Toyota's Initiatives for Realizing Sustainable Mobility

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Toyota's Actions
Focused on Rapid Changes Today

Advanced Gasoline Engine Technology

Complete upgrading all of engine series from L3 (1.0 ℓ) through V8

L3
1.0ℓ

Newly-developed
L4
1.3ℓ
New Start & Stop system

L4
1.8ℓ
2.0ℓ
Valvematic system

Newly-developed
L4
2.5ℓ
2.7ℓ

V6
2.5ℓ
3.0ℓ
3.5ℓ
4.0ℓ

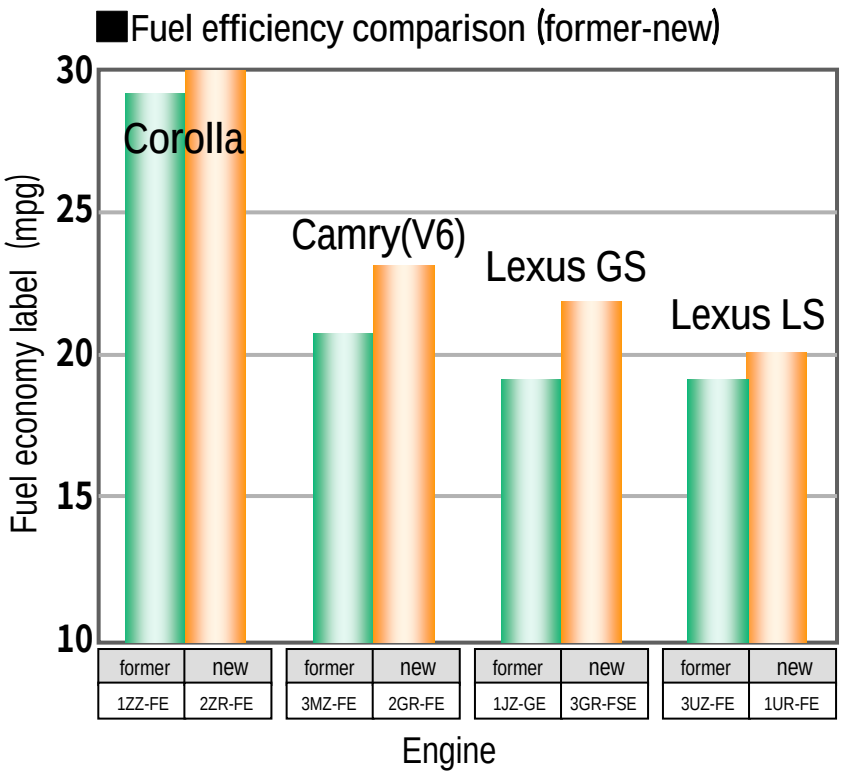
V8
4.6ℓ
5.0ℓ
5.7ℓ

Add variations of fuel-efficient engines

Advanced Gasoline Engine Technology

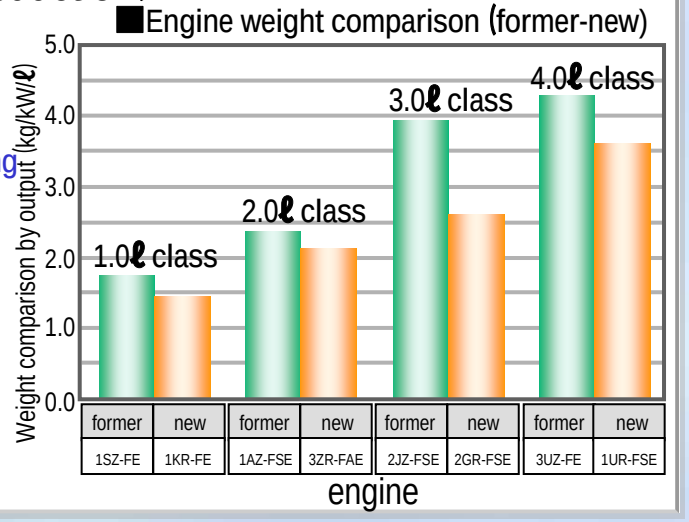
<Improvement of fuel efficiency>

Achieved improvement in fuel efficiency by introducing new engines



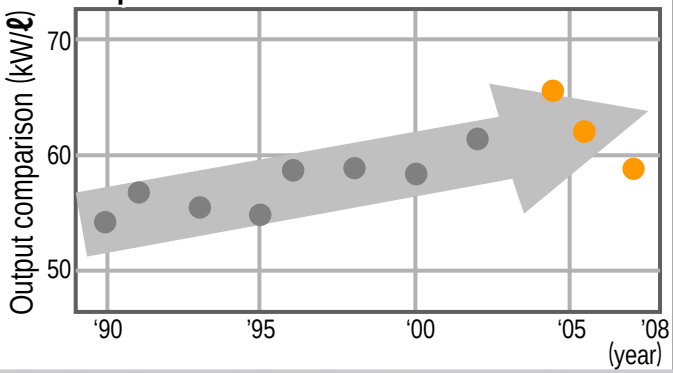
<Weight reduction>

Reduced weight by using aluminum material, and modularized parts.



<Improvement of performance>

Performance improved by introducing D-4S, high compression ratio, and lowering friction.



Achieved improvement in weight reduction, fuel efficiency, and in performance at the same time

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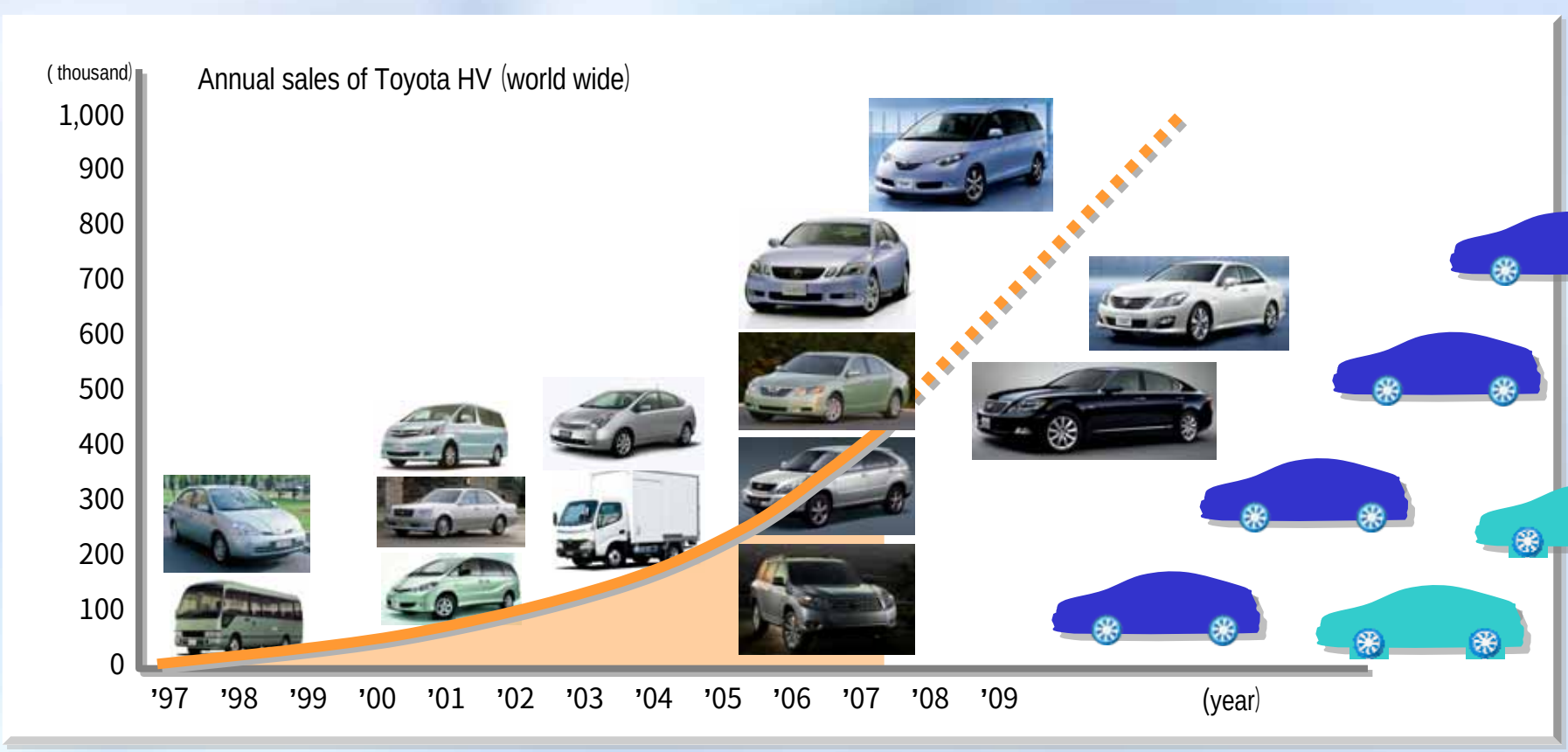
Expansion of promoting Hybrid Vehicles (HV)



Accelerate promoting hybrid models to satisfy market demand

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Actions Focused on Mid-Long Term

Recognizing Challenges

1. Reducing Oil Consumption
   and Promoting Wide Use of Alternative Energies

2. Reducing CO_2 (for preventing global warming)

3. Prevention of Air Pollution

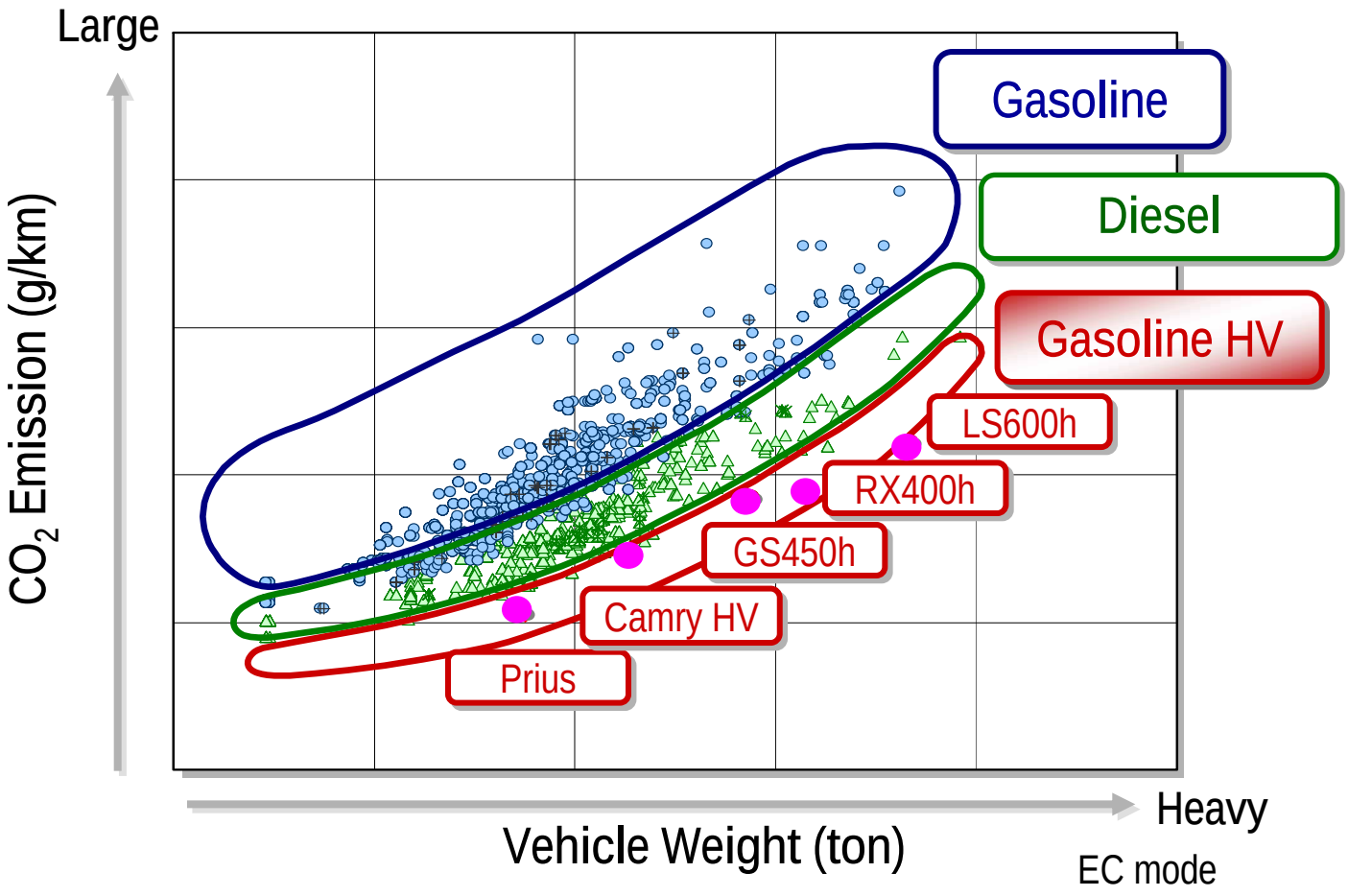
Initiatives for Reducing Size and Weight of Vehicles

【 Six methods by which world's most compact vehicle was achieved 】

Differential gear reverse placement 	Center take-off gearbox 
Placement of ultra-thin fuel tank under floor 	Slimmed seat backs 
Compact air conditioning unit 	Asymmetric installment panel 

Size and weight reduction is crucial to energy conservation and lower CO_2 emissions

Environmental Superiority of HV



HVs contribute to reduced CO_2 emissions

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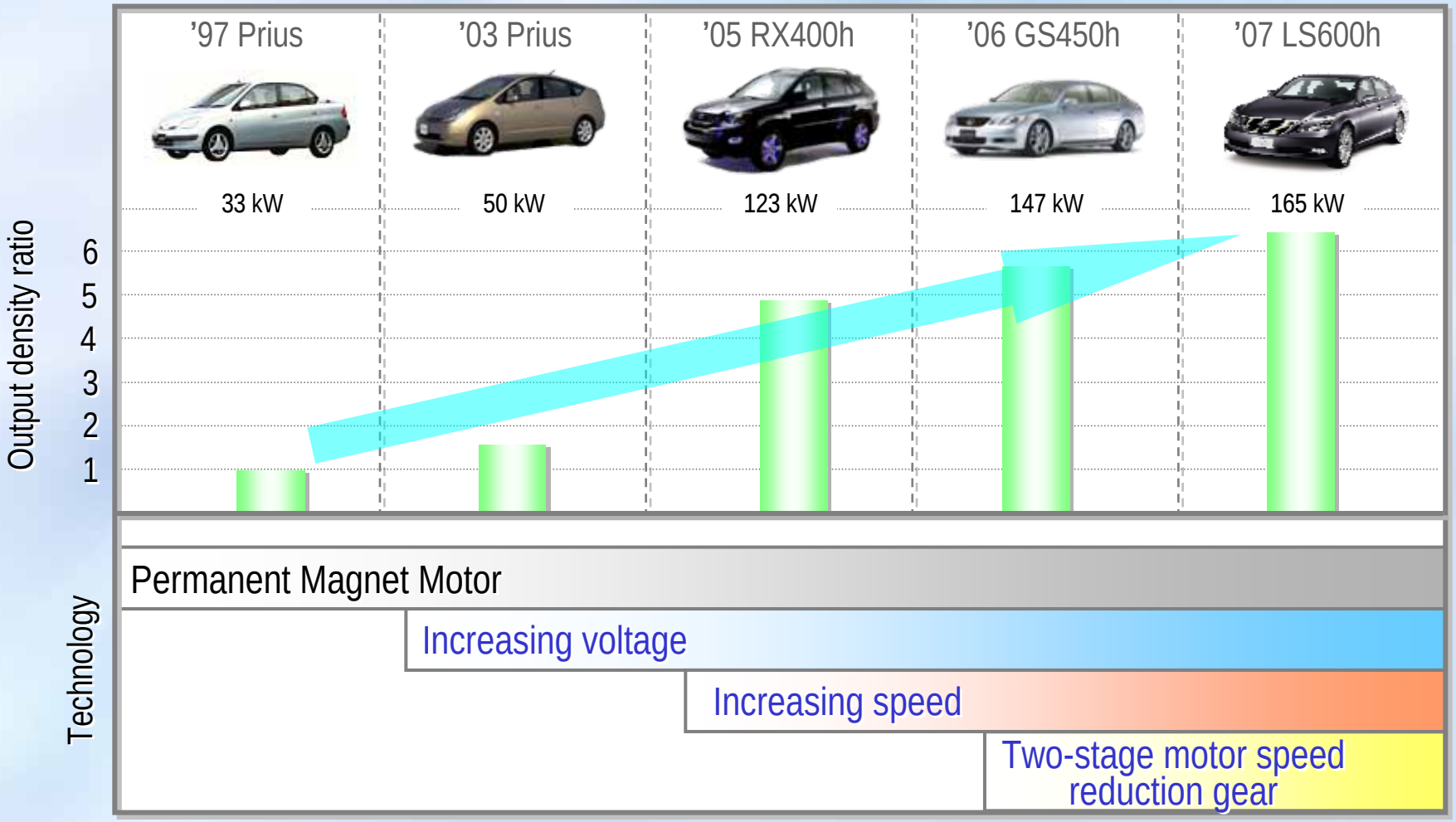
Evolution of Electric Motors for HV



Reducing size and weight by increasing output density

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Evolution of Batteries for HV

(Square plastic package)

Lighter

'03 Prius

RX400h
(Square metal package)

35%
Improvement

30%
Improvement

'00 Prius
(Square resin package)

'97 Prius
(Cylindrical)

Smaller

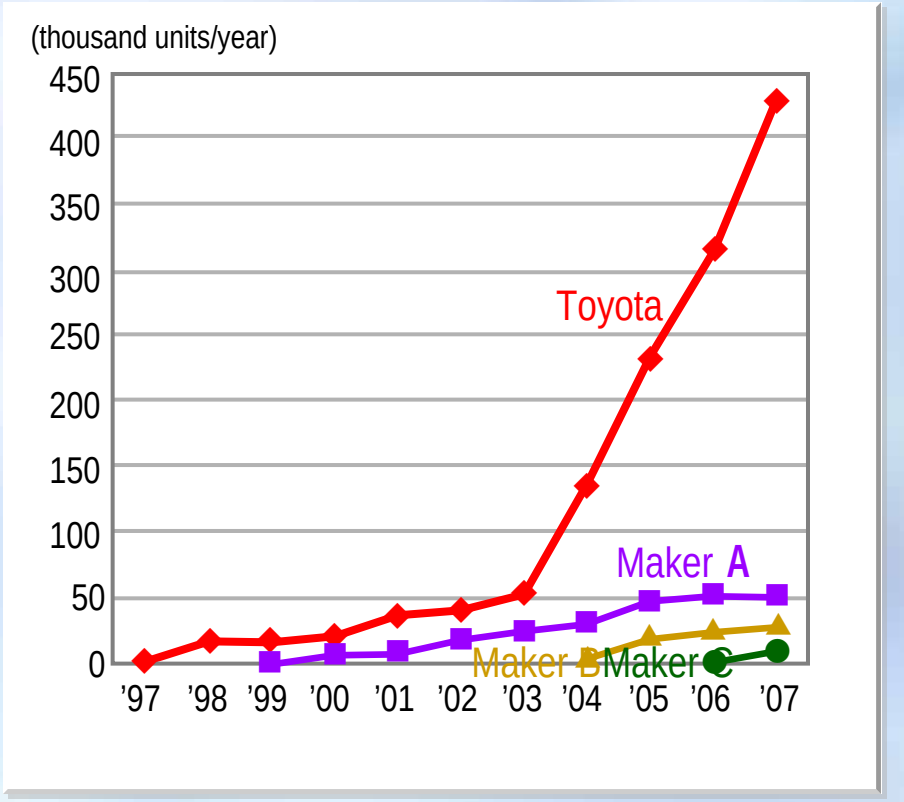
Mass output density (W/kg)

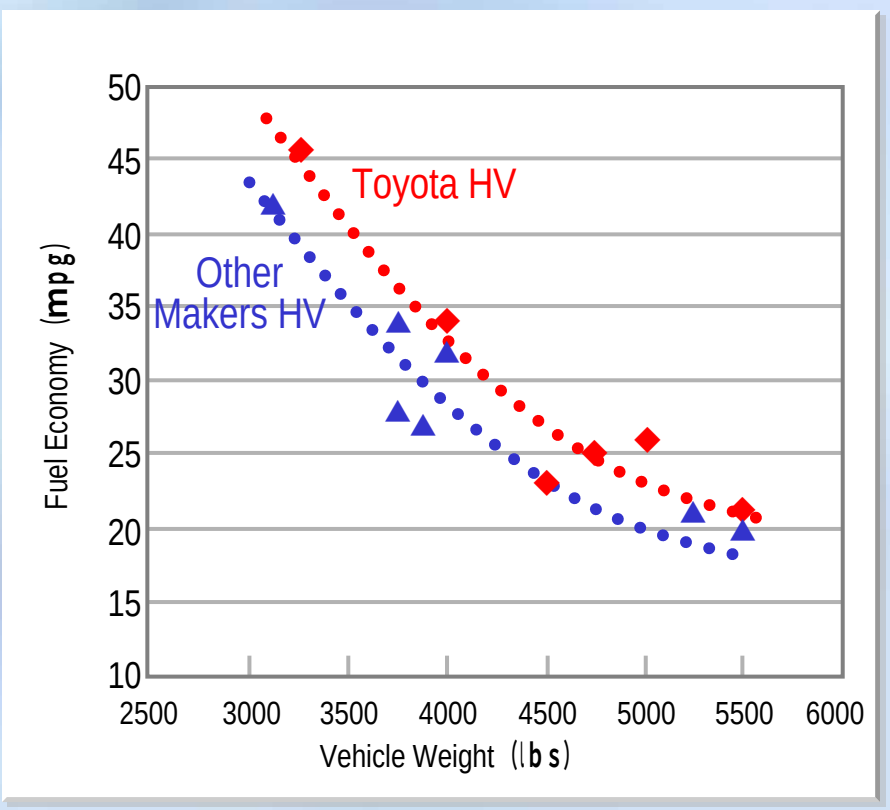
0

Volume output density (W/ℓ)

Reducing size and weight by increasing output density

HV Competitiveness of HV With Other Car makers

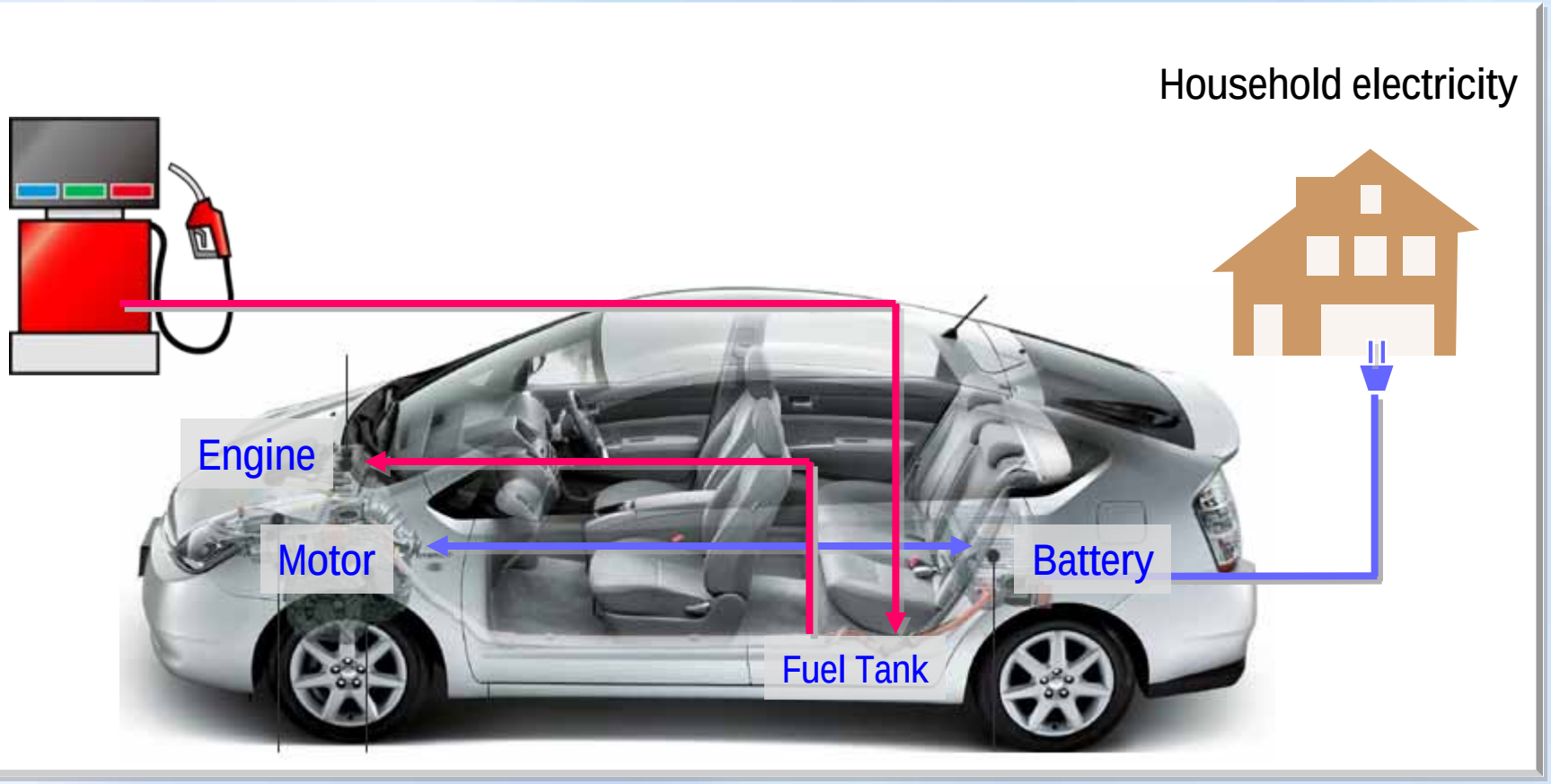




- Toyota overcomes other car makers in HV sales
- Toyota HV superiors other makers' HV in fuel efficiency

Plug-In Hybrid Vehicle

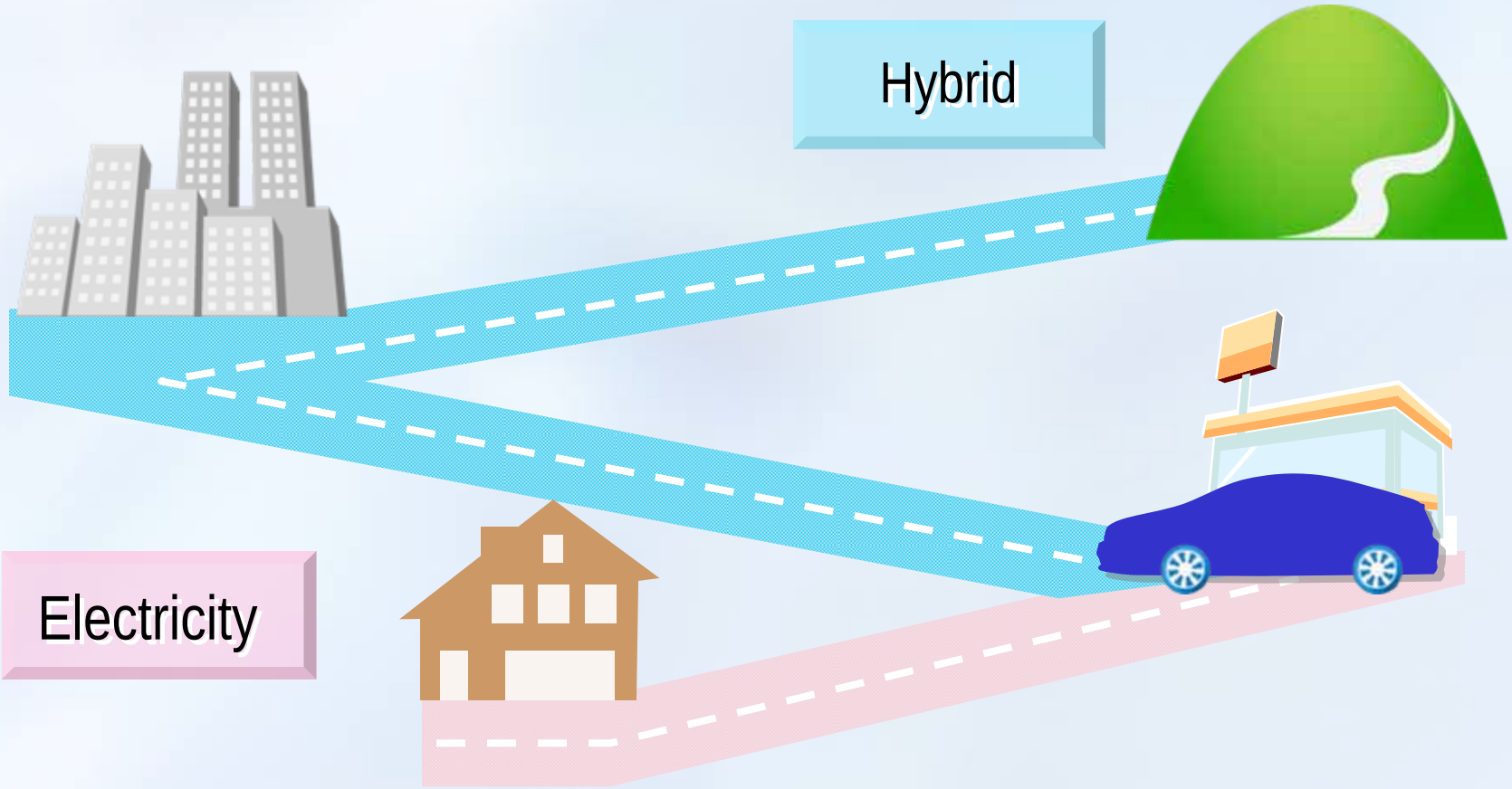
Recharging battery using an external power source
Short distance:EV, Long distance:HV



What is Plug-In Hybrid Vehicle?

Short distance: EV

Long distance: HV

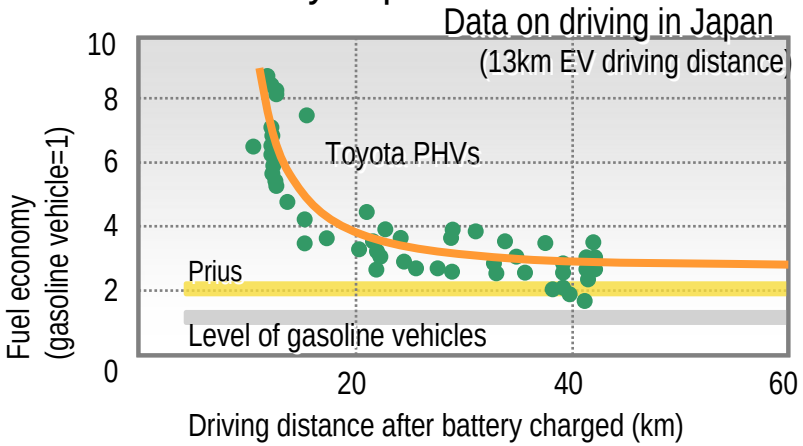


Results of Verification Testing for Plug-in Hybrid Vehicles

Partner: EDF

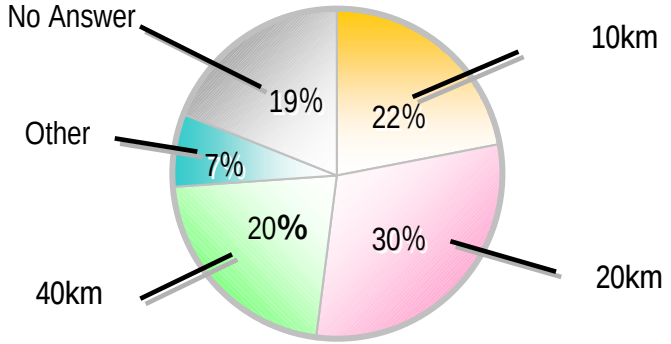
Partner：
University of California
Berkeley, Irvine

＜ Fuel Efficiency Improvement ＞



＜ Expected Values for EV Driving Distance ＞

(Result of the user questionnaires)



Verification testing is underway in Japan, Europe and the USA
⇒confirmation of improved fuel efficiency for plug-in hybrid vehicles

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EV Initiatives

Toyota RAV4 EV

Toyota e-com

Accelerate R&D of new generation EV (in early 2010s)

Challenges for EV:
1) Cruising range, 2) cost, 3) charging time, 4) dedicated charging infrastructure
➔ For the time being, a realistic option as compact commuter vehicles

Alternative Fuels Initiatives (Bio Fuels, Natural Gas, Hydrogen)

Bio Fuels

- Research for manufacturing cellulose ethanol
- Completed all models to adopted to E10
-Development of vehicles like FFV or BDF-vehicles to satisfy regional demand

FFV

Natural Gas

- Introducing CNG vehicle

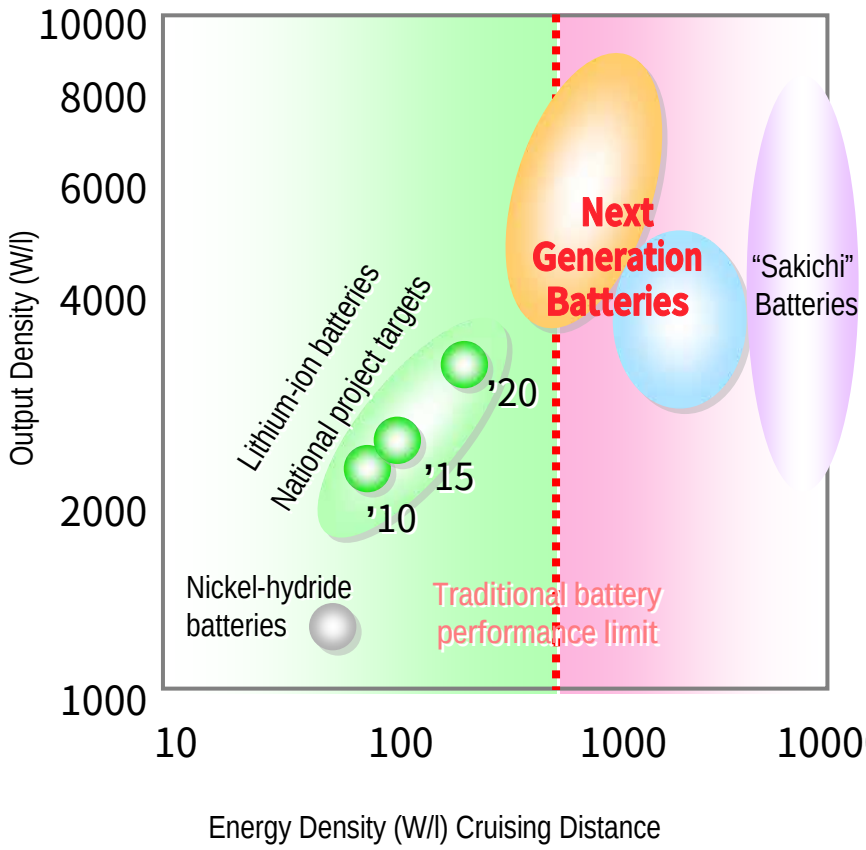
Hydrogen

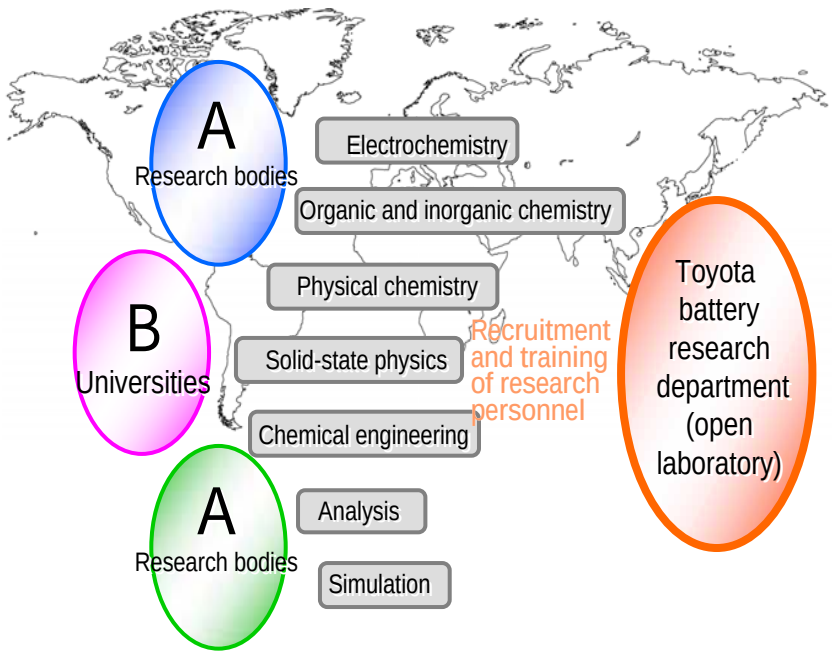
- Steady advances in FCV technology

FCHV

Place HV and PHV as core technologies, Toyota develops and offers items based on the concept “right vehicle for the right place at the right time”

Research Organization for Next-generation Batteries





New battery research department to be established as part of efforts to accelerate R&D for a next generation battery

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Global R&D Centers

North America

South East Asia

Japan

North America Research Institute (TRI-NA) is newly-organized

Europe

Australia

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TODAY for TOMORROW