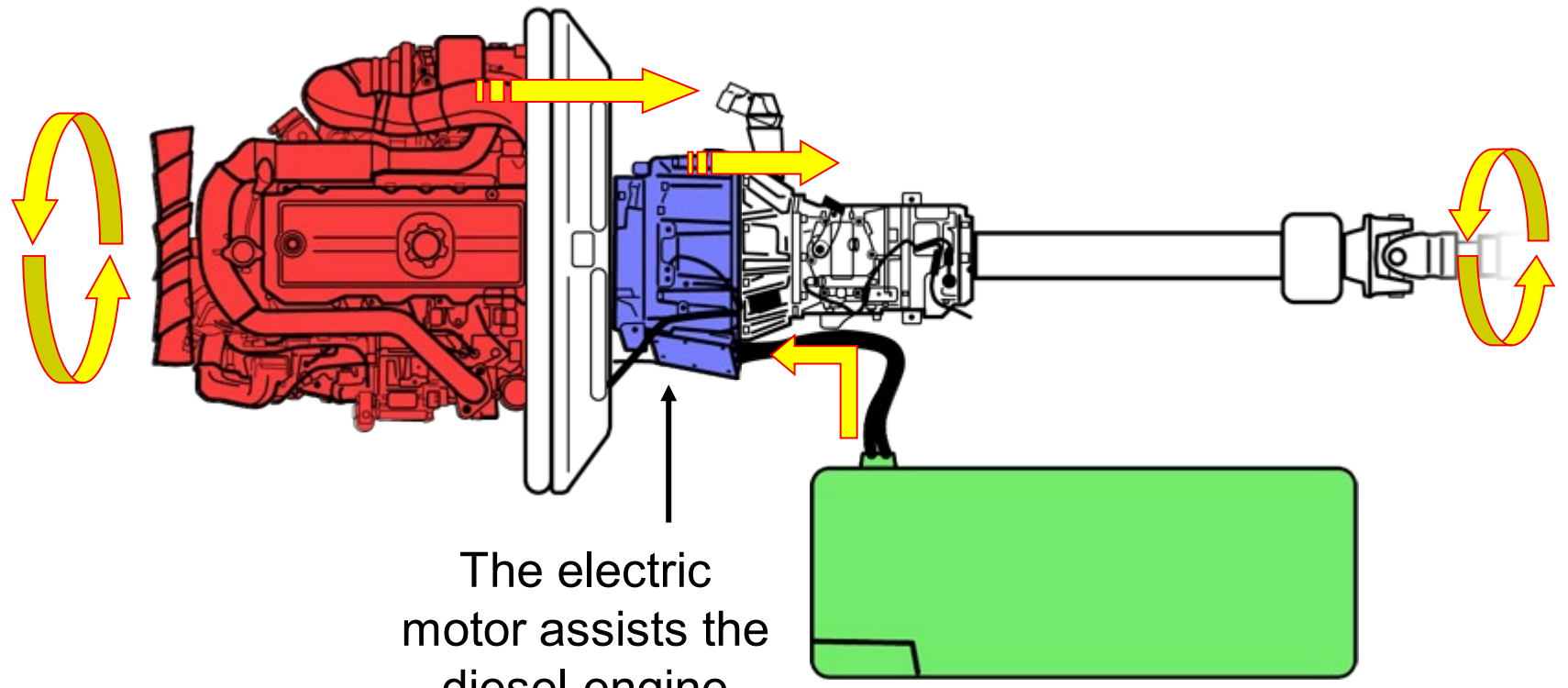
IDLE STOP FUNCTION

- Automatically turns off the diesel engine when the vehicle is stationary
 - Vehicle is stopped
 - Engine id idle
 - Foot brake is applied
 - In neutral with the clutch not engaged





ACCELERATING AND TAKING OFF



The electric motor assists the diesel engine when accelerating



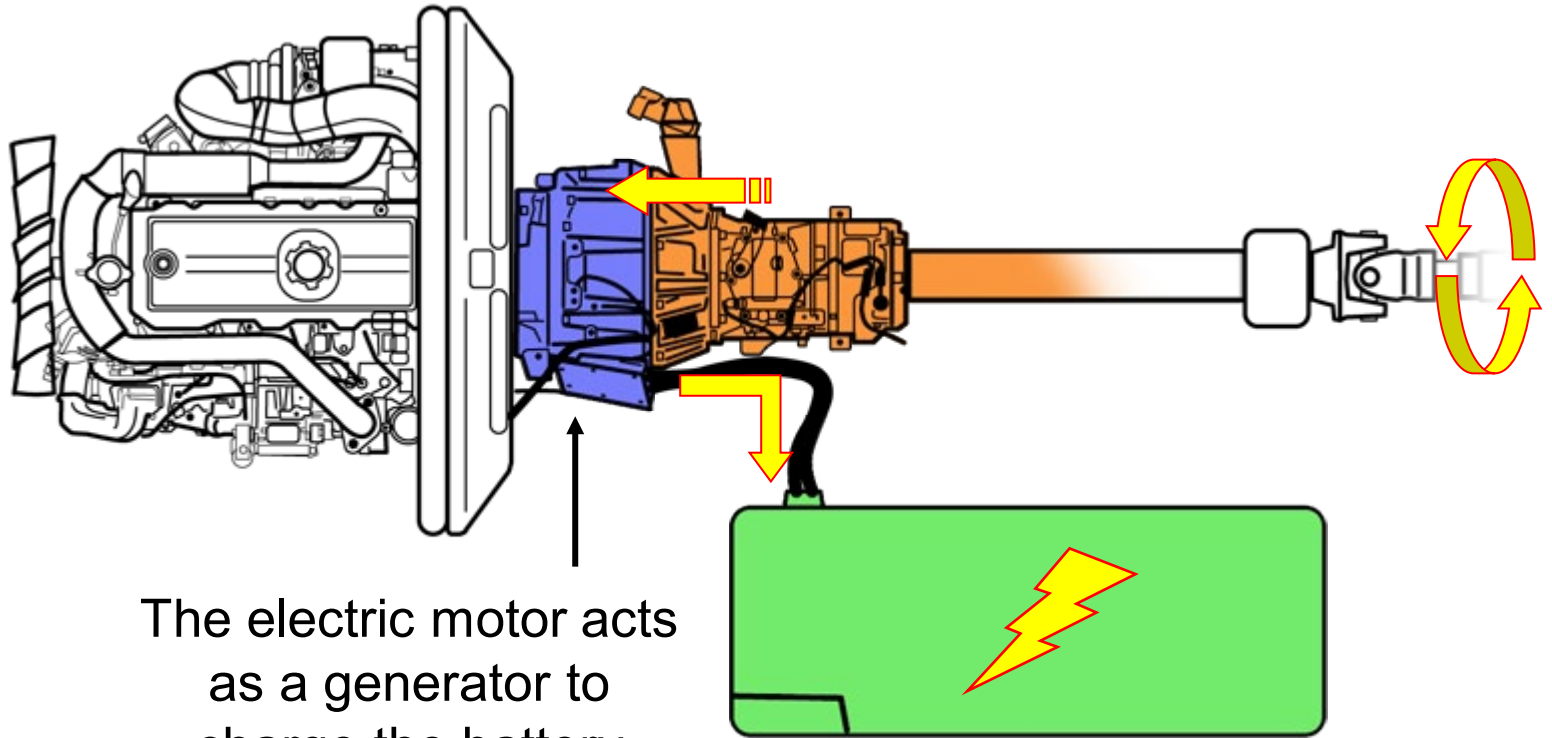
AST LAMP (ELECTRIC MOTOR ASSIST)



ECO LAMP (Economy)



BATTERY CHARGERS WHEN DECELERATING

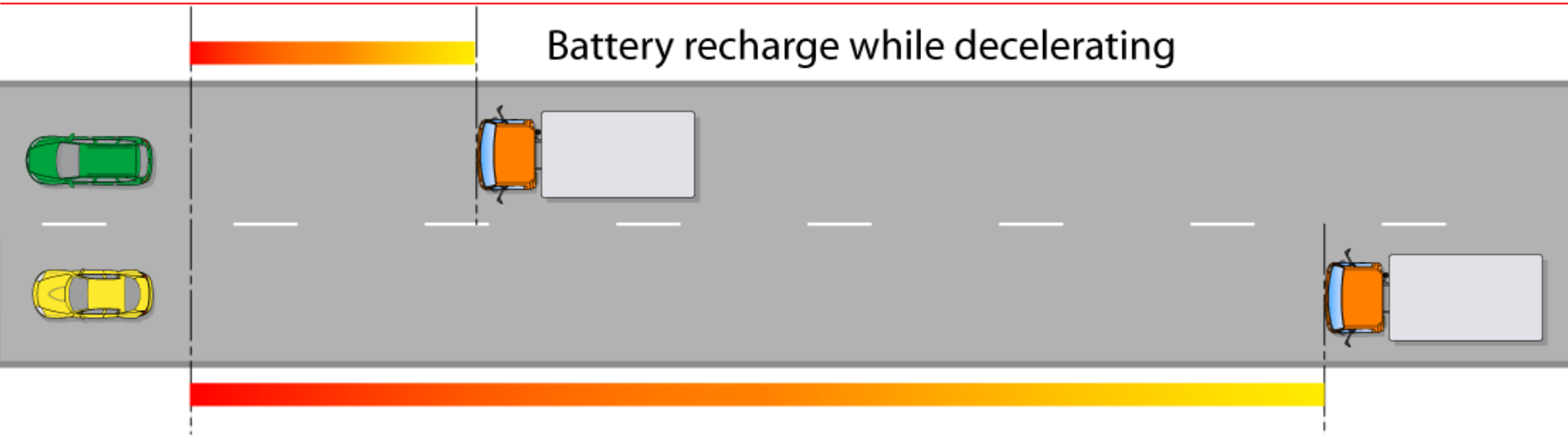


The electric motor acts as a generator to charge the battery when decelerating

CHG LAMP (CHARGE)



BRAKING DISTANCE



When decelerating the electric motor works as a retarder

- Longer retardation = better battery recharge
- Safer and with reduced driver stress
- Less brake wear

BATTERY CAPACITY LAMP



Upper Capacity

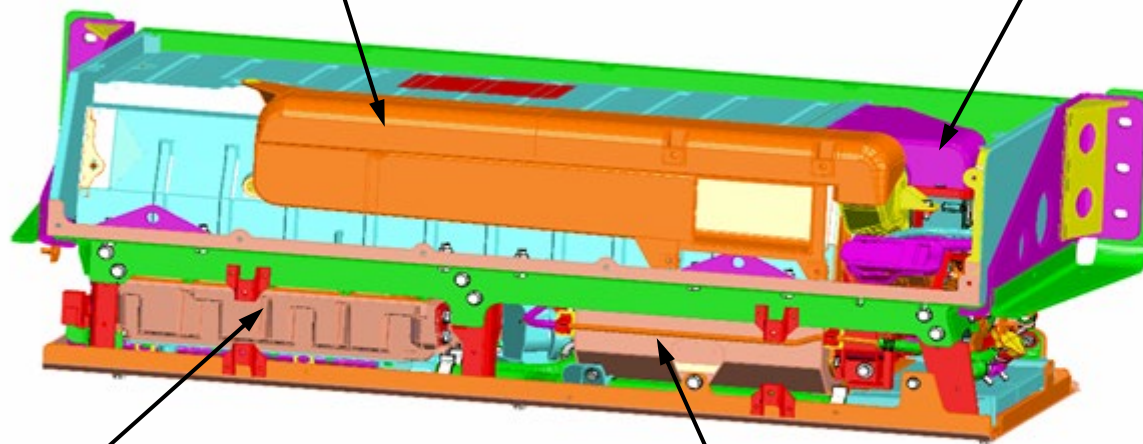
Middle Capacity

Lower Capacity

HYBRID BATTERY

Nickel metal
hydride battery

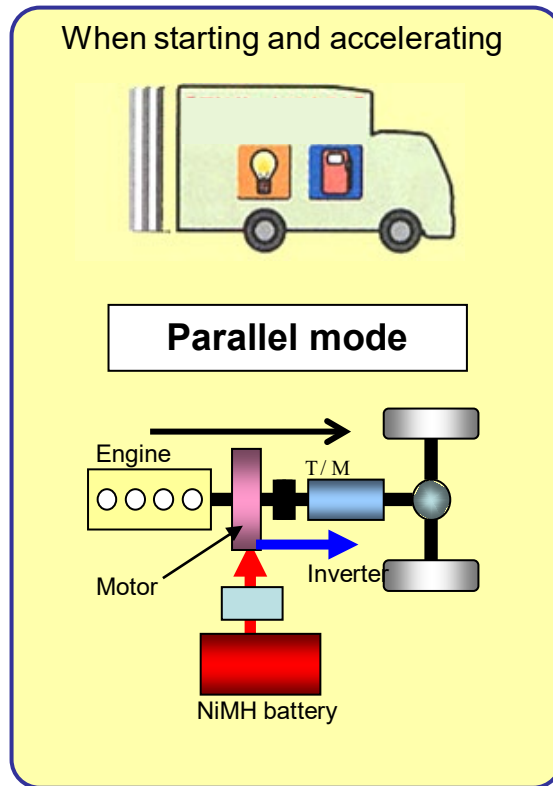
Cooling fan
for HV battery



Inverter

ECU Box
(HV-ECU , ECU for battery)

OVERVIEW OF HYBRID'S OPERATION

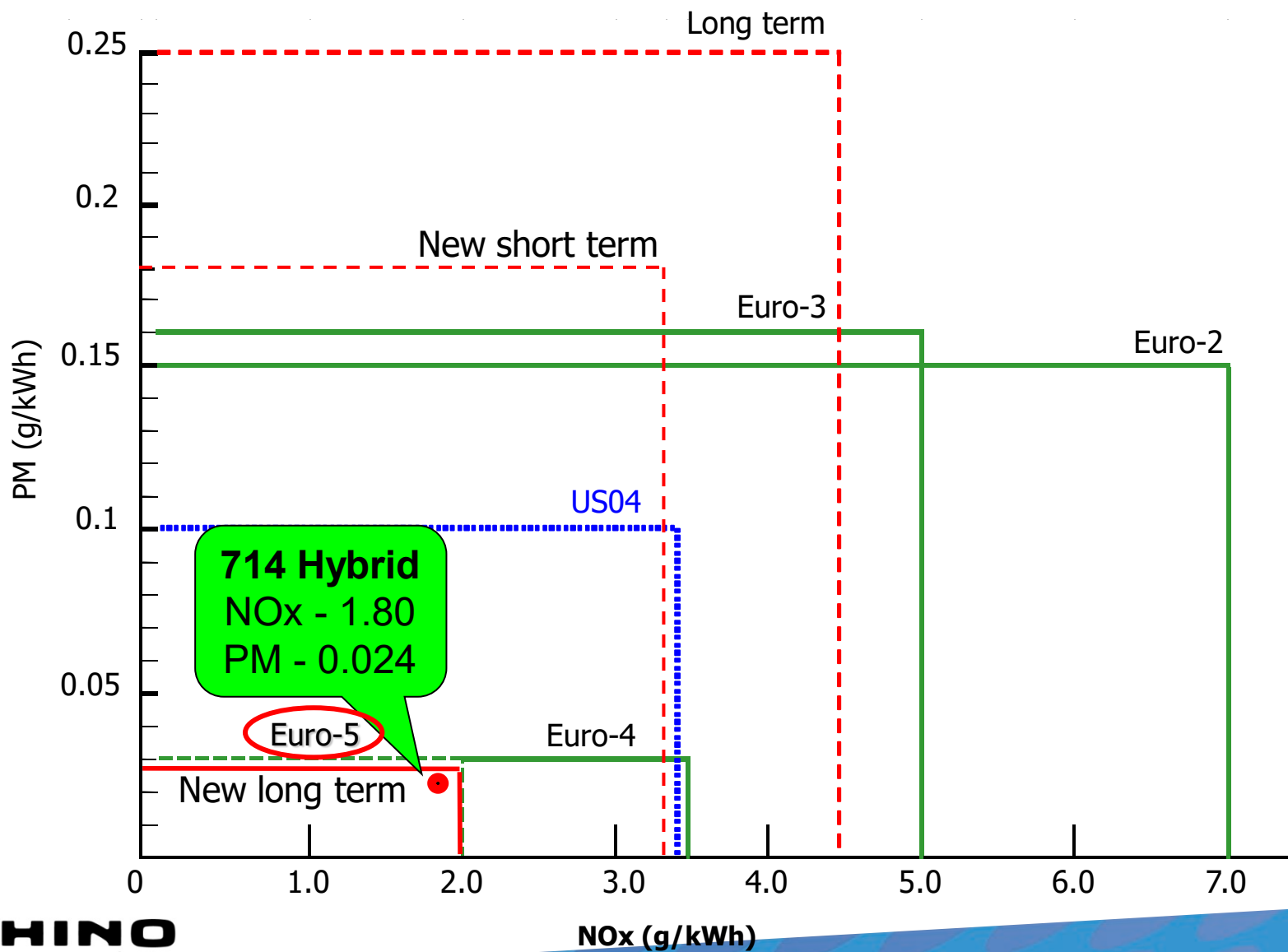


When large torque is needed, like taking off or accelerating etc, electric motor assists engine

When decelerating, recovery of deceleration energy to battery for the next start/acceleration.

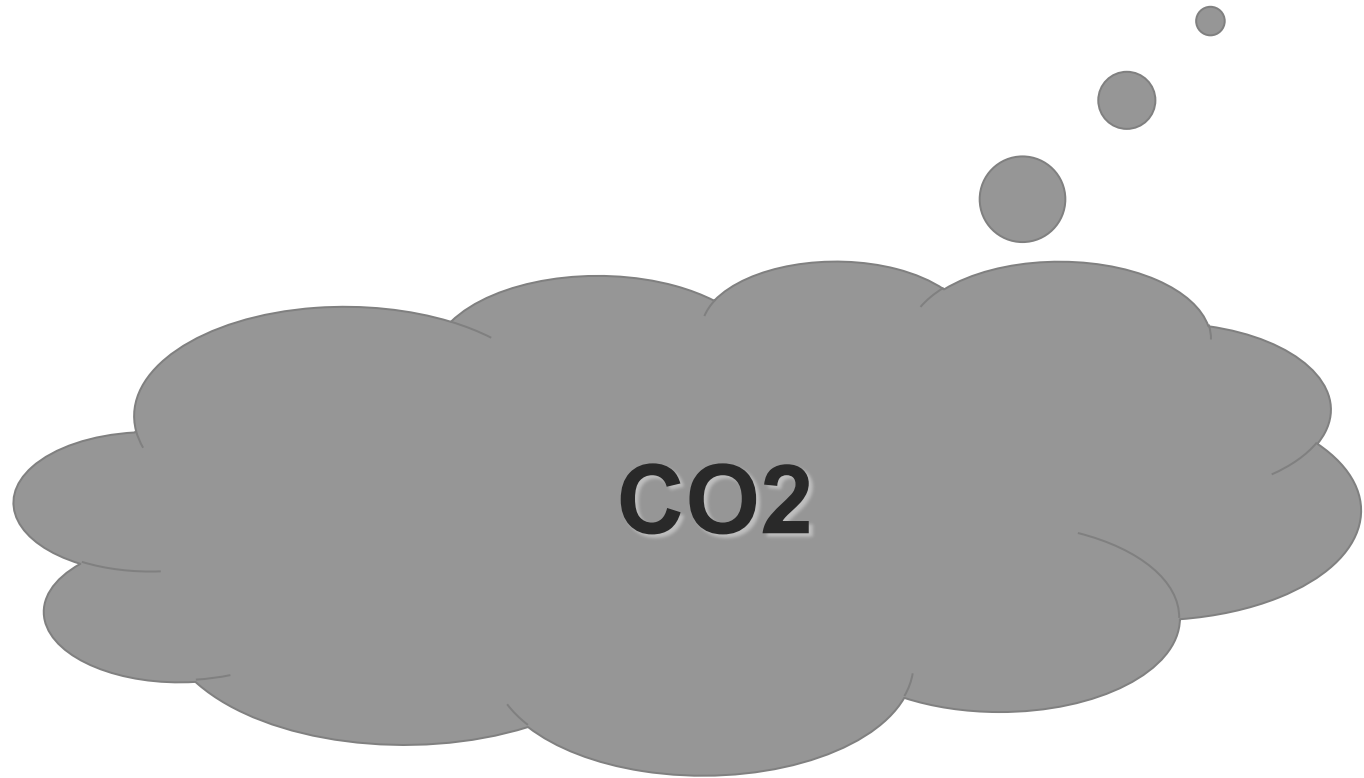
BENEFITS OF THE HINO HYBRID

HINO HYBRIDS EXHAUST EMISSIONS





CO2 REDUCTIONS?





WHAT APPLICATIONS TO GET THE BEST BENEFITS?

- Stop/Start Applications that average 15 km/h
 - possible over 35% fuel savings
- Suburban traffic with traffic lights, average 24 km/h
 - possible 24% fuel savings
- Highway traffic, average 37 km/h
 - possible 9% fuel savings

The word "Hybrid" is written in a white, italicized, sans-serif font. The letters are three-dimensional and appear to be floating above a large, glossy, blue oval shape that has a white highlight on its left side. The background is a blue gradient with a repeating pattern of darker blue ovals.

Hybrid