Powersource Evolution

Shuichi NISHIMURA
Corporate Vice President
Nissan Motor Co., Ltd.

Agenda

- Nissan’s approach for sustainable mobility
- Technologies for Powersource Evolution

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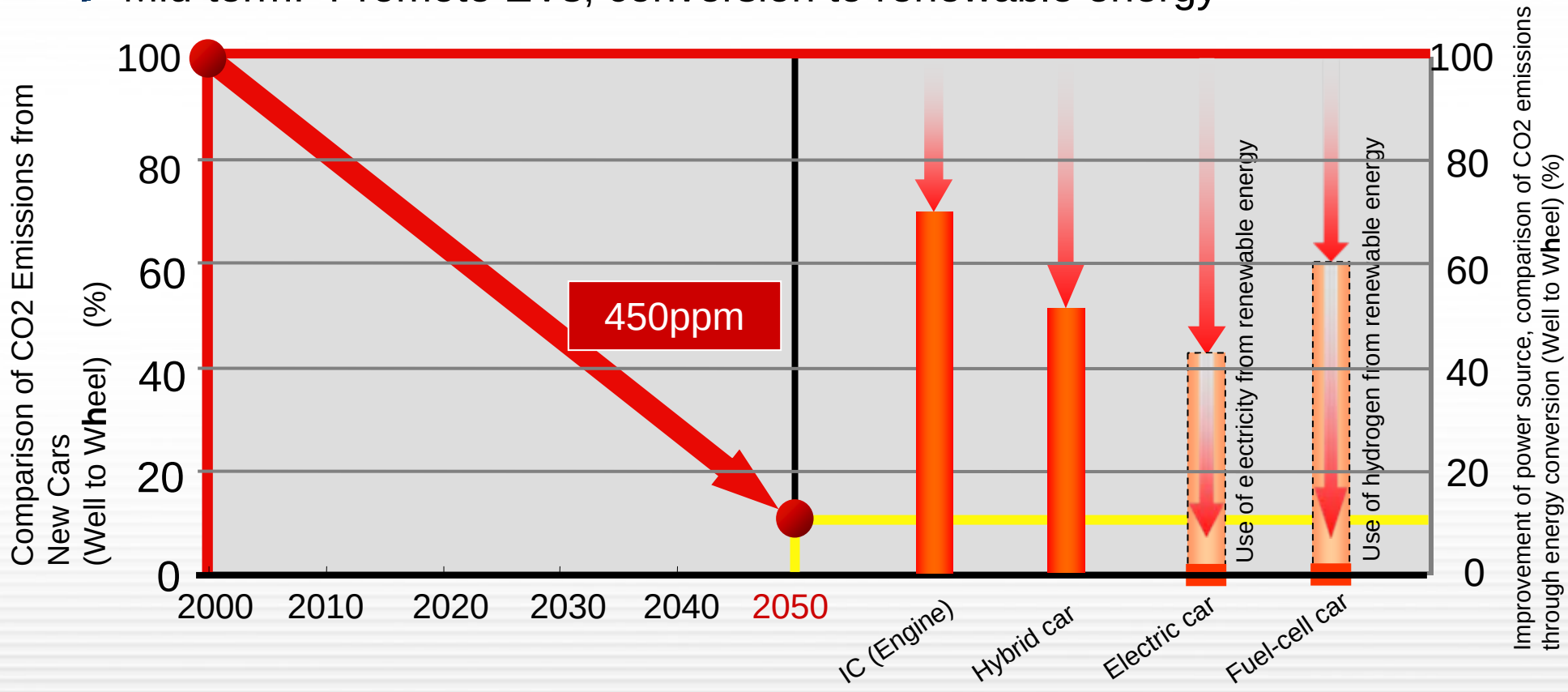
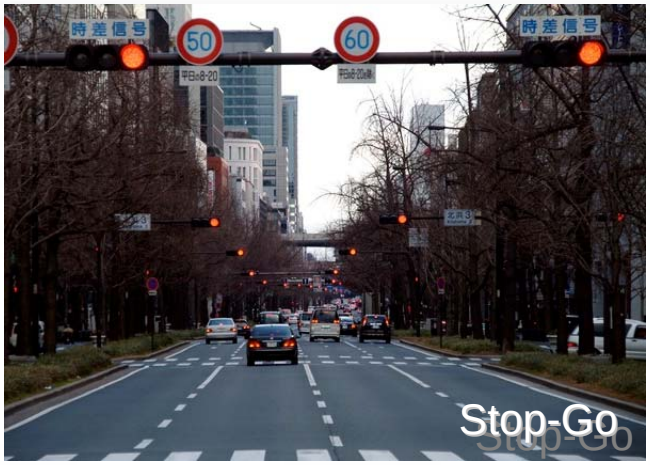
CO_2 reduction scenario

- CO_2 reduction as below is required
- Powersource Evolution becomes essential
  - Short-term: Engine efficiency improvements
  - Mid-term: Promote EVs, conversion to renewable energy



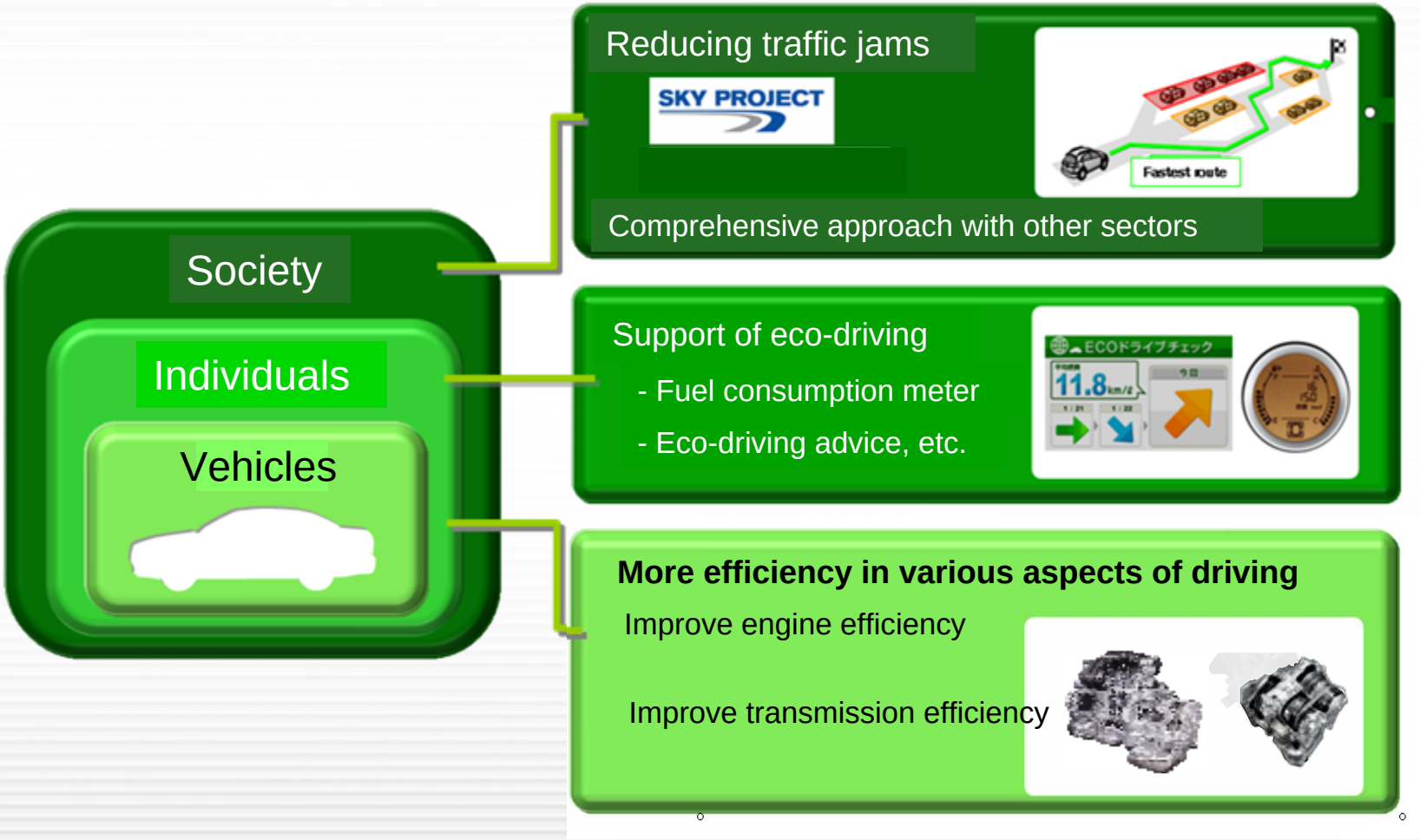
CO_2 reduction in real world

- In real world, vehicles are used in various conditions
- CO_2 reduction to be approached from several aspects



Development approach

- For efficient CO2 reduction in real world,
  “Triple Layered Approach” has been applied



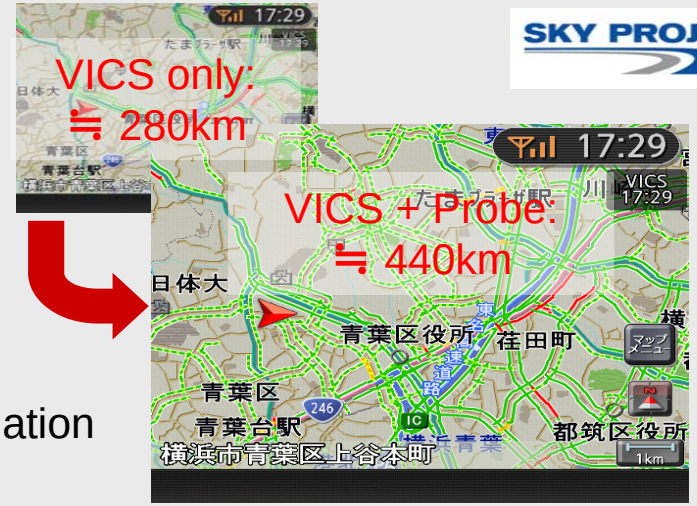
Technologies for “society” level approach

- “SKYPROJECT” to analyze actual traffic information, “fastest route guidance” to realize smooth traffic

SKY PROJECT

Society

- Utilize “probe” information
- Trial with many cities



actual traffic information

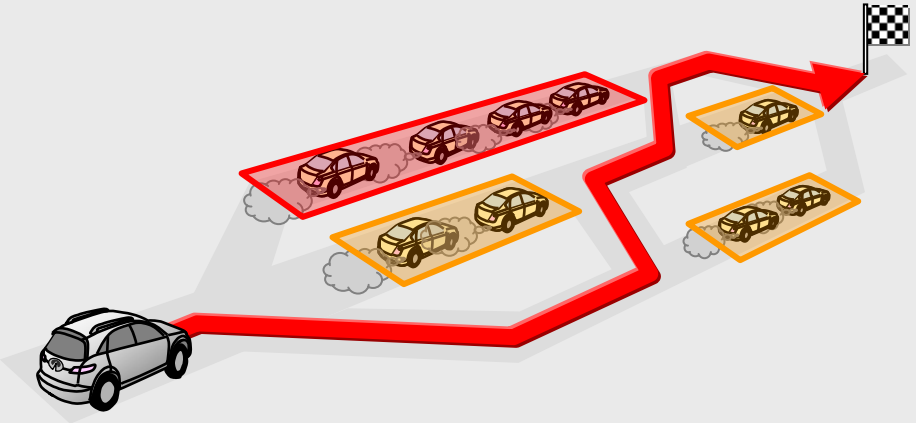
SKY PROJECT

PURE DRIVE

Fastest route guidance

Society

- “fastest route” calculation
- Shorter travel time by 20%
- Less CO2 by 17%



PURE DRIVE

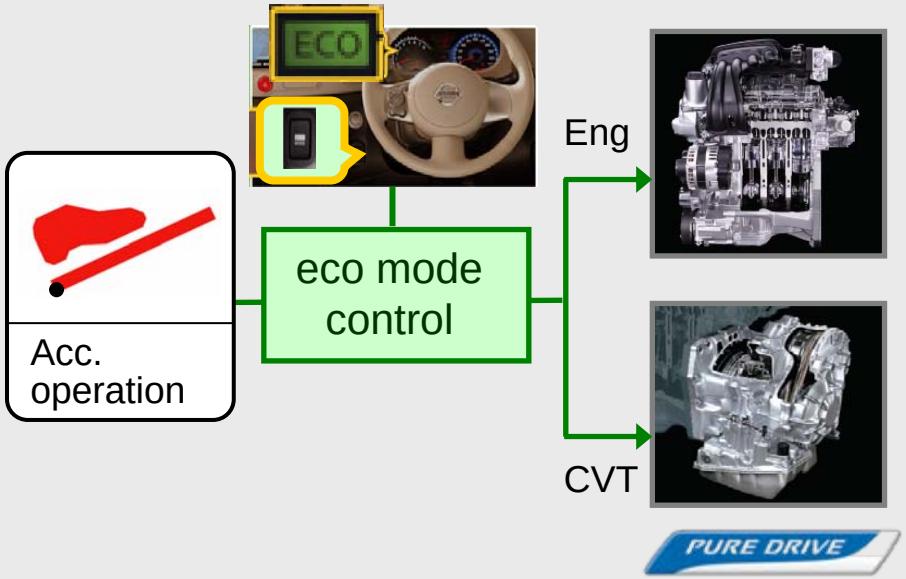
Technologies for “individual” level approach

- “eco-mode” to control powertrain most effective, “eco-pedal” to directly support eco-driving

eco-mode

Individuals

- Moderate accel operation
- Cooperative control Eng and CVT
- “eco-mode” indicator

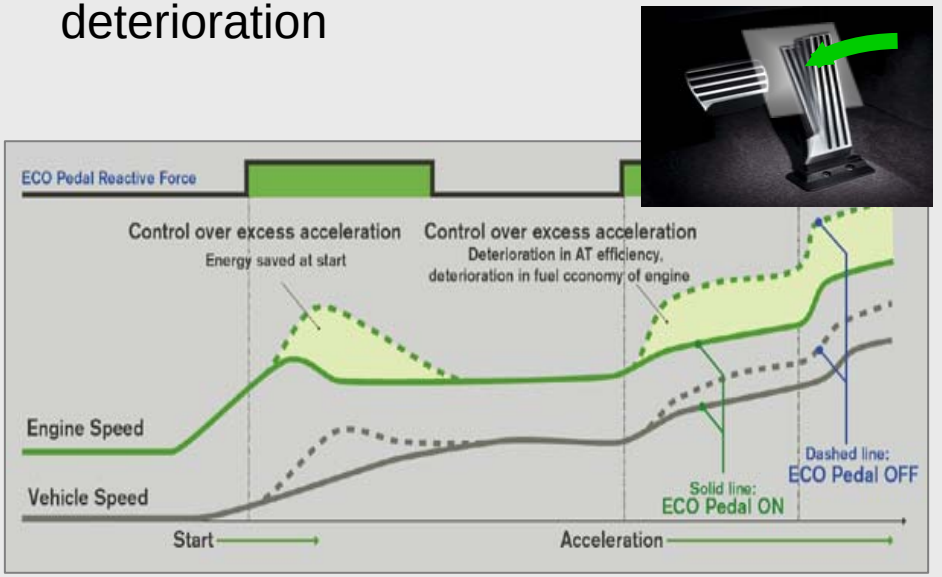


PURE DRIVE

eco-pedal

Individuals

- Avoid excessive acceleration
- Direct information of fuel economy deterioration



PURE DRIVE

Technologies for “vehicle” level approach

- “Downsizing Engine” and “new CVT” was launched in Micra, minimizing PT losses. Nissan Micra M/T achieved 95g CO2

Downsizing Engine (HR12DDR)

Vehicle

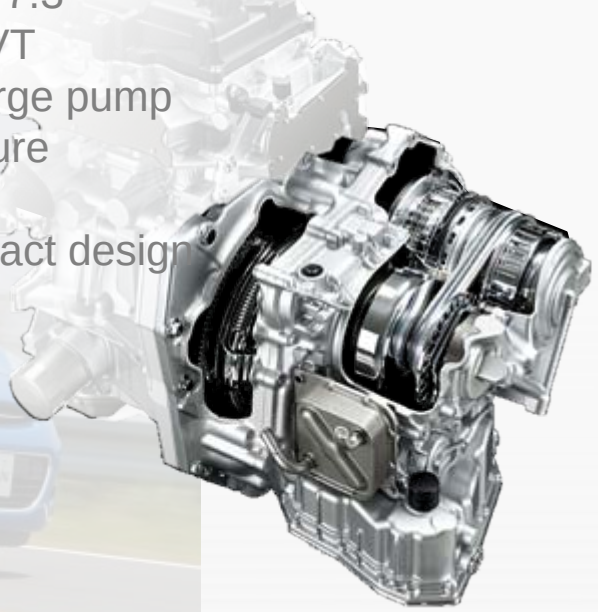
- miller cycle + supercharger
- direct injection
- comp. ratio 13
- dual com phaser
- high flow EGR
- DLC coating
- micro finishing

PURE DRIVE

CVT with idling stop

Vehicle

- ratio coverage 7.3 with 2 peed CVT
- electric oil charge pump
- inner lock feature for idling stop
- light and compact design
- low fric. belt

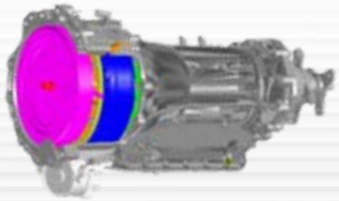


PURE DRIVE

Technologies for “vehicle” level approach

- HEV launched “1 Motor 2 clutch” type HEV, mass-produced EV “LEAF”

1 motor 2 clutch



1M2C system located in T/M

Motor

synchronous motor

Inverter

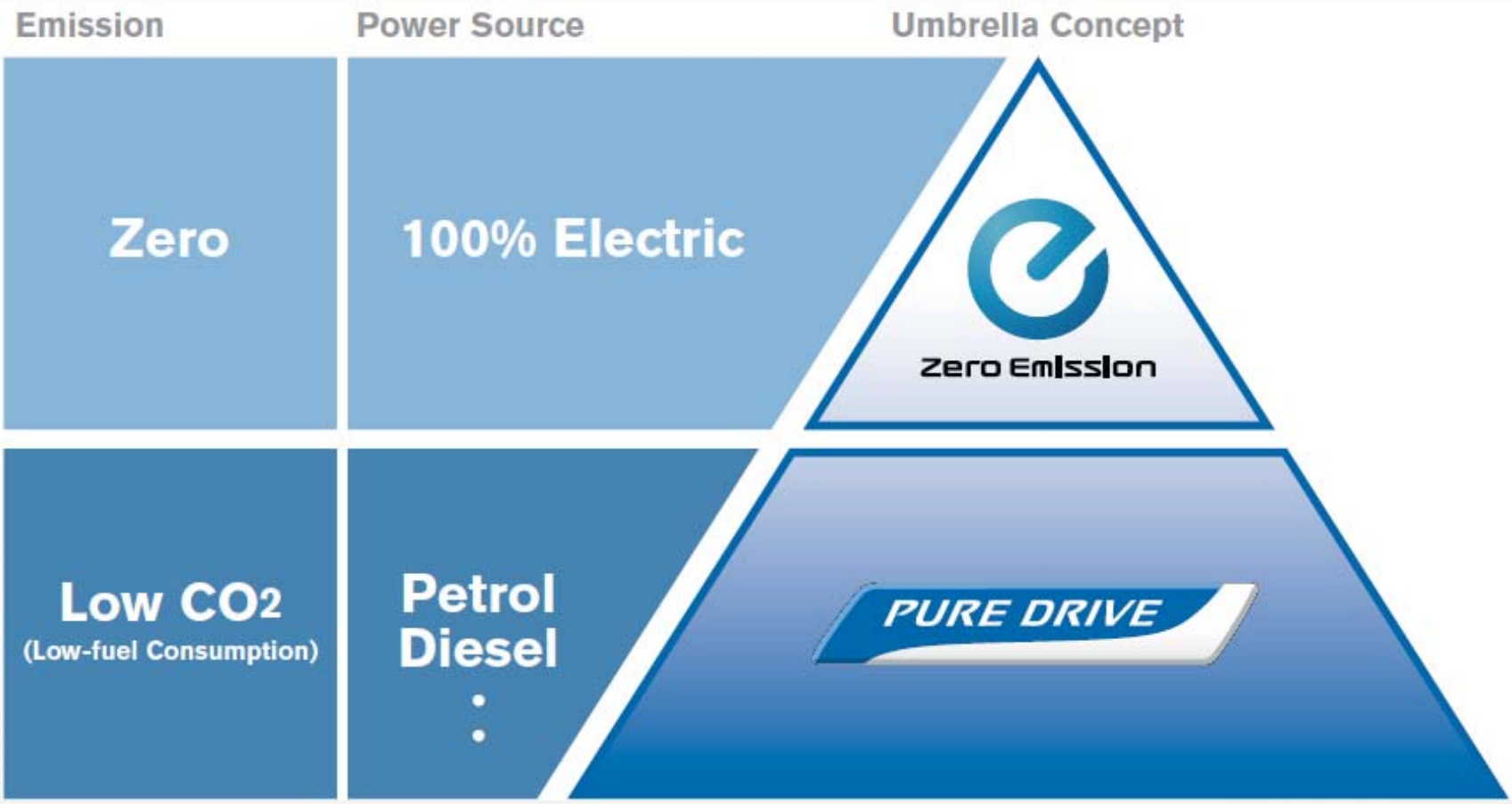
high power IGBT

Battery Pack

laminate type high energy density

Nissan’s concept toward Sustainable Mobility

- Nissan’s Sustainable Mobility technologies are to be launched within two pillars – Zero Emission and PURE DRIVE



Agenda

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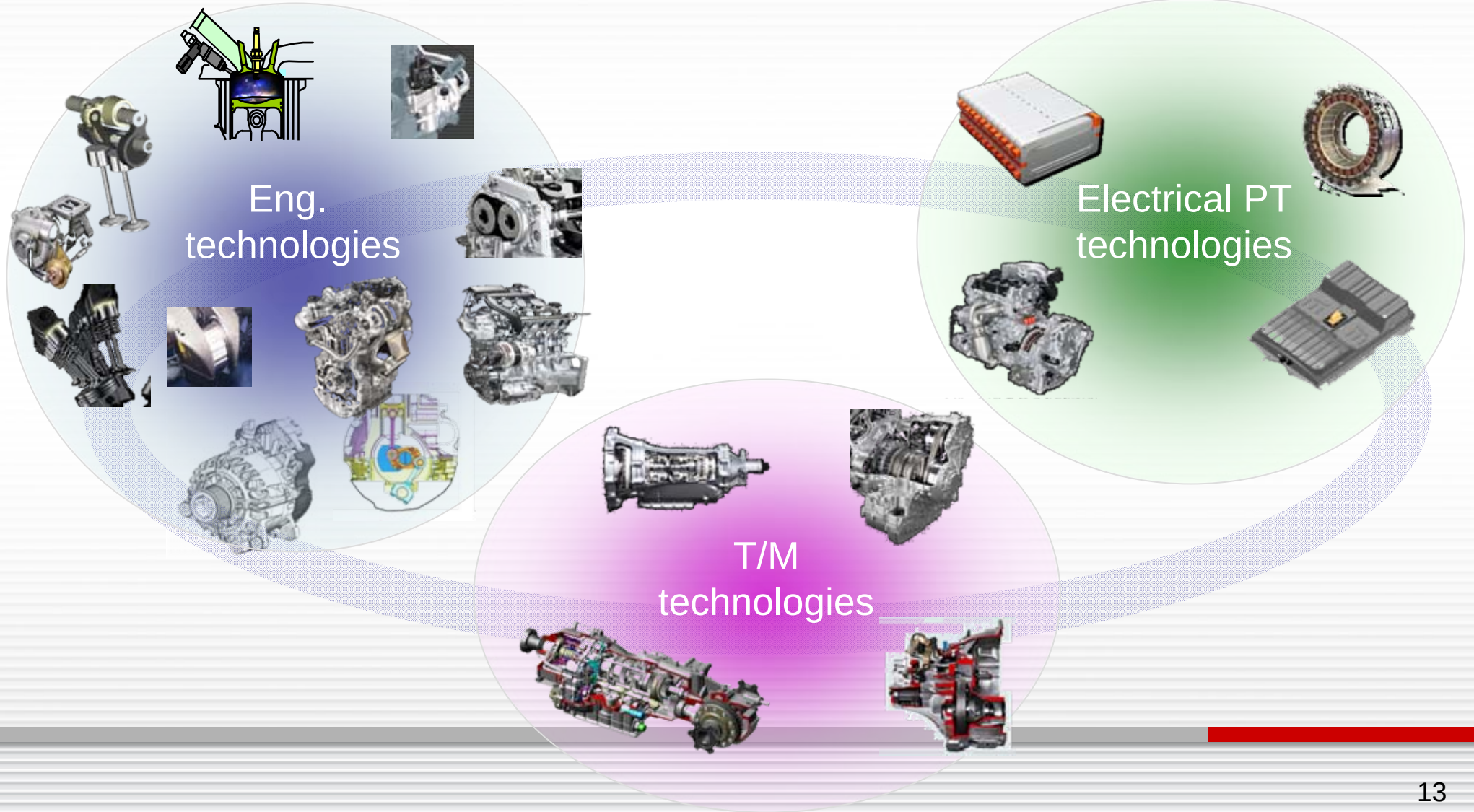
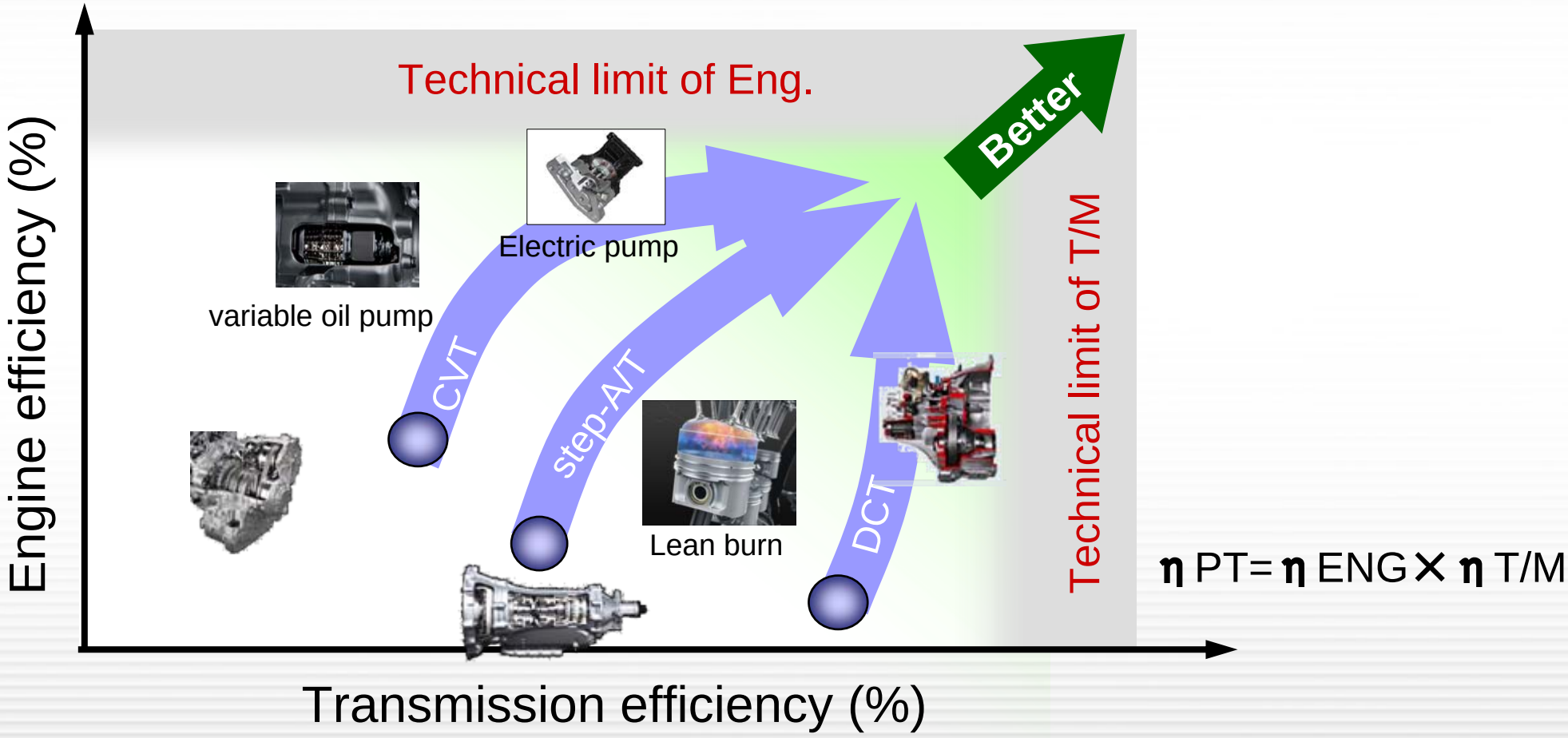
Chaos of Technologies

- Many technologies are under development within each area (engine, transmission, electric components, etc.)



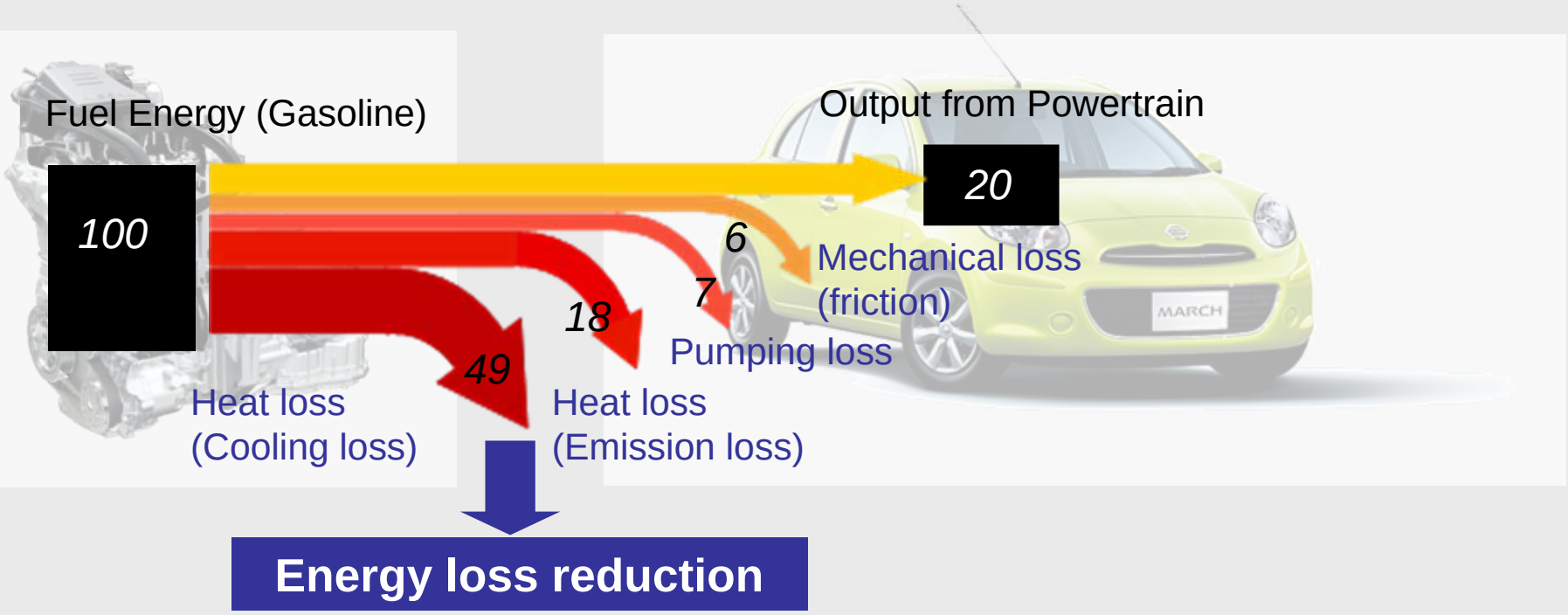
Approach “as Powertrain”

- Several Paths to improve PT efficiency
- To clarify effectiveness of each technology as combination, approach “as Powertrain” becomes essential



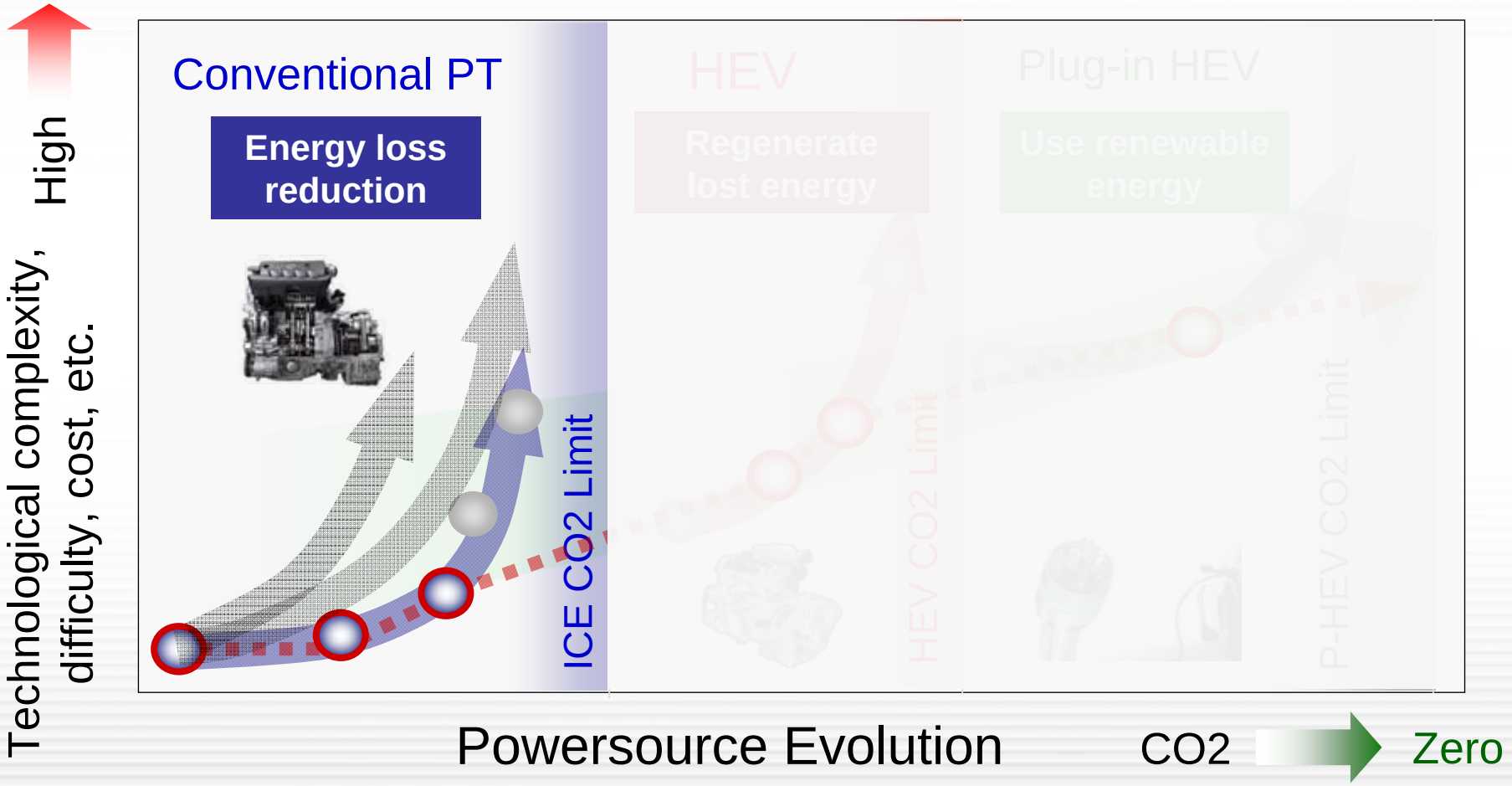
Evolution of Conventional Powertrain

- As first step, reduction of energy losses are essential
- Various technologies have developed to reduce each energy losses, but conventional powertrain has theoretical limit to improve



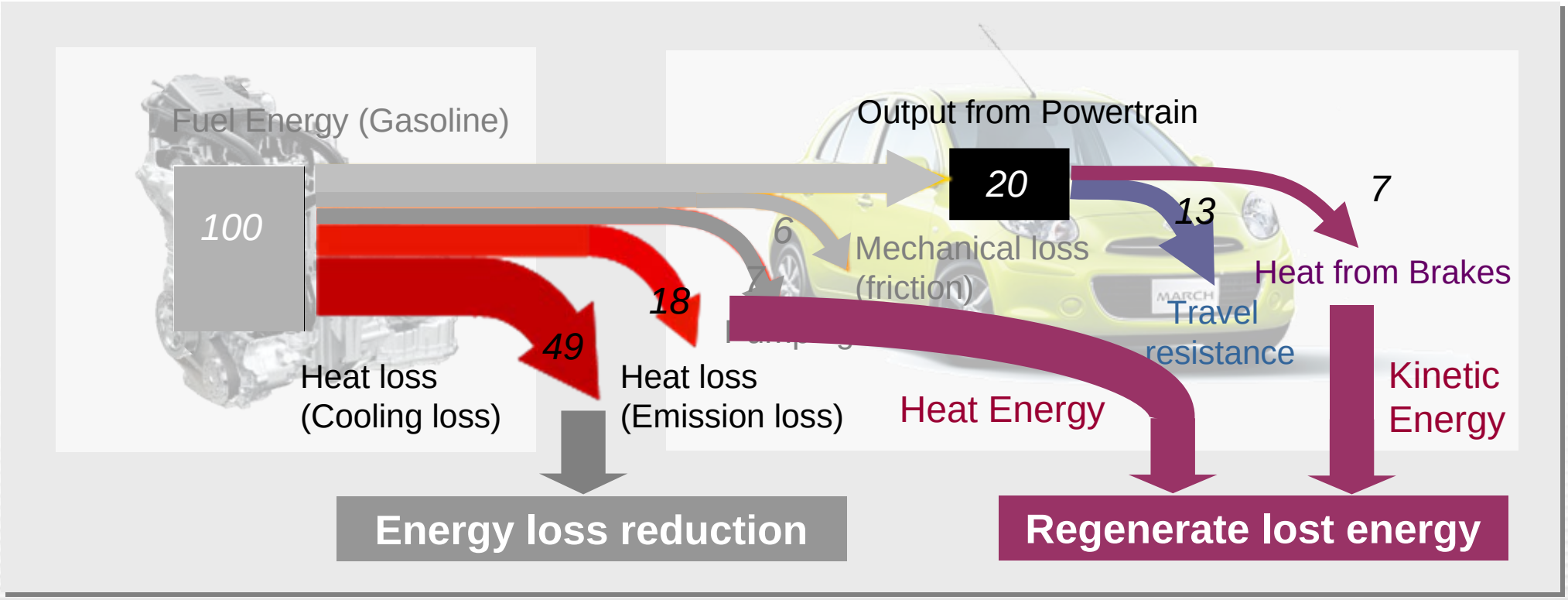
Powersource Evolution

- By “as Powertrain” approach, technologies can be arranged in conventional PT zone as below



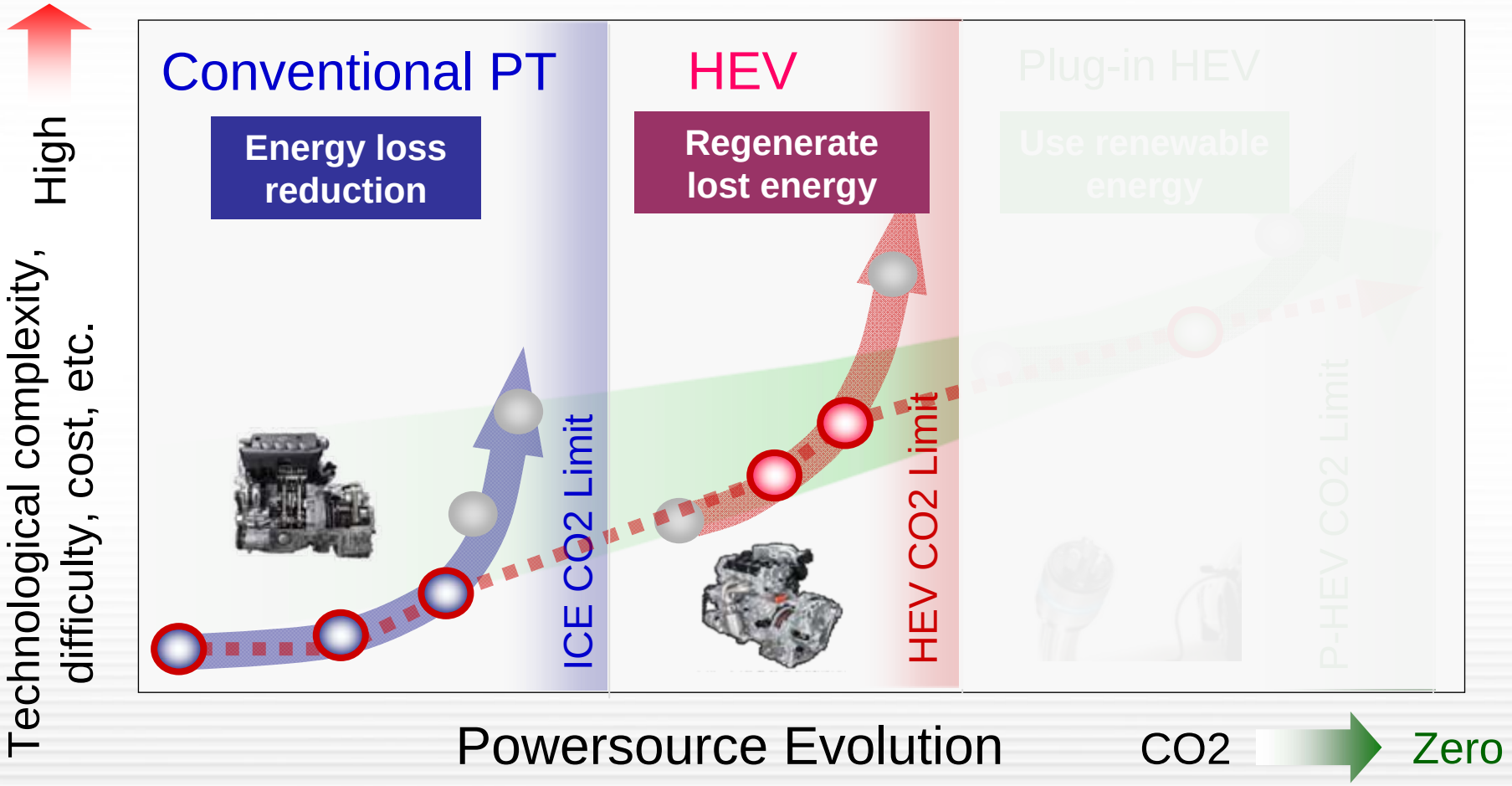
Switch to Energy Regeneration Stage

- CO2 reduction technologies are to shift;
  energy loss reduction tech.→ lost energy regeneration tech
- Reduction / regeneration of energy loss have technical limits,
  to reduce CO2 further, Powersource has to evolve



Powersource Evolution

- Technologies have to be arranged to consider all stages under “As Powertrain” and “As Powersource Evolution” concept



Powersource Evolution

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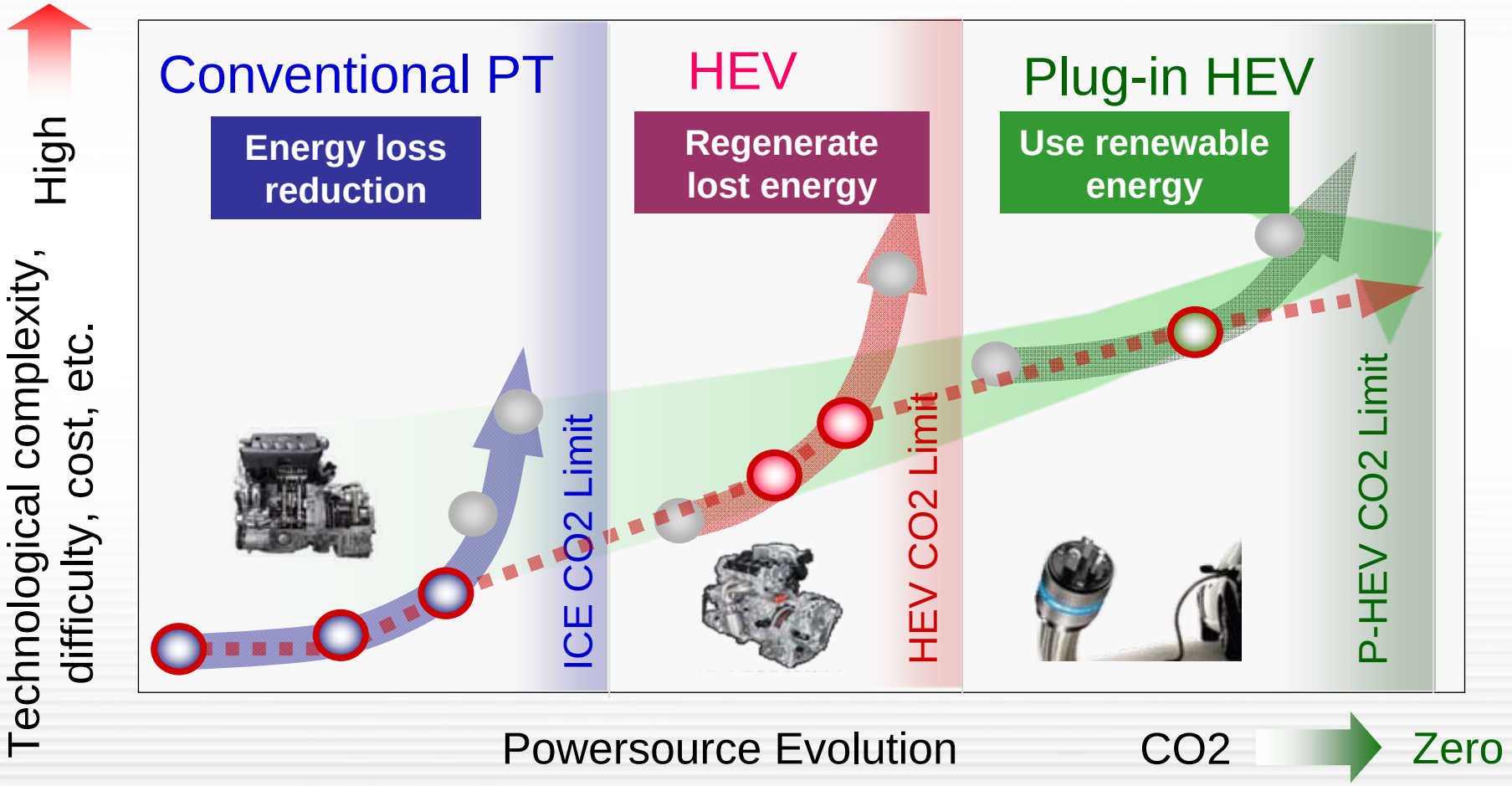
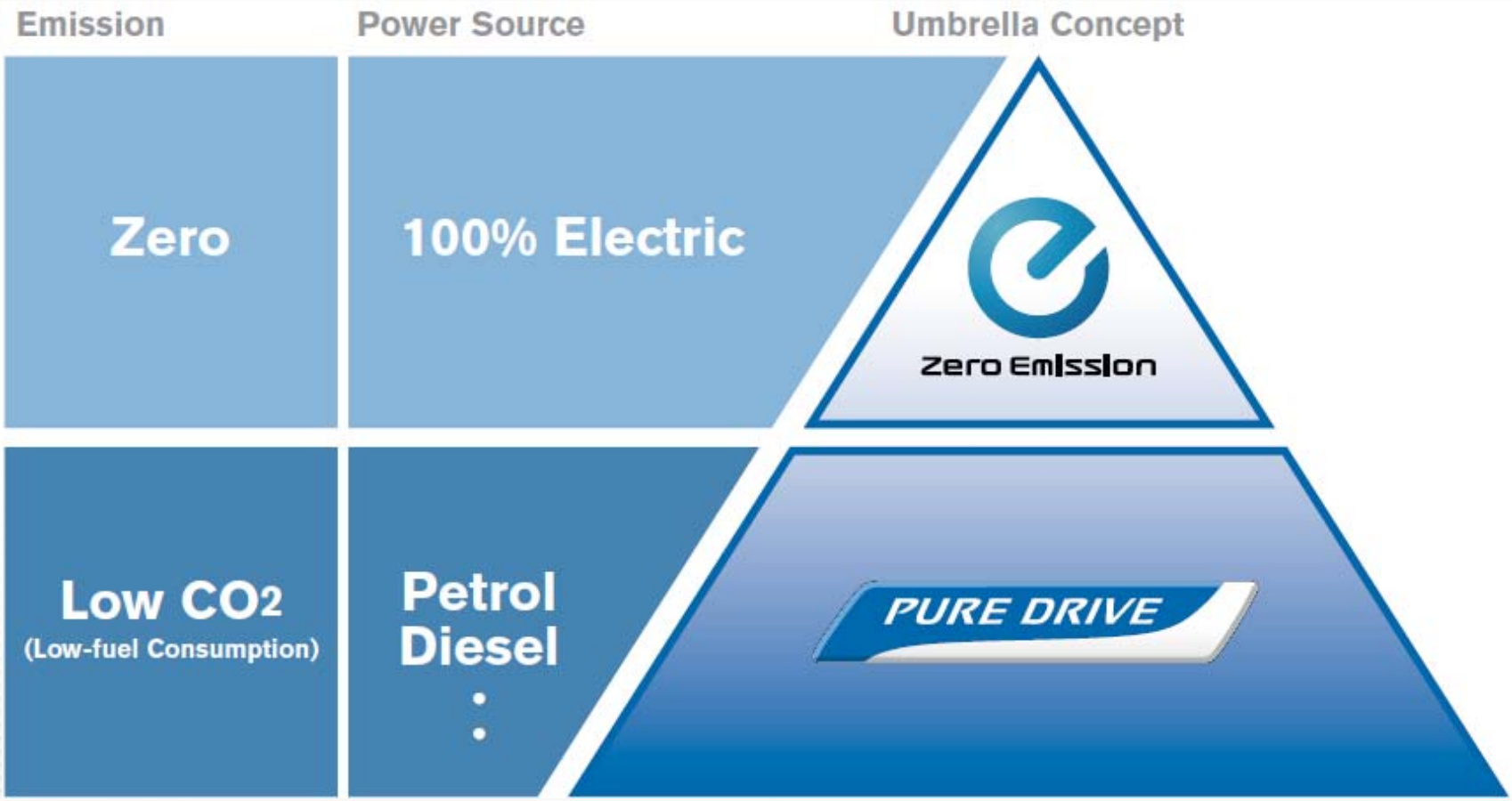


Nissan’s concept toward Sustainable Mobility

- Nissan’s aforesaid Sustainable Mobility technologies are to be launched continuously along the concept !



Thank you for your attention!