

2016 Technology Media Trip

Overview of Toyota's environmental activities



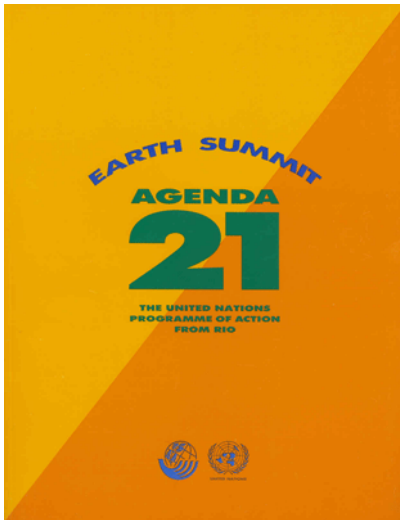
TMC Public Affairs Div. Grand Master

Hisashi Nakai

Earth is plagued by environmental problems



Since The Earth Summit in Rio de Janeiro in 1992, Toyota has positioned environmental friendliness and sustainable development as business priorities



1992 Earth Summit in Rio

International agreement reached on basic thinking on the environment and development



Toyota Earth Charter

(Formulated in 1992, announced in 1993)

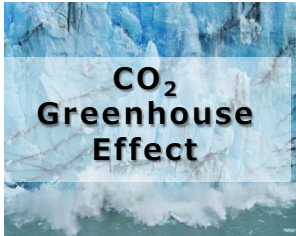
BASIC PHILOSOPHY

"Our mission is to provide clean and safe products and to work toward creating a more livable and comfortable society in all that we do."

BASIC PRINCIPLES

1. Contribute to 21st century society
2. Pursue environmental technology
3. Conduct activities voluntarily
4. Collaborate and cooperate with society

In 2011, Toyota established a 3-pillar approach to addressing environmental problems



1. Contribution to a low-carbon society



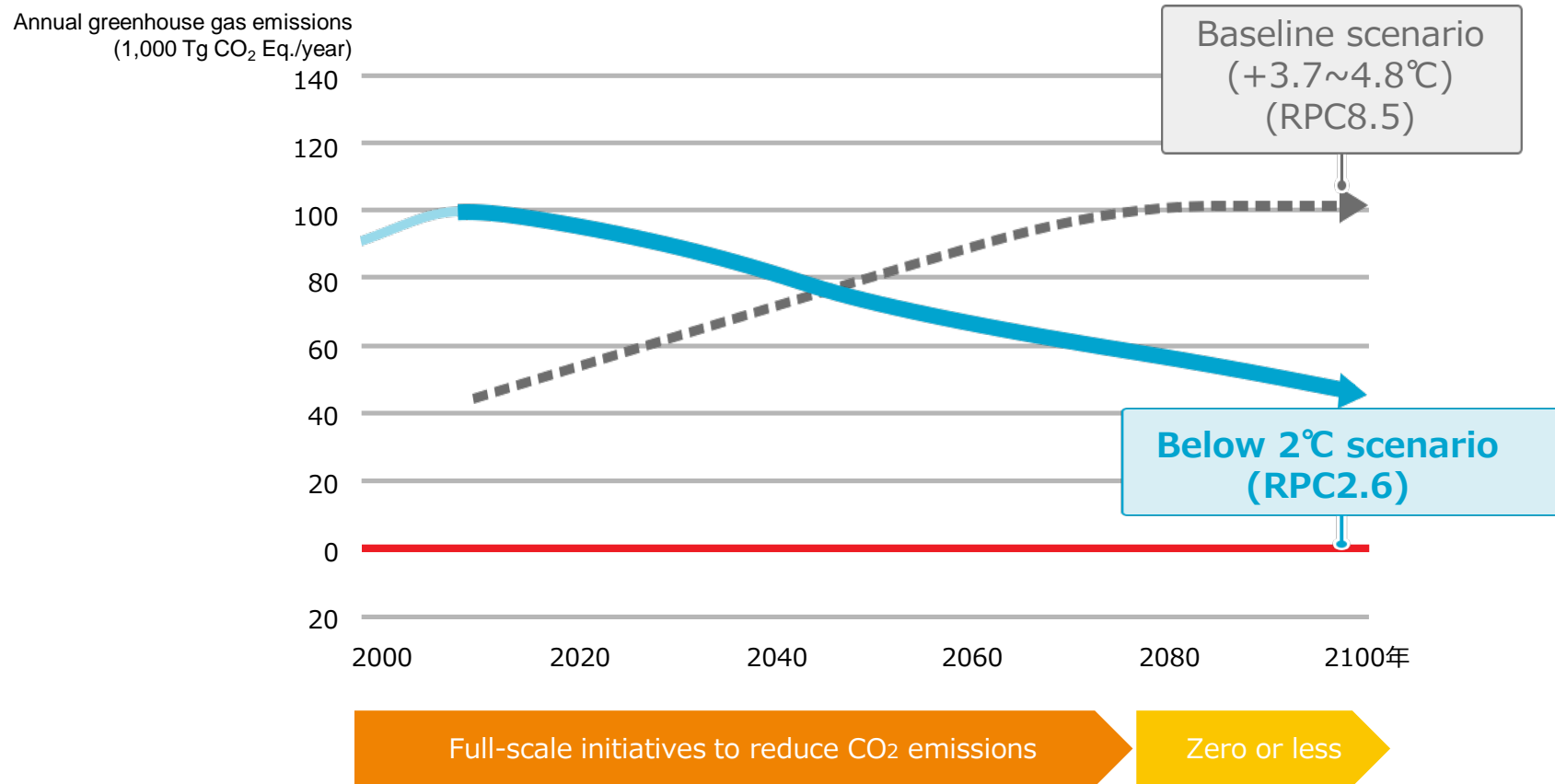
2. Contribution to a recycling-based society



3. Environmental protection and contribution to harmony with nature

1. Contribution to a Low-carbon Society

Limiting greenhouse-effect gases, such as CO₂, is an urgent issue



Source: From the Intergovernmental Panel on Climate Change Working Group III 5th Assessment Report (2014)

To achieve a low-carbon society,
Toyota endeavors to reduce CO₂ emissions
throughout its operations

Development

Production

Logistics

Sales



REDUCE CO₂

Low-carbon Society

Toyota's efforts in R&D and vehicle design
⇒ Development of environmental friendly vehicles



Development & Design

As for R&D and vehicle design,
Toyota is following 2 approaches to achieve a low-carbon society

Use of fossil fuels generates CO₂



Solution1:

**Reduce the consumption
of fossil fuels**

Low-emission vehicles



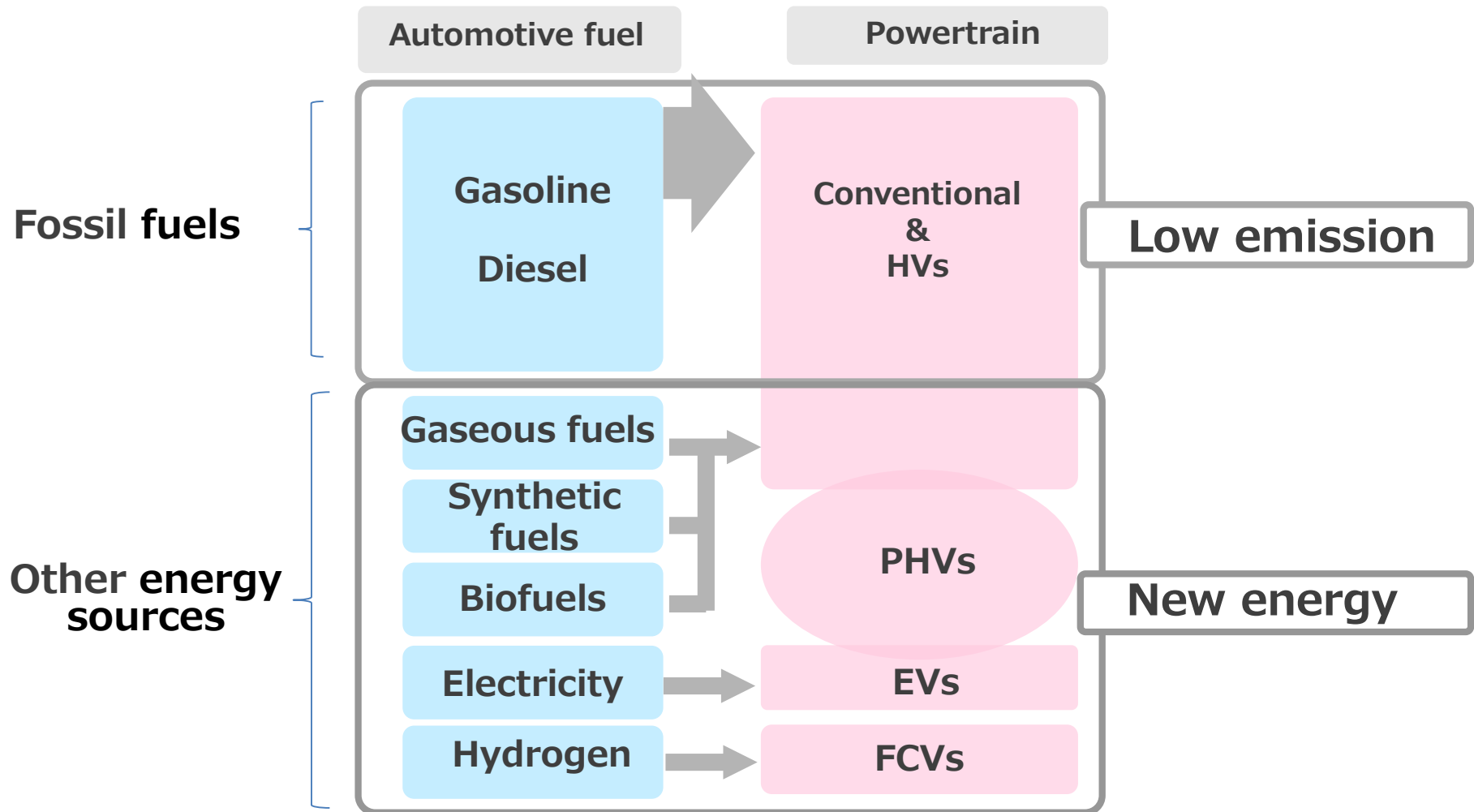
Solution 2:

**Try using energy sources
other than fossil fuels**

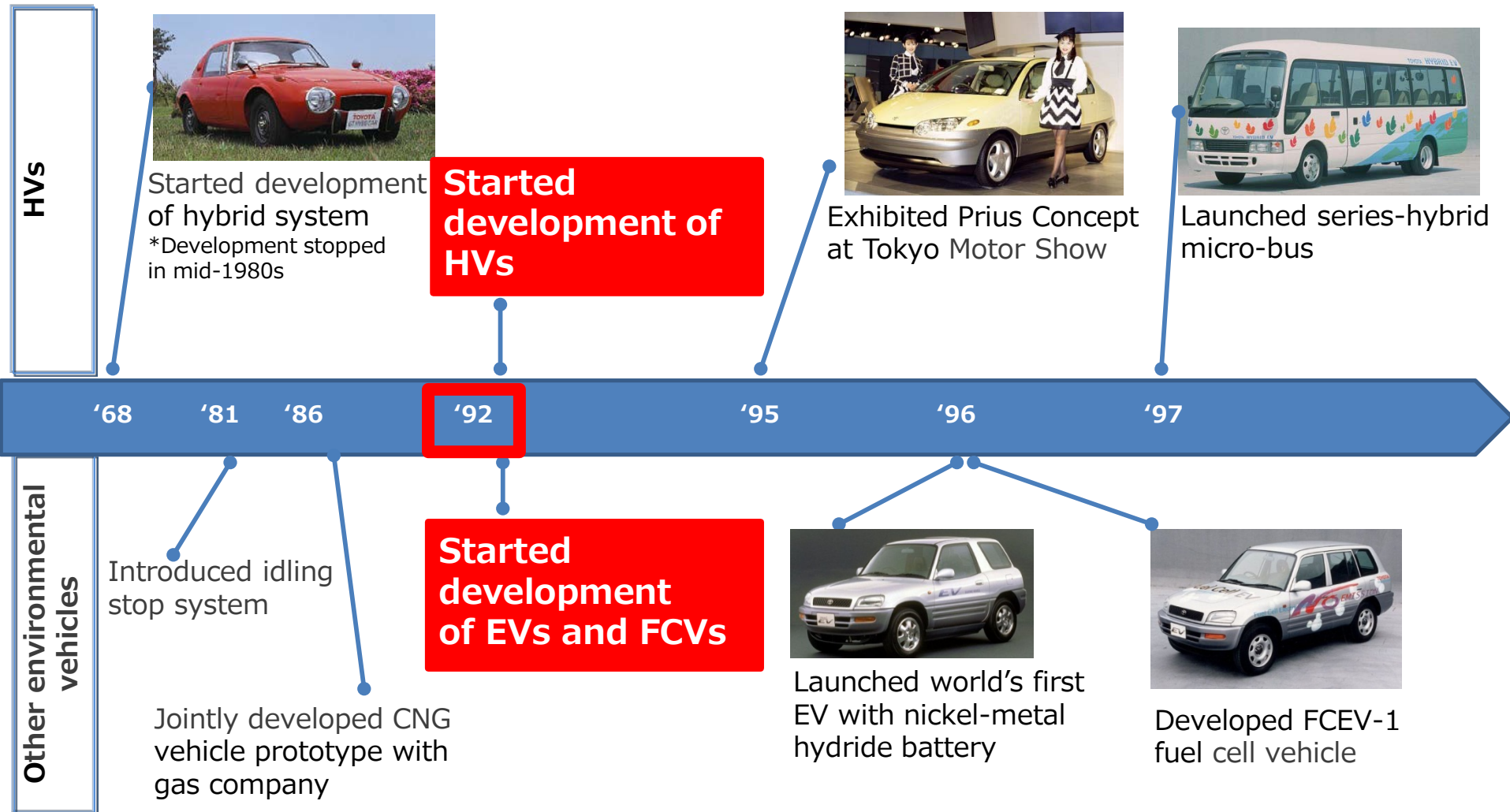
New-energy vehicles



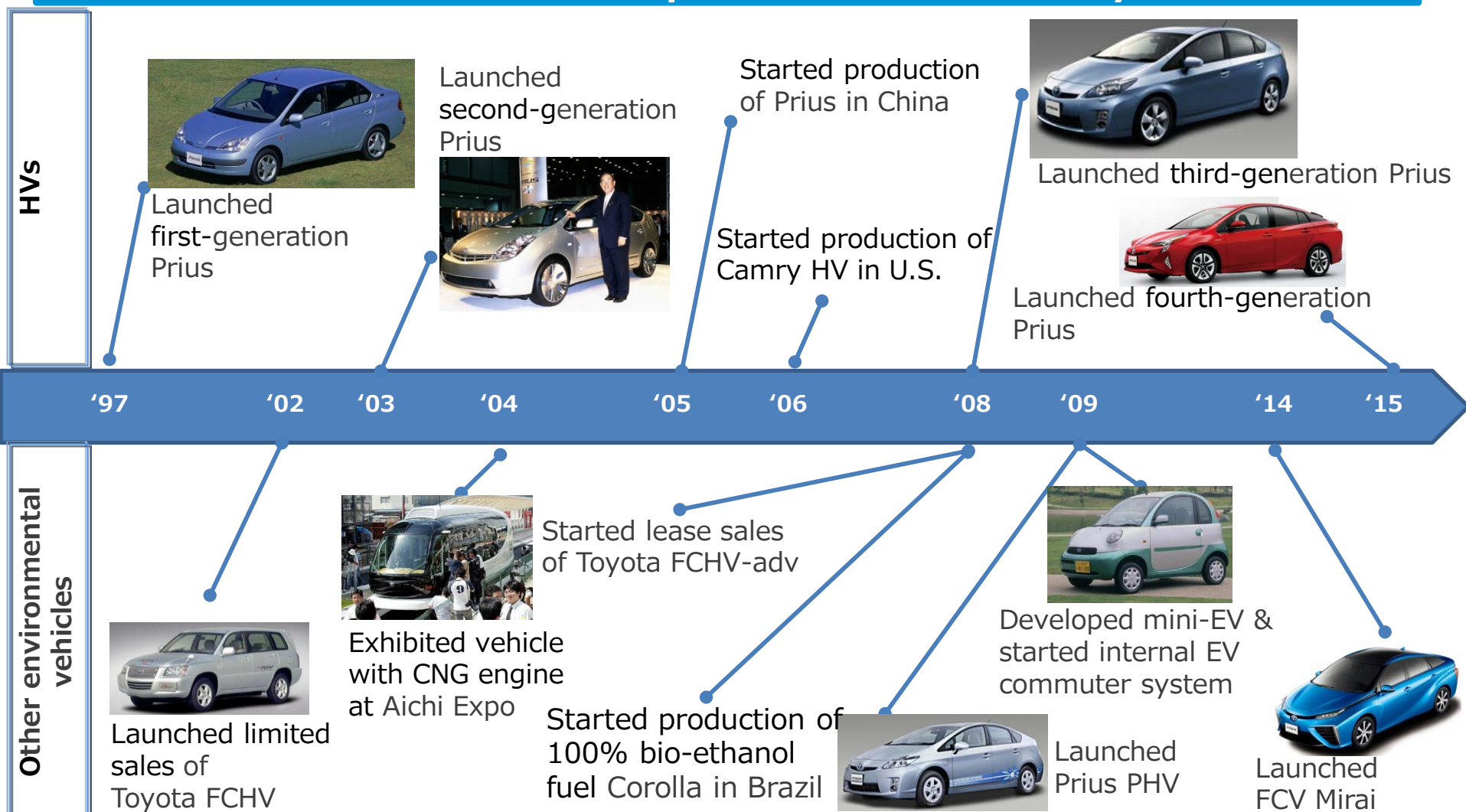
Toyota aims to reduce fuel consumption by improving conventional vehicles and hybrid vehicles, while developing vehicles for many types of energy



Toyota has been developing environmental friendly vehicles for a quarter of a century



Toyota has been developing environmental friendly vehicles for a quarter of a century

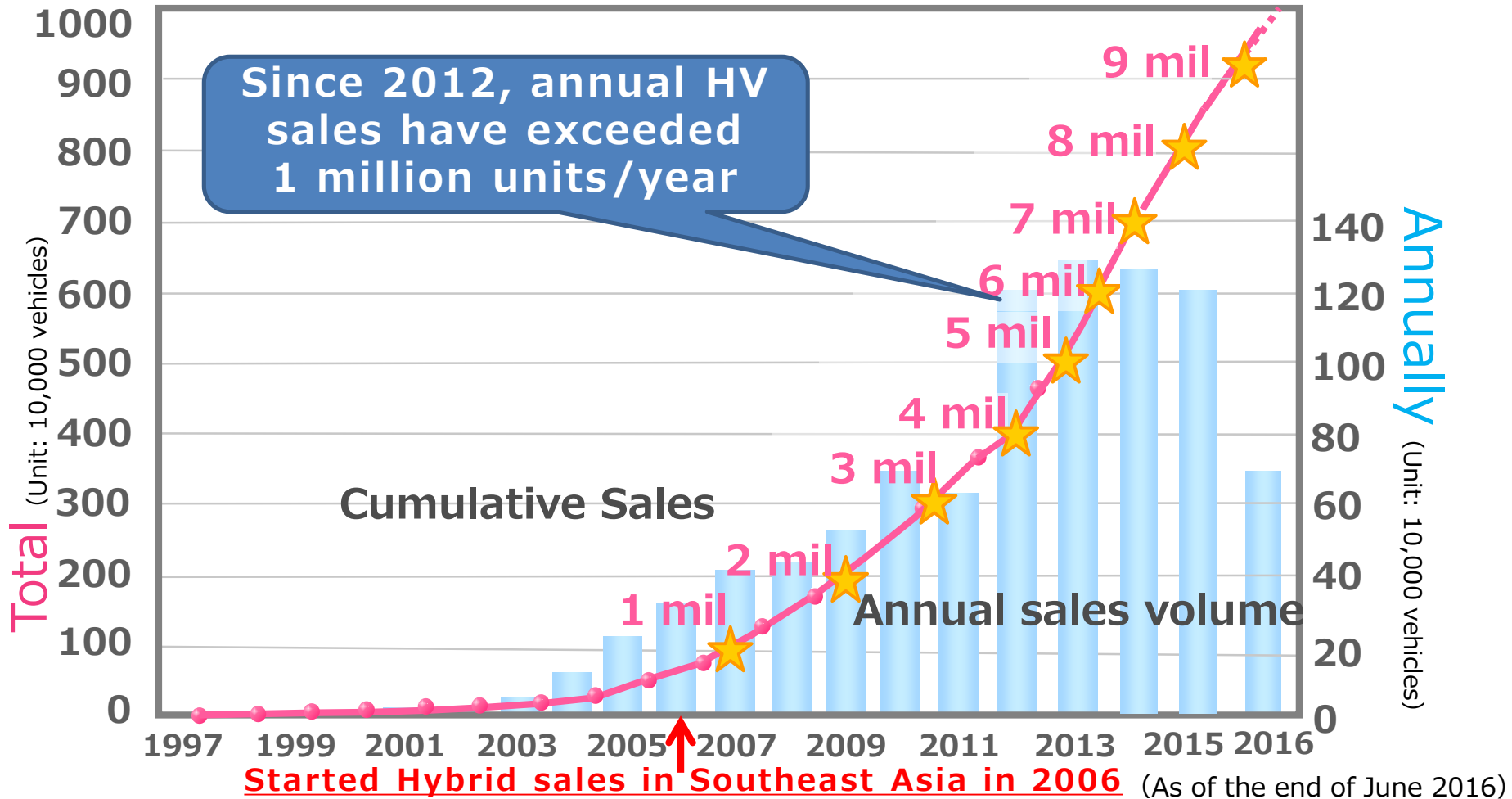


Toyota started selling the first mass-produced HV model in 1997; a first for any automaker

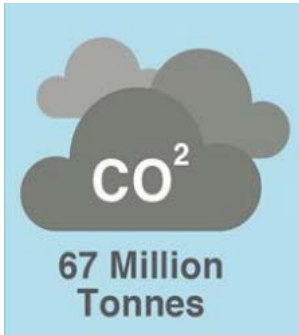
Birth of 1st-generation Prius



Since the launch of the Prius, HV sales have been constantly-increasing, reaching a cumulative sales of 9 million units this year



By selling 9 million HVs, Toyota has vastly reduced CO₂ emissions and greatly conserved gasoline



**Land Cruiser
24 Million units**

Reduced CO₂ emissions by 67 million tons*

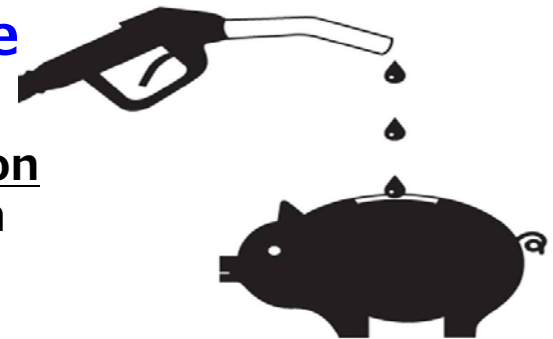
Compared to conventional vehicles (in same displacement class)

***Equivalent to the weight of 24 million units of Land Cruiser**

Conserved 25 million kiloliters* of gasoline

Compared to conventional vehicles (in same displacement class)

***Equivalent to the amount needed to make 1.3 million roundtrips that are each the distance from the Earth to the Moon and back.**



Toyota now has HVs in all vehicle categories to meet diverse customer needs

Compact



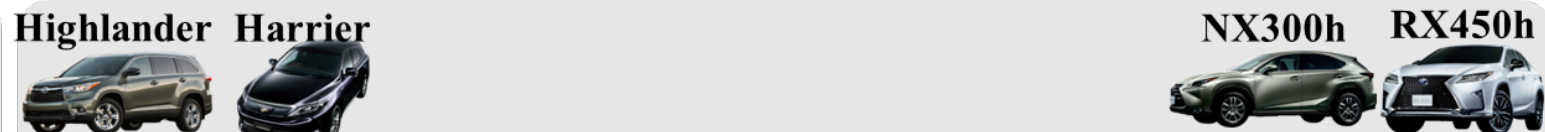
Medium



Large



SUV



Minivan



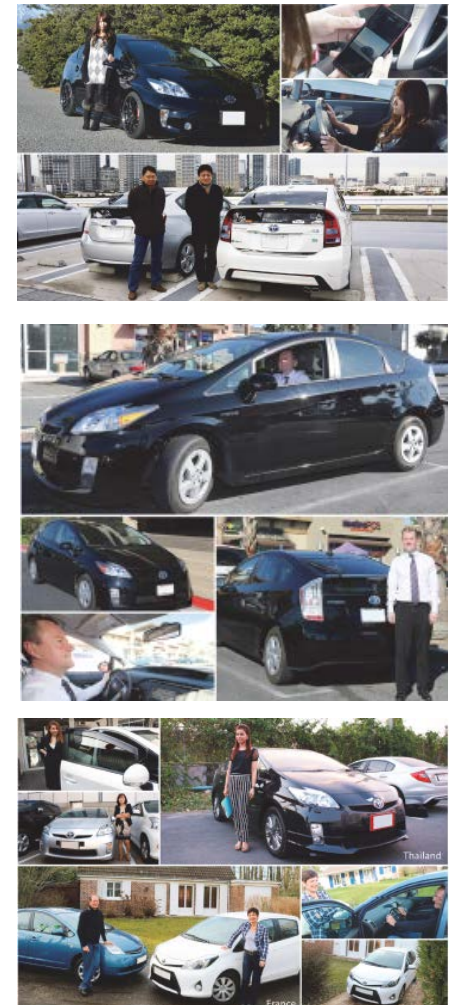
Commercial



As of the end of June 2016

HVs have been well received in various regions because of the trend and match to traffic situations

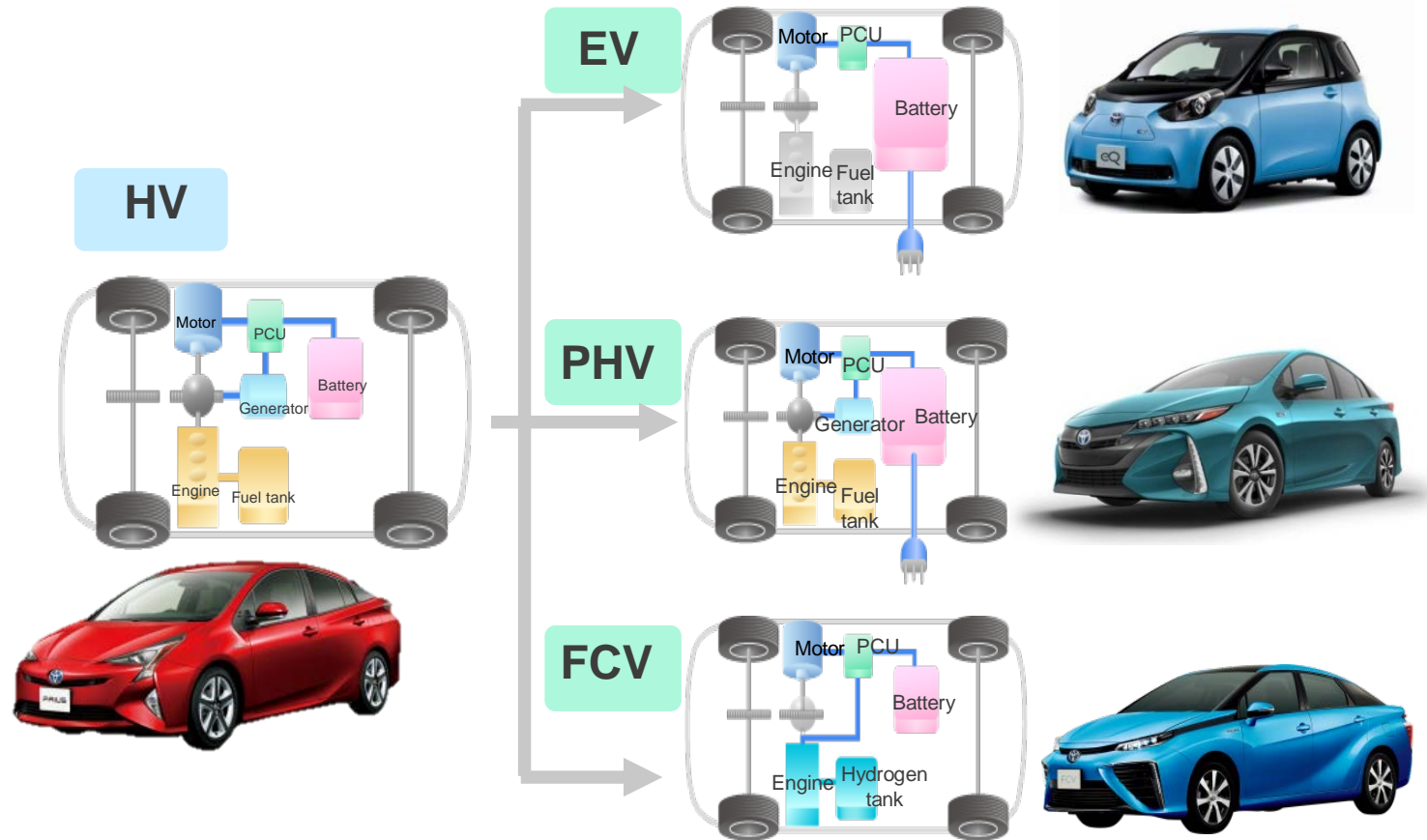
Region	Why HVs have become popular	Total HV sales (As April 2016)
Japan	<p>High fuel efficiency has been a selling point due to more starts and stops, compared to the traffic environments in major cities in other countries</p> <p>Note: The average vehicle speed in Japan's urban areas is 16km/h. (London: 26km/h; Paris: 34km/h; Singapore: 35km/h) Data from Ministry of Land, Infrastructure and Transport, 2010</p>	<p>4.38 mil</p> <p>(Sold since 1997)</p>
U.S.	<p>Rise in gasoline prices (since the 2000s)</p> <p>Fashionable: Hollywood movie stars have taken a liking to the Prius for its being "advanced and eco-friendly"</p>	<p>3.0 mil</p> <p>(Sold since 2000)</p>
Europe	<p>Accepted as a new eco-friendly vehicle, while "downsizing" was popular in the case of European auto-makers</p>	<p>1.11mil</p> <p>(Sold since 2000)</p>



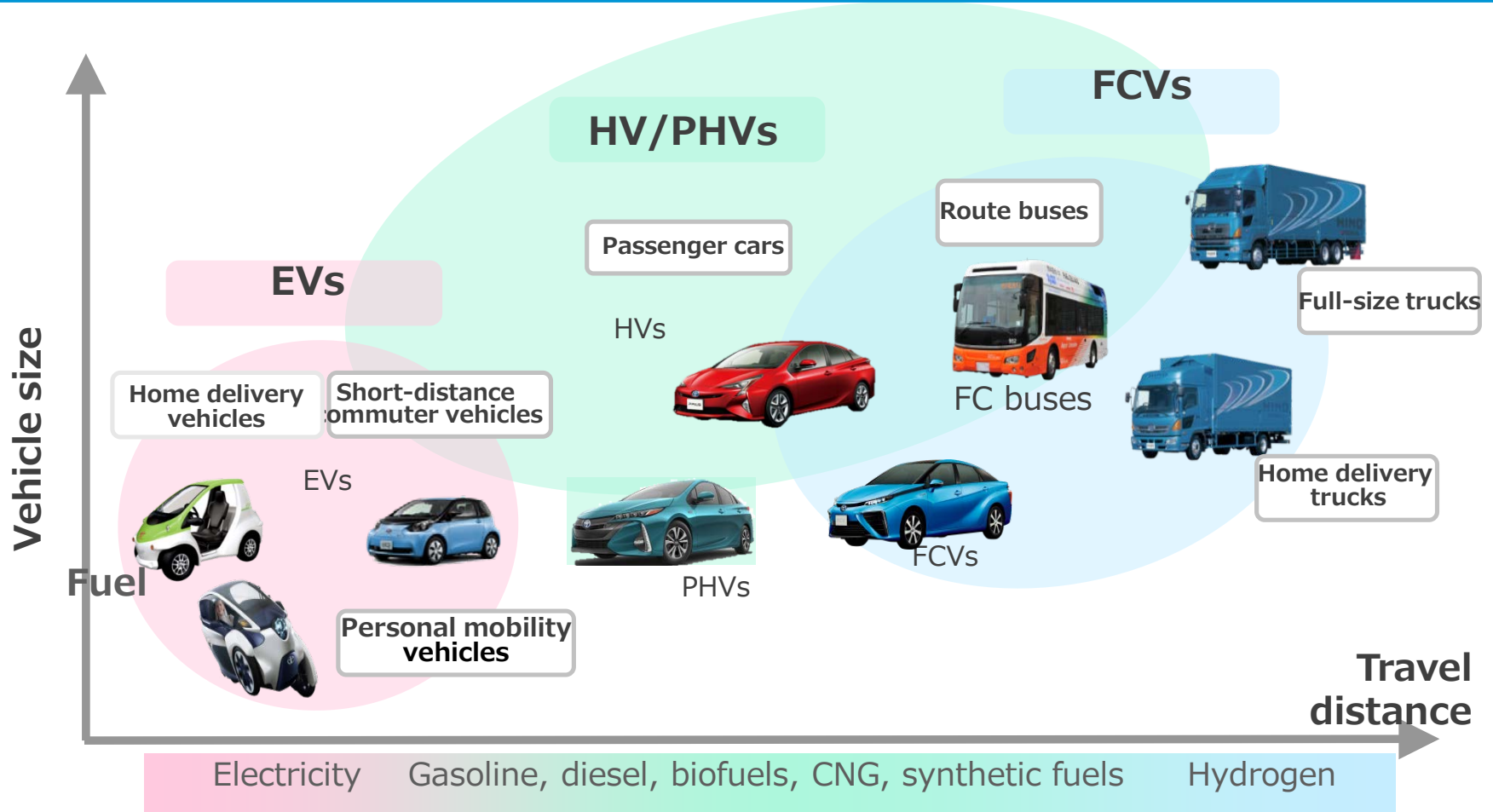
At the beginning of Hybrid Sales, Government supported to give boost until HVs received certain level of popularity

Region		HV preferential treatment policies	Introduction period
Japan		Tax deduction 50-70% deduction in automobile tax and automobile acquisition tax	3 years (Apr 2009~May 2012)
		Subsidy A subsidy was provided when replacing a more-than-13-year-old vehicle with a new environmentally friendly vehicle; regular vehicle: 250,000 yen, minivehicle: 100,000 yen	3 years (July 2009~May 2012)
U.S.		Tax deduction Maximum \$3,600 tax deduction when buying an HV. The deduction applied to up to 60,000 vehicles for each OEM. Beyond 60,000 vehicles, the deduction amount was reduced in stages.	3 years up to 6000 vehicles (Jan 2006~Dec 2009)
		Favorable treatment HVs with fuel efficiency of 45mpg or higher could drive in the carpool lane in California.	~Jul 2011
Europe	France	Subsidy A premium (bonus) is paid to the purchasers of vehicles that emit less than 130g CO ₂ /km. On the other hand, a sales tax (penalty) is levied on cars that emit more than 160g CO ₂ /km.	2008~
	UK	Tax deduction The automobile acquisition tax is reduced to a maximum of 1,020 £ when purchasing an HV or vehicle that runs on CNG	2002~

Hybrid technology is a core technology and is found in PHVs, EVs and FCVs



Toyota is developing several kinds of environmental vehicles:
EVs for short-distance use, HVs & PHVs for general-purpose use
and FCVs for medium-to-long-distance use



Although Toyota is developing many kinds of vehicles, when considering the convenience of our customers, HVs will remain mainstream for the time being

	Gasoline HV	Electricity EV	Gasoline+ electricity PHV	Hydrogen FCV
Well-to-wheel CO ₂	Good	From not good to excellent	Good	From not good to excellent
Cruising distance	Excellent	Not good	Excellent	Excellent
Filling time	Excellent	Not good	Good	Excellent
Infrastructure	Excellent	Good	Good	Not good

Toyota is striving to improve the environmental performance of gasoline engines and to develop powertrains that support the diversification of energy sources

Improving internal combustion



Engine	1.2-liter turbo	2.0-liter turbo	Global Diesel Engine
Maximum thermal efficiency	36%	36%	44%

Adapting to diversified energy sources

i) Bio-fuel vehicle



Corolla Altis

Flex-fuel vehicle capable of using 100% bio-ethanol fuel

ii) CNG vehicle



Limo

CNG and gasoline bi-fuel vehicle

Low-carbon Society

Toyota's efforts in Production



Production



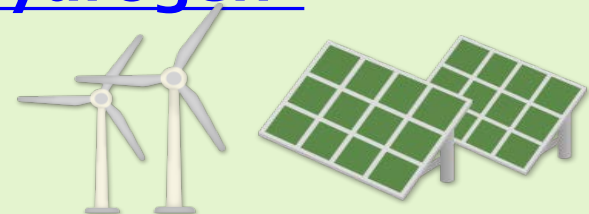
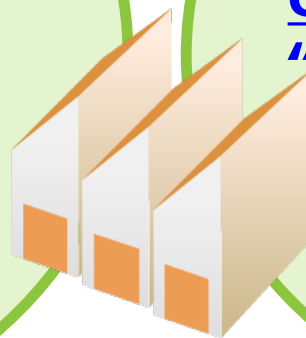
In the area of production, Toyota is taking 2 approaches to reducing CO₂ emissions from manufacturing plants

Use of fossil fuels is what generates CO₂

Solution1:
Reduce the consumption of fossil fuels
"Innovative production engineering"



Solution2:
Try using energy sources other than fossil fuels
"Use of renewable energy"
"Hydrogen"



Aim: Zero CO₂ from plants

Toyota will reduce fossil fuel consumption through production engineering and the daily mind-set of all Toyota members

	Initiatives	Process
CO ₂ reduction through production engineering	Introducing “simple and slim” production lines <ul style="list-style-type: none">• Maximize efficiency of production processes → Be able to make production lines shorter• Minimize machine movement on production lines	Painting Casting Machining
	Improving efficiencies in energy use <ul style="list-style-type: none">• Minimize wasted energy• Store energy	Machining
Daily mind-set for reducing CO ₂ emissions	<ul style="list-style-type: none">• Eliminate waste, inconsistencies and actions that are unreasonable• Realize unpowered/low-thrust operation	All processes

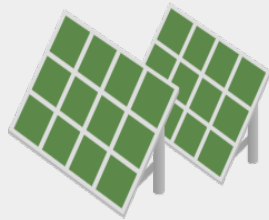
Toyota is endeavoring to use alternative energy sources, in place of fossil fuels, to generate power for production plants

Renewable energy use

Wind-power generation



Solar-power generation



Renewable energy

Electricity

Power generation from CO₂-free hydrogen

CO₂-free hydrogen

Liquid hydrogen tank



Cooling & combustion

Electricity

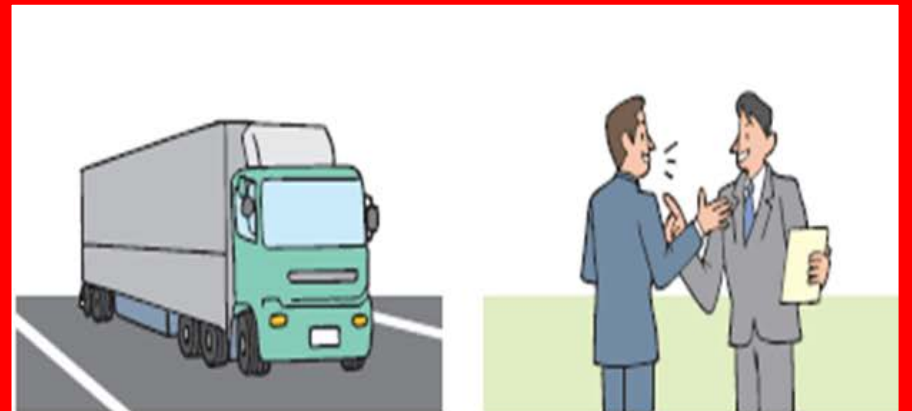
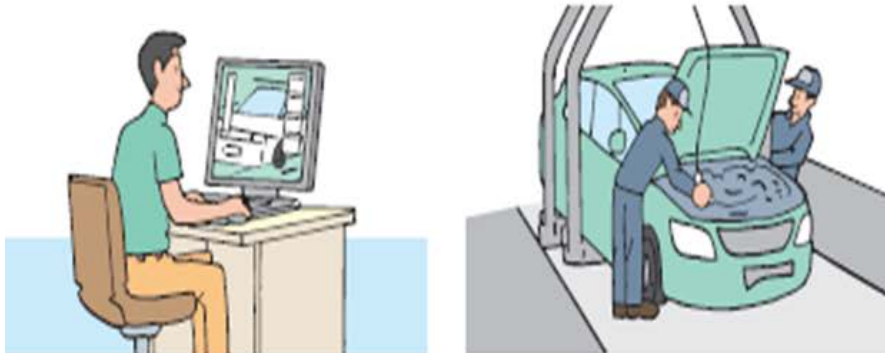
Hydrogen power generation, etc.

Filling



Low-carbon Society

Toyota's efforts in Logistics and Sales



Logistics

Sales

**In the areas of logistics and sales,
Toyota is conducting activities to reduce CO₂
with the help of transportation companies and dealer outlets**



Before



After

Logistics

- Improving transport efficiencies
- Using eco-friendly vehicles

Sales

- Saving water and electricity and operating eco-friendly dealerships



Before



After

2. Contribution to a Recycling-based Society

Toyota is endeavoring to recycle natural resources, such as rare earths used in hybrid batteries

“Battery-to-battery” recycling activities



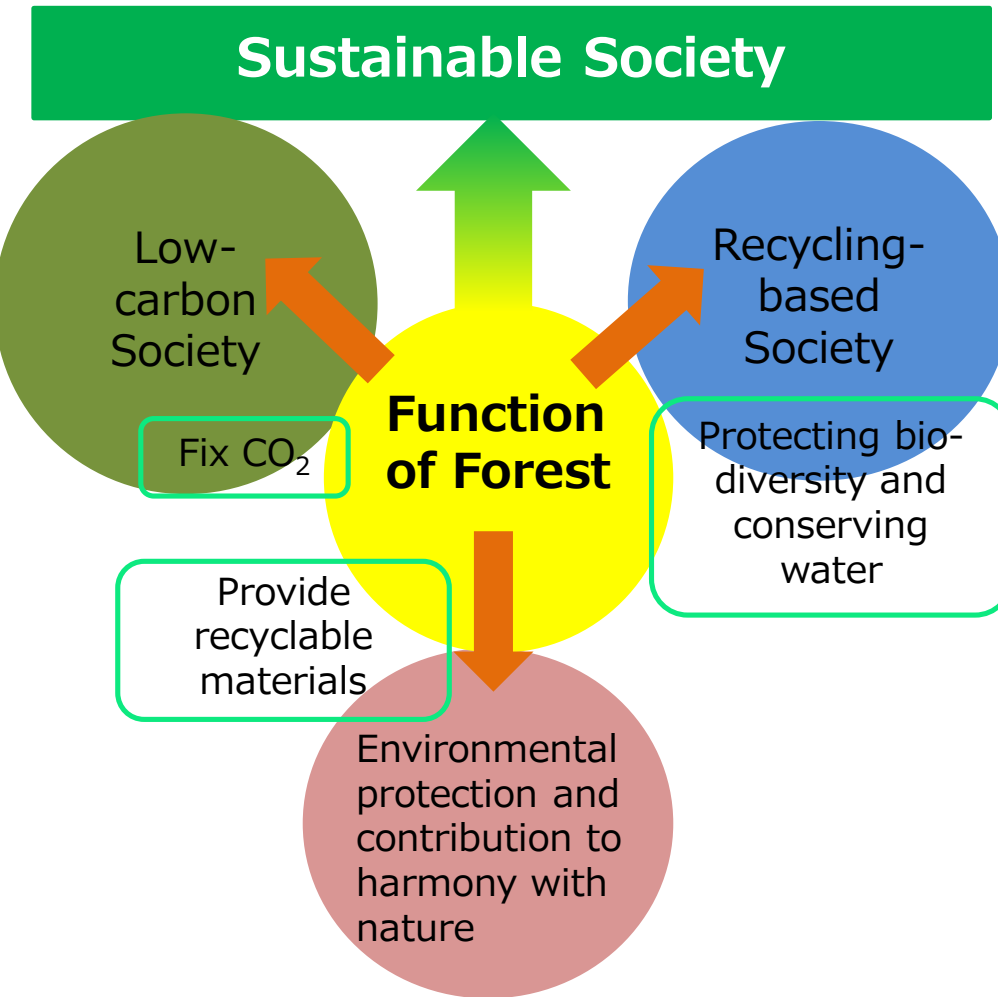
- Toyota is promoting the recycling of used HV batteries
- 42,000 HV batteries have been collected and recycled as of March 2015



3. Environmental protection and contribution to harmony with nature

Toyota is planting forests, because we believe doing so is one way to achieve a sustainable society

▼ Reason for promoting forest-building activities



▼ Forest of Toyota

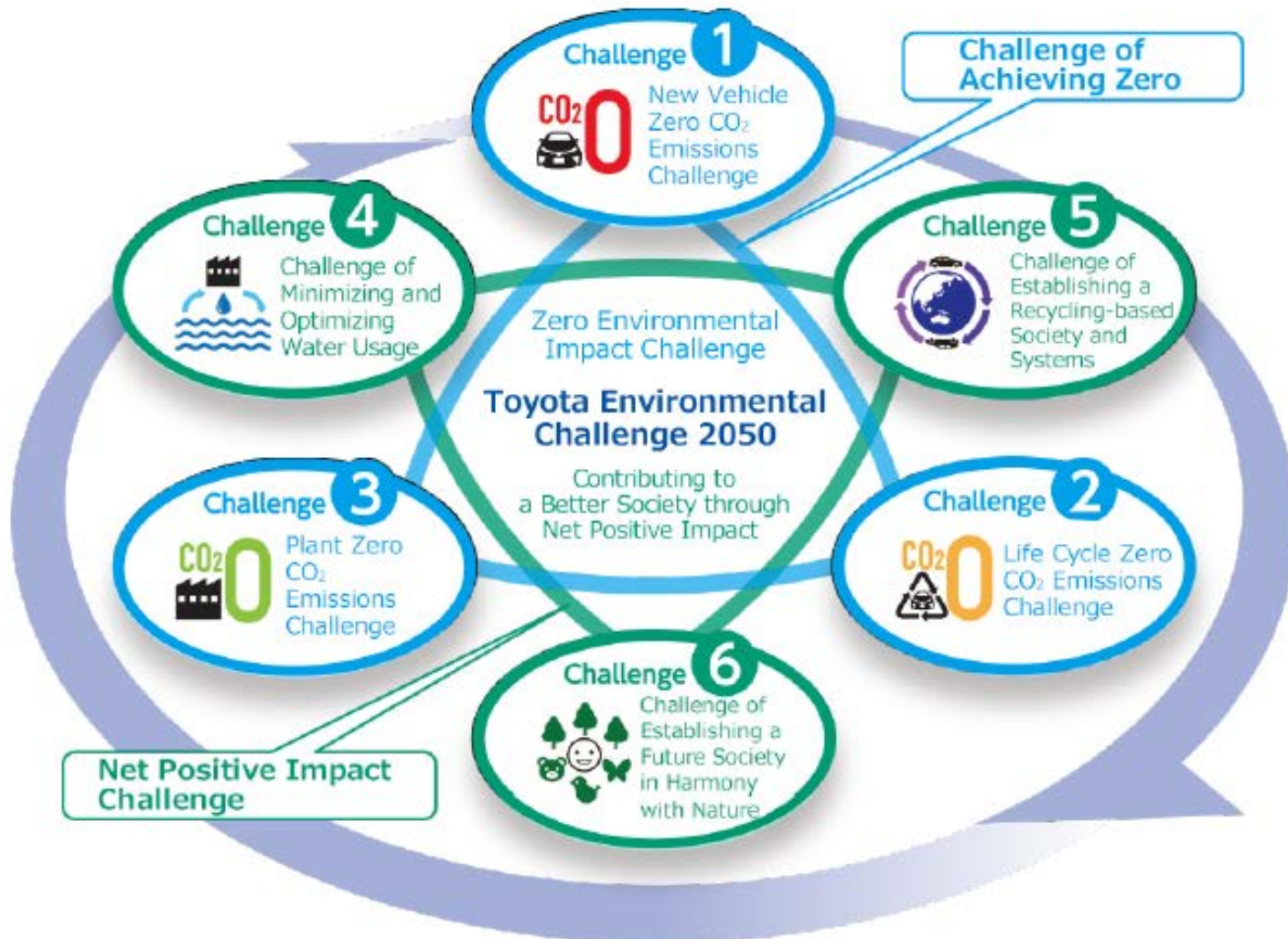


▼ Planting Trees at production plants (Tsutsumi Plant)



4. Initiatives for the Future

In October 2015, Toyota announced its long-term vision for achieving zero environmental impact



Schedule	Program Content	3 pillars of Toyota's environmental activities		
		Low-carbon Society	Recycling-based society	Environmental protection & harmony with nature
30 August (Tuesday)	① The Integrated Approach to Environmental Issues in Japan's Road Transport			
	② Explanation of Toyota's environmental initiatives	✓	✓	✓
	③ Explanation of HV technology	✓		
	④ HV test drives and other environmental technologies (EV, FCV)	✓		
31 August (Wednesday)	① Primearth EV Energy visit Battery production line, testing facility, biotope	✓	✓	✓
	② HV production plant and environmental activities at plant	✓		✓
	③ Toyota Kaikan visit	✓		

Thank you!!

