

INFINITI M35 HYBRID

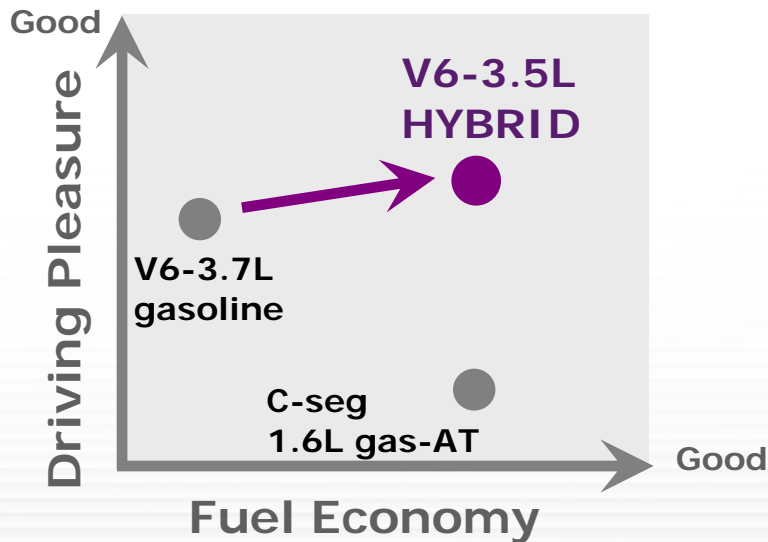


March, 2010

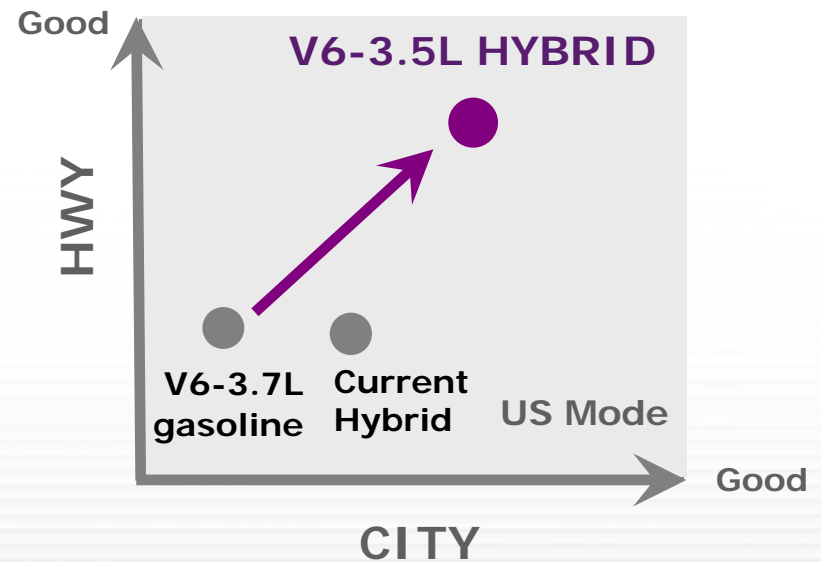
Advantage of INFINITI M35 HYBRID

- Fuel economy champion of all-new M Line saloon range, both in City mode and in Highway mode
- Better response and more Direct feeling
- Lightweight system

Performance
Driving pleasure vs. fuel economy



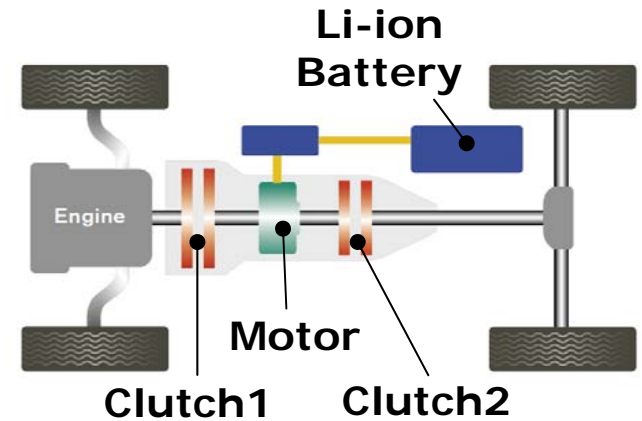
Fuel Economy
HWY mode vs. CITY mode



INFINITI DIRECT RESPONSE HYBRID

■ Parallel hybrid system with one-motor/two-clutch configuration

- ✓ Engine traction directly transmitted from engine to tires (Torque converter-less)
- ✓ Engine can be decoupled via clutch
- ✓ One motor does propulsion and generation



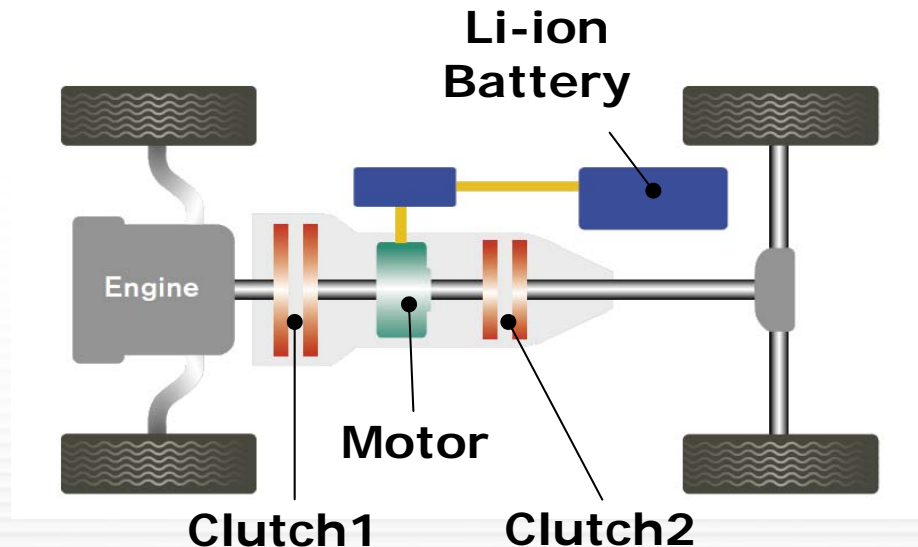
■ Original Li-ion battery

- ✓ Li-ion battery capable of providing high-power immediately



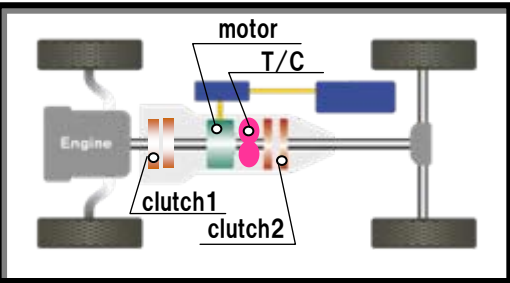
Reasons Behind System's High Performance

1. For Lightweight system, 1 Motor system
-> **1 Motor** operates both propulsion and generation
2. For Fuel economy, decoupling V6 engine in EV drive mode
-> Equipped **Clutch-1** between engine and motor
3. For Fuel economy and DIRECT RESPONSE, no torque converter
-> **Clutch-2** Control and Motor torque in place of torque converter



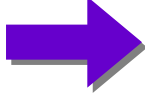
System Comparison with Competitors

Porsche, VW

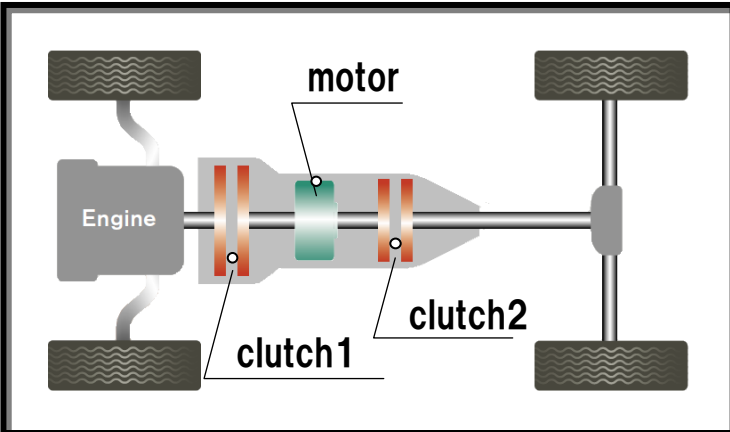


1 Motor 2 Clutch with T/C Parallel Hybrid

- Torque Converter-less
- Motor 38kW -> 50kW

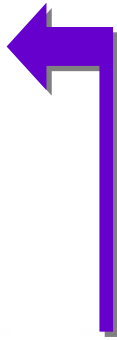


INFINITI



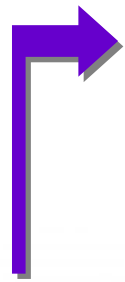
1 Motor 2 Clutch Parallel Hybrid

- 2 Motor -> 1 Motor
- Parallel Hybrid

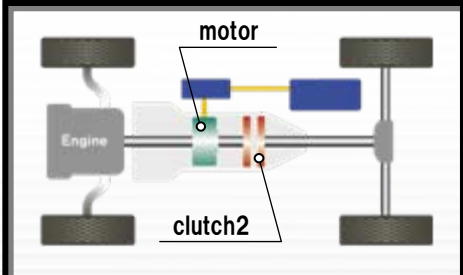


TOYOTA, GM

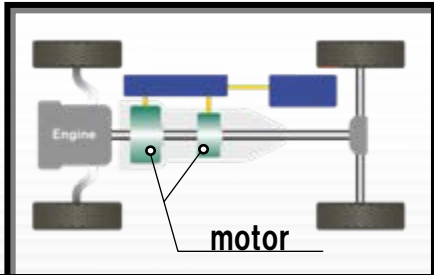
- Clutch installed between engine and motor
- Motor 15kW -> 50kW



HONDA
Mercedes/BMW



1 Motor 1 Clutch Parallel Hybrid



2 Motor Series-Parallel Hybrid

Achieving a Performance Breakthrough

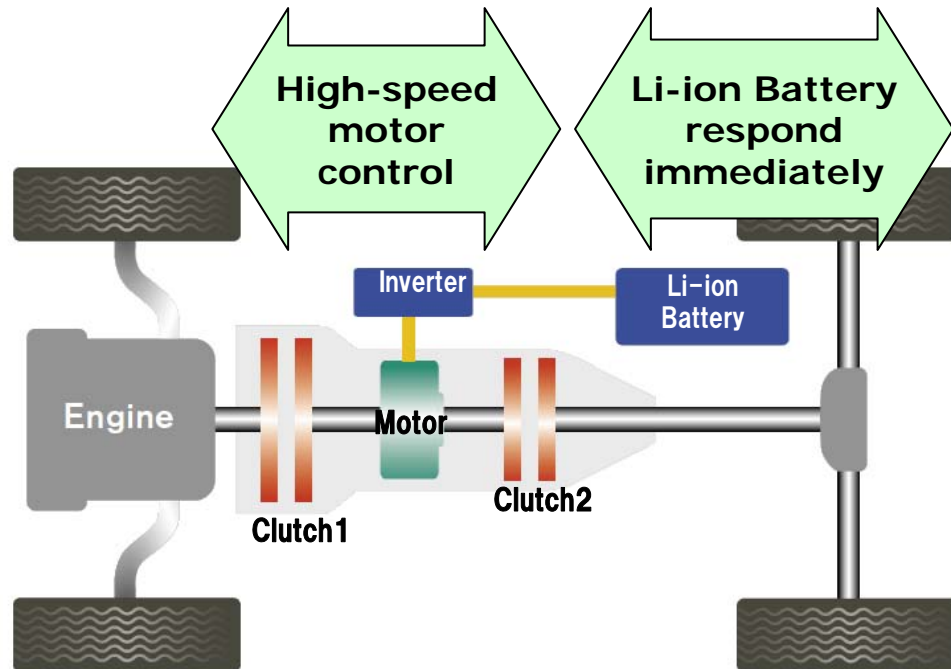
■ Items required for breakthrough

- ✓ Immediate and high-output power assist
- ✓ Smoothness at engine start
- ✓ Responsive adaptive shift control



■ Solution

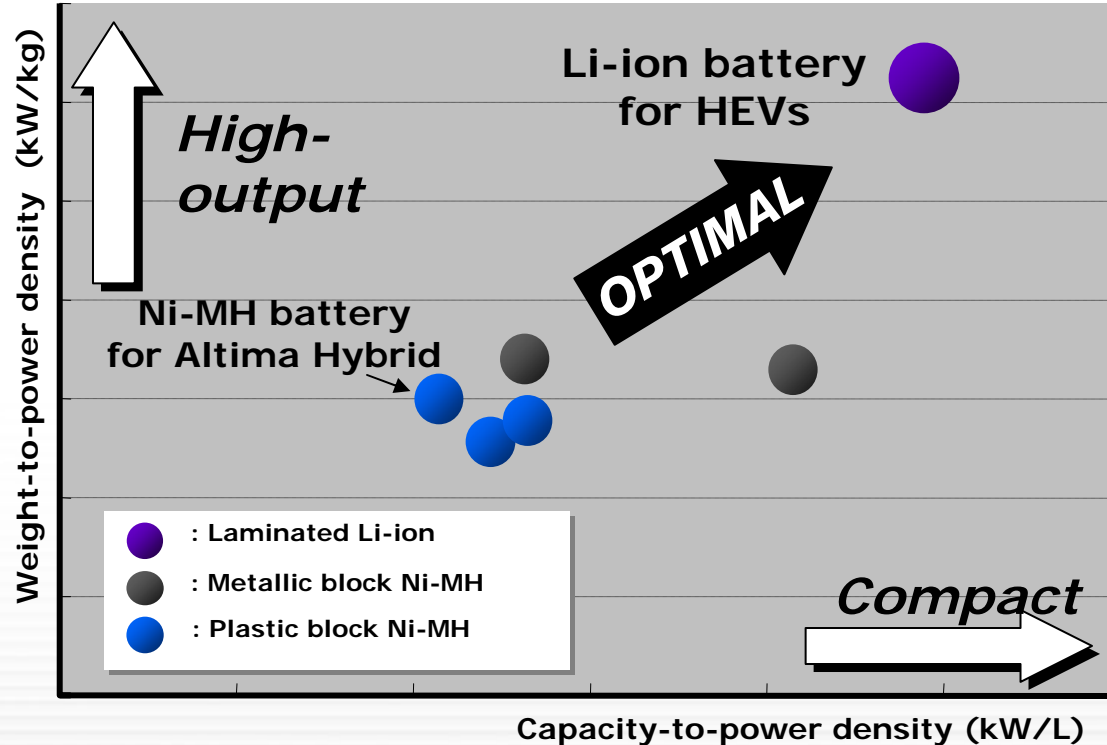
- ✓ High-speed and precise motor control
- ✓ High-output Li-ion battery capable to switch charging/discharging immediately



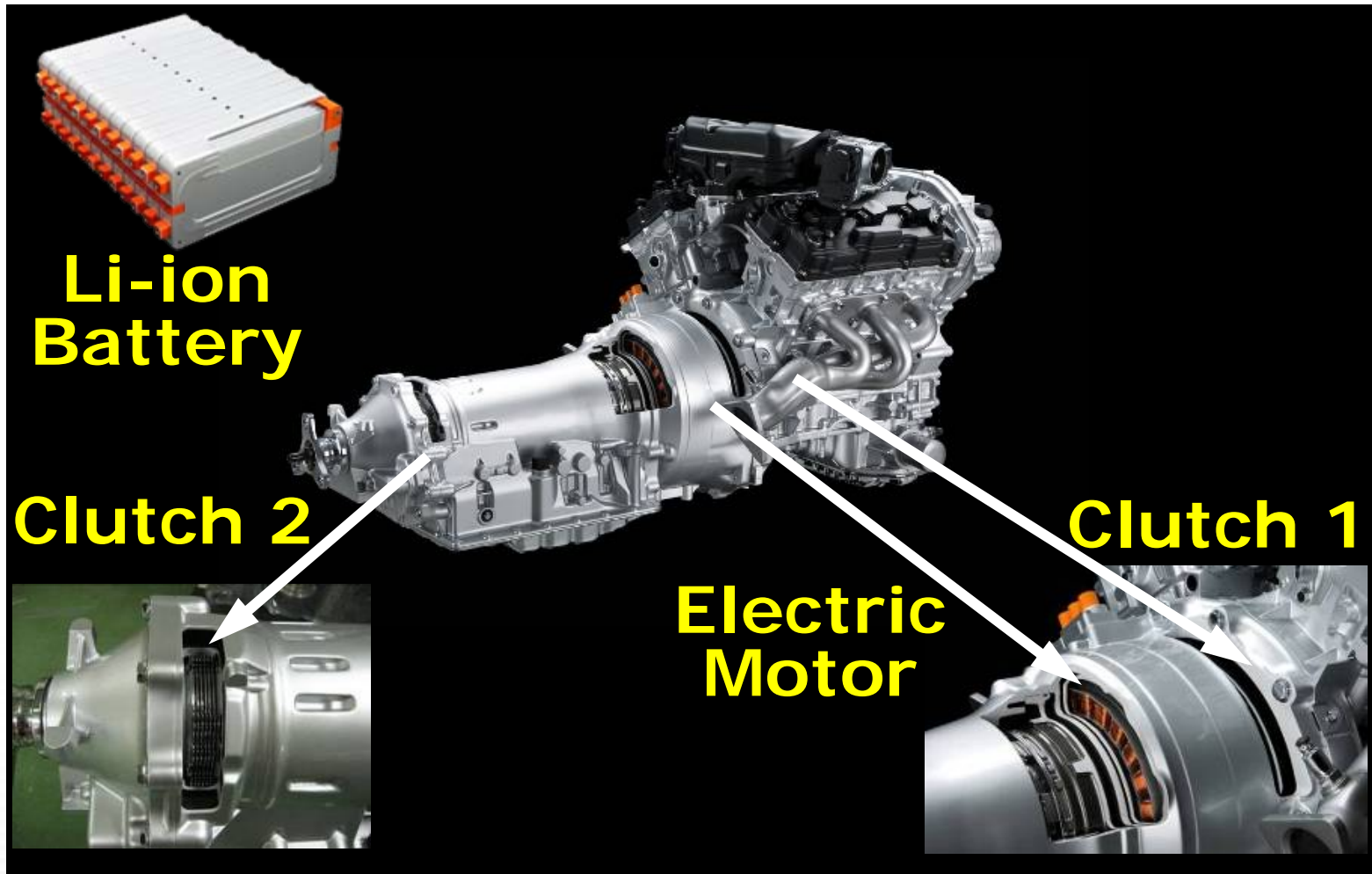
Li-ion Battery

■ High-output and compact original Li-ion technology

- ✓ Achieves twice the power density compared to that of conventional batteries
- ✓ Capable of providing high-power immediately
- ✓ The laminated cell configuration offers high durability and enhanced cooling performance

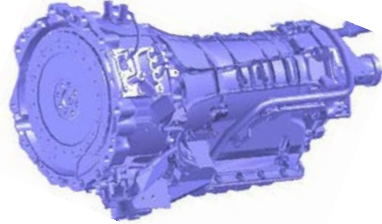


INFINITI DIRECT RESPONSE HYBRID



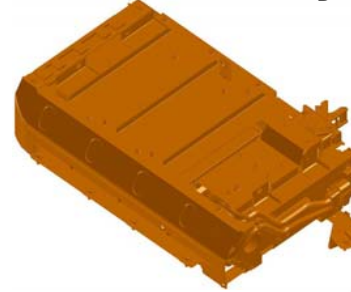
INFINITI DIRECT RESPONSE HYBRID

7 Speed Transmission with Motor



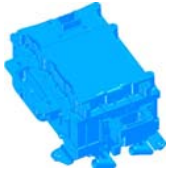
50kW

Li-ion Battery



345V
96cells

Inverter



Engine
V6 3.5L

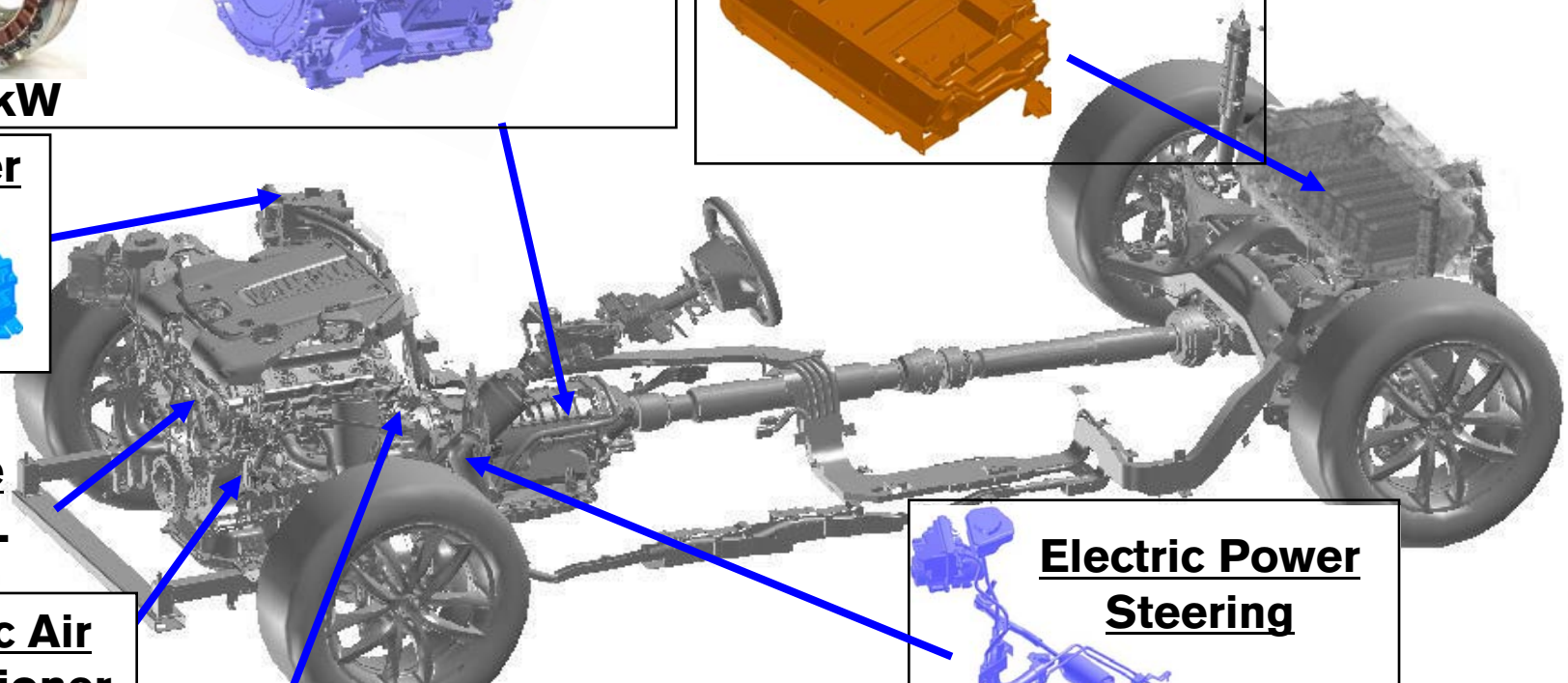
Electric Air
Conditioner



Regenerative Brake



Electric Power
Steering

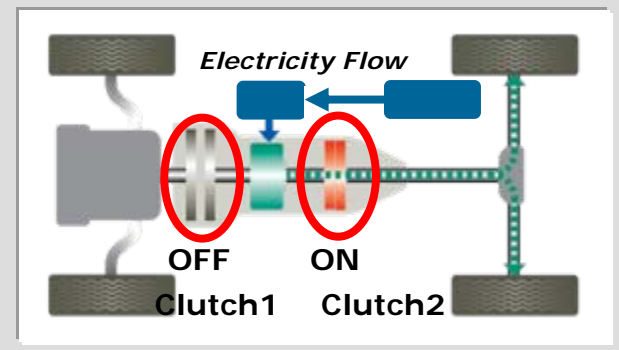


Fuel Efficiency

■ Improved efficiency by connecting/disconnecting engine

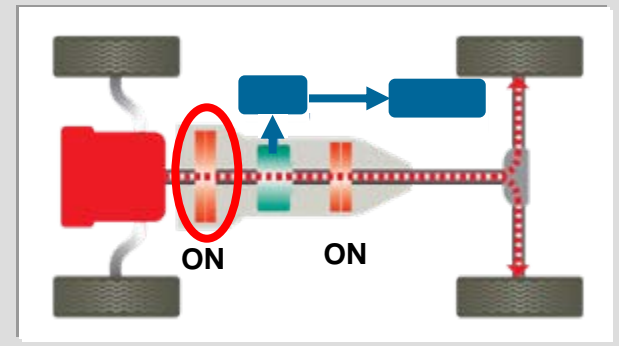
Low- / Mid-speed

- Frequent EV drive can be realized without engine friction to separate from the engine by the clutch



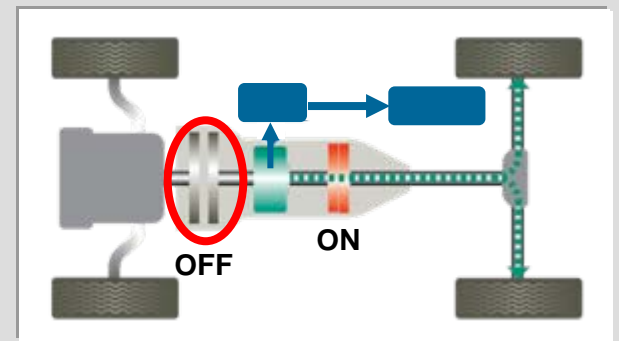
Mid- / High-speed

- The engine can be used in the efficient operation range by generating power with the motor and the high final gear ratio
- Highly efficient because the clutch transmits engine torque directly



Deceleration (regenerating)

- Efficient motor-regenerating by disconnecting engine and eliminating engine friction
- Efficient charging by Li-ion battery when regenerating

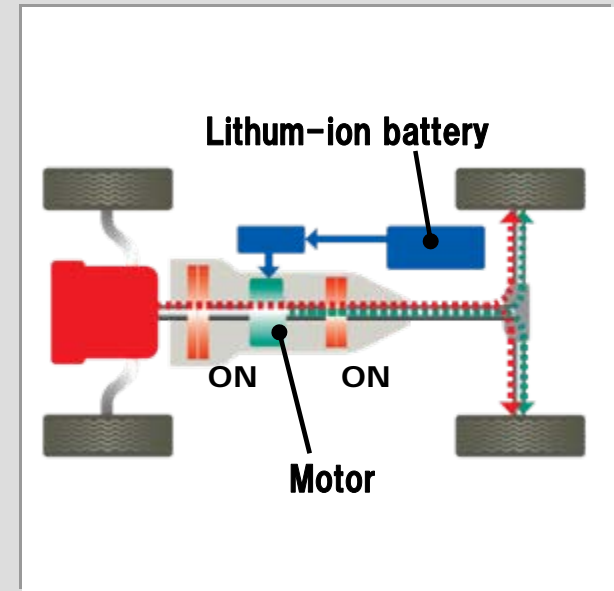


Driving pleasure

- Achieves direct feel and good response by use of high-speed, precise motor control and a Li-ion battery capable of providing high power immediately

Full acceleration/shifting (motor-assisted)

- Linear and direct feeling due to motor assist and “torque converter-less” transmission
- Adopted and enhanced the rev-matching technology onto the motor control
- Power assist without compromising drivability by using compact Li-ion battery



"INFINITI **DIRECT RESPONSE** HYBRID "

- ✓ Engine traction **directly transmitted** to tires without Torque converter
- ✓ Engine can **be decoupled via clutch** in EV mode
- ✓ Li-ion Battery provide **High response and High Power**

Fuel Economy

- ✓ More **Efficiency**
- ✓ Frequent **EV Drive**

Driving Pleasure

- ✓ More **Direct** feeling
- ✓ Better **Response**

Lightweight

- ✓ **1** motor
 - ✓ **Li-ion** Battery
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