Toyota Environmental Challenge 2050
Ever-better manufacturing

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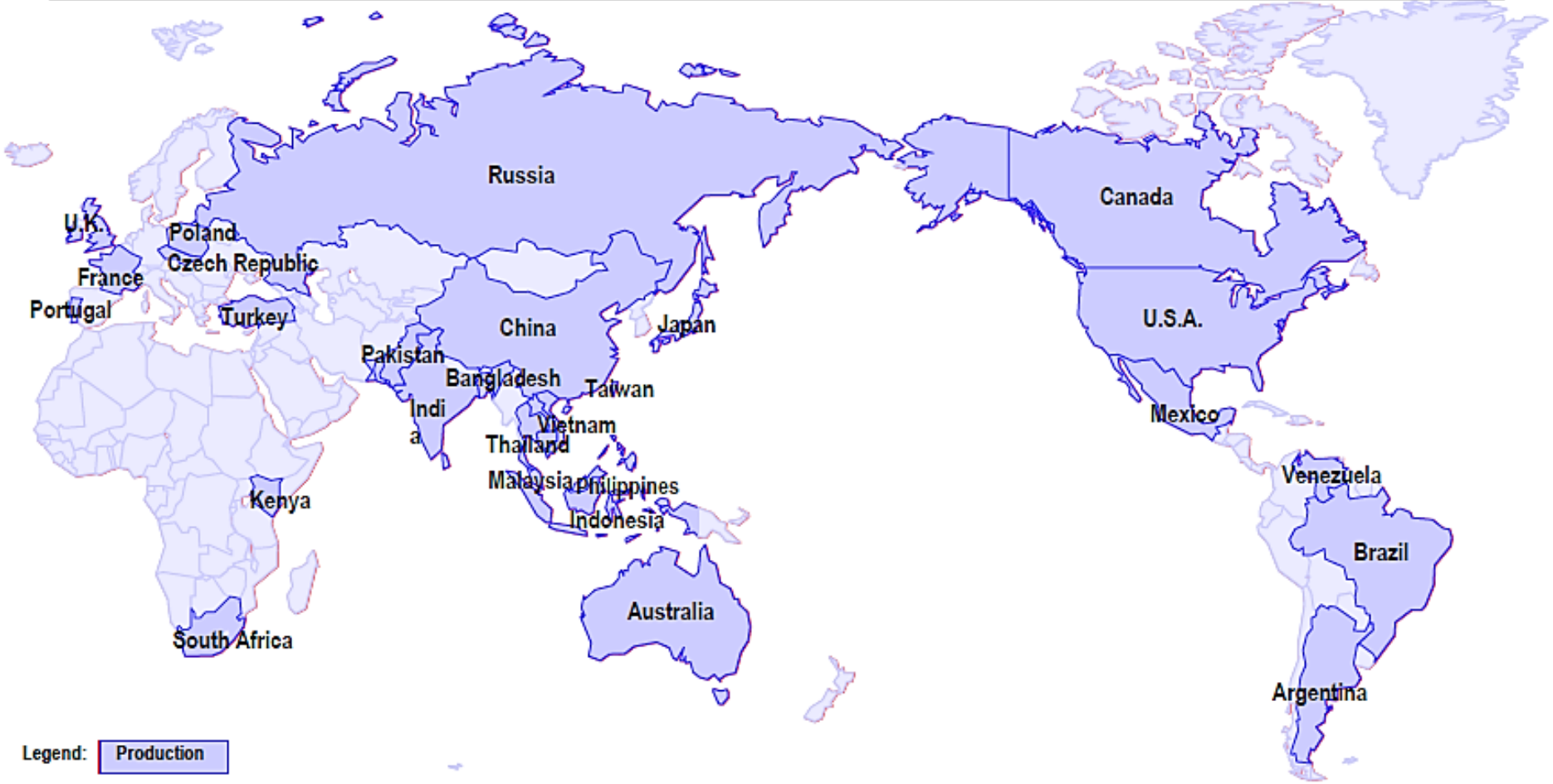
Toyota in Global

Worldwide operation (as of Mar 2016)

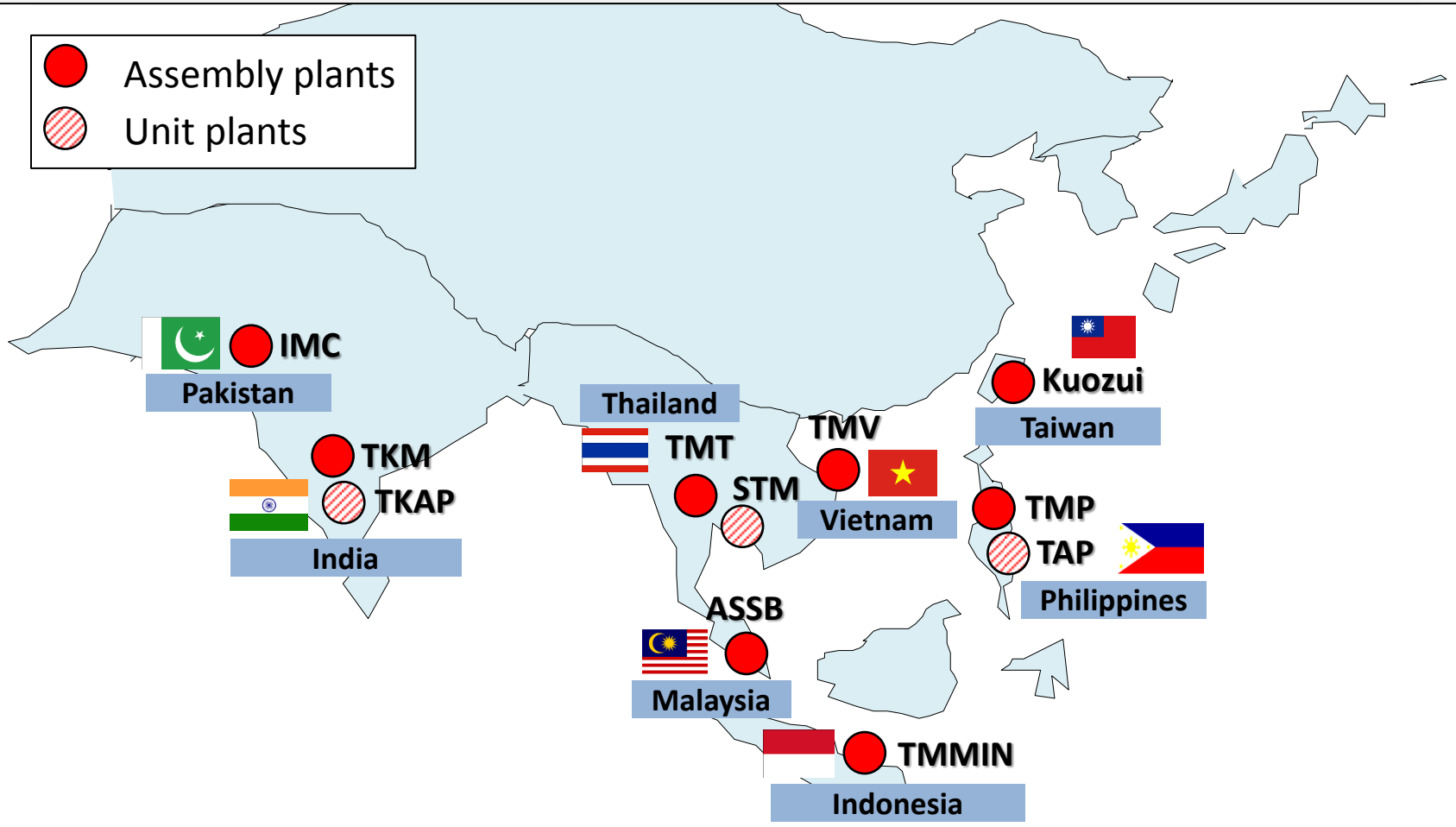
From 348,877 employees, Toyota conducts its business worldwide with 54 manufacturing companies in 28 countries, and sold to over 170 countries



Toyota in Asia

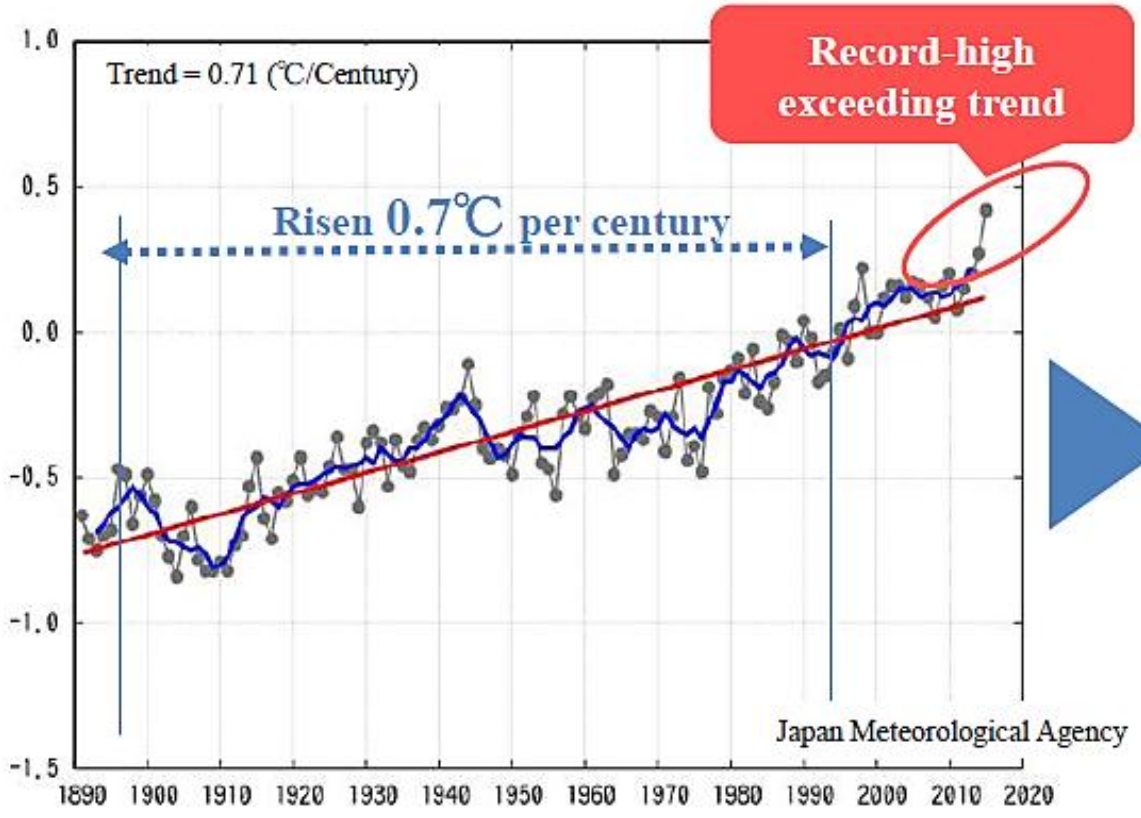
Network of Toyota companies in Asia

Toyota manufacturing business in Asia covers
11 companies in 8 countries



Global warming: Frequent 'extreme weather events' occur worldwide

Global mean temperature has risen 0.7℃ per century.
Temperature in 2016 was higher than record-high previous year.
Extreme weather events such as droughts/bush fire by temperature rise, and enormous typhoons and floods by seawater temperature rise has become more frequent.




Food scarcity by drought


Bush fire due to global warming


Unexpected rise in sea level

Global trend: Paris Agreement was put into force

COP21(2015) ・・Adopted the Paris Agreement→Put into force in November 2016

***All Parties agreed to submit CO2 emissions reduction target and take domestic countermeasures.**

*ca. 196 countries

~Keep temperature rise below 2℃ and decarbonize 2050 onwards~

<Final agreement on the Paris Agreement>

Item	Point
Objective	**Keep temperature rise below 2℃** (collective efforts to limit temperature rise further to 1.5℃)
Long-term target	Latter half of this century (2050) onwards **Balance emissions and absorptions ~zero emissions~**
GHG* Emissions reduction target	**①All the countries are obliged to submit reduction target and take domestic countermeasures** **②Review the target every 5 years (UN verified progress every 5 years)**

Prime Ministers from 150 countries participated
＝Climate change measures have become the global top agenda.

PMs from 150 countries (MOF HP)

Unanimous agreement (BBC)

Two major emitters, US, CN and increasing emitting IN indicated reduction target for the first time (=Countries that have not ratified the Kyoto Protocol)

Despite US decision on withdrawal from the Paris Agreement, major companies in EU, China and US are insisting on remaining in the agreement.

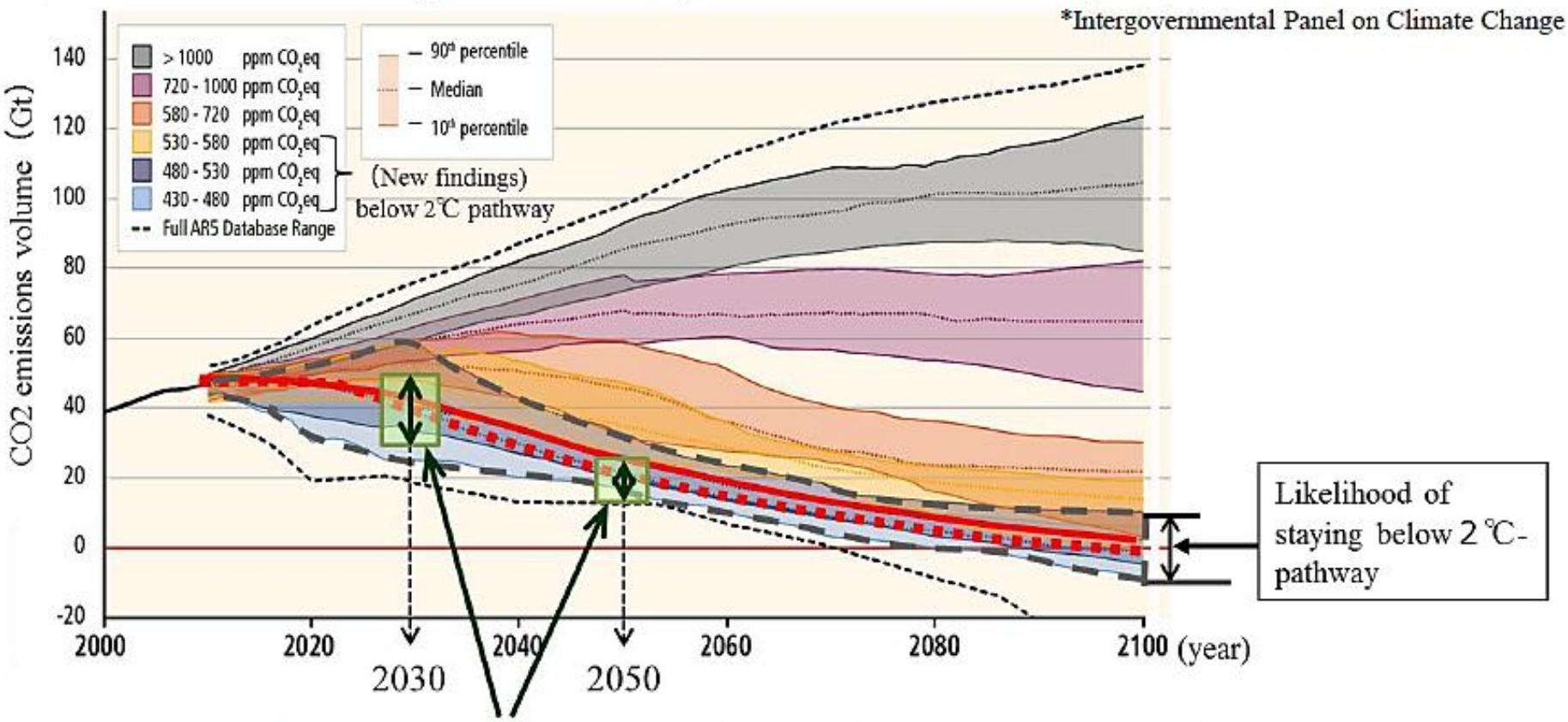
Global trend: Agreement on 2℃ scenario

COP21: Background of agreement

In order to prevent catastrophic damage on earth, it is evitable **to hold the increase of the temperature to 2 ℃.**

G7 leaders' declaration ⇒ 40-70% reduction by 2050 (from 2010)

<Latest scientific findings on climate change IPCC 5th Assessment Report 2014>



G7 leaders' declaration ：40~70% reduction scenario

Toyota's Actions

TOYOTA ENVIRONMENTAL CHALLENGE 2050

To go beyond zero environmental impact and achieve a net positive impact, Toyota has set itself six challenges. All these challenges, whether in climate change or resource and water recycling, are beset with difficulties, however we are committed to continuing toward the year 2050 with steady initiatives in order to realize sustainable development together with society.

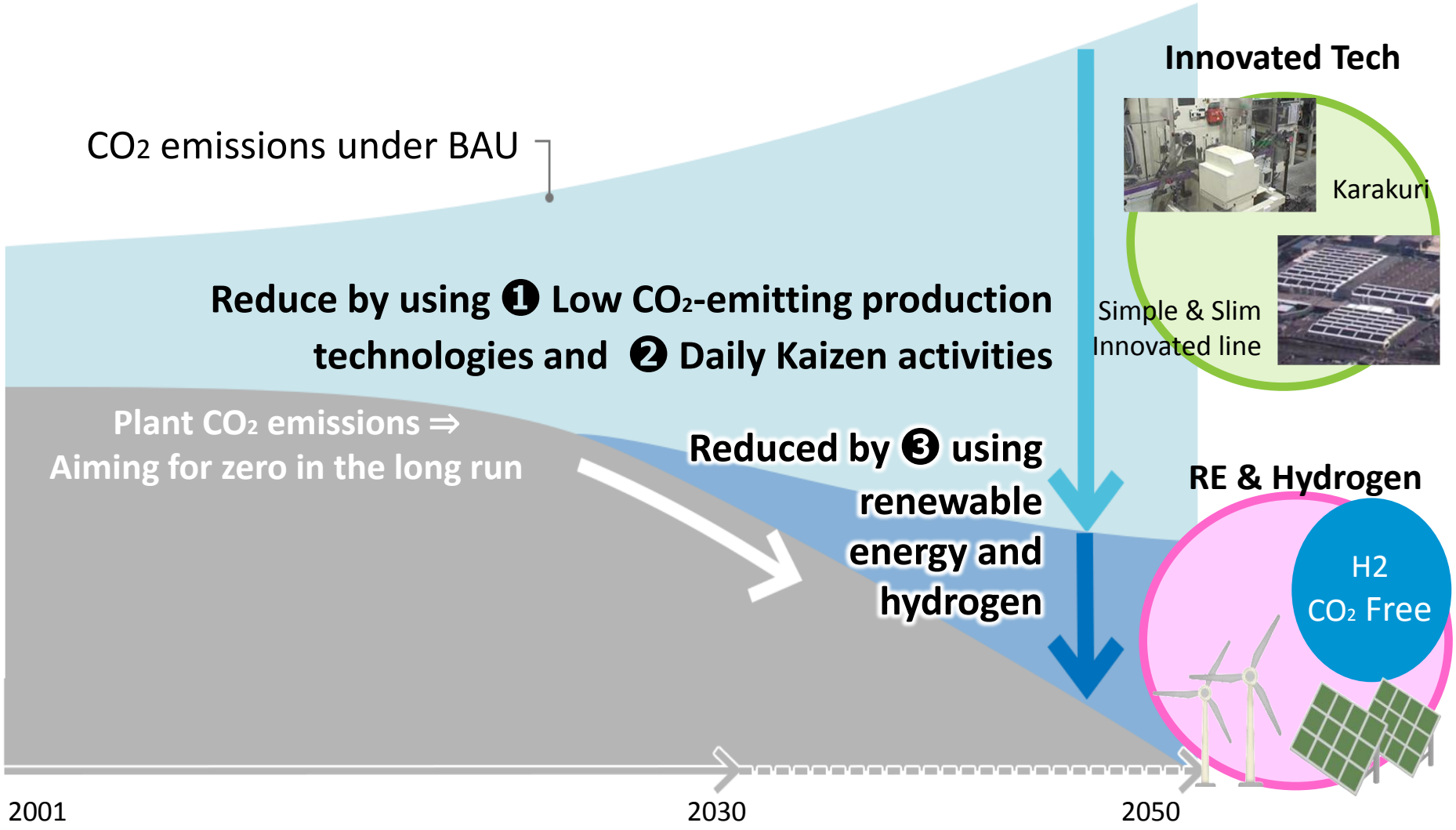
CHALLENGE 1	CHALLENGE 2	CHALLENGE 3	CHALLENGE 4	CHALLENGE 5	CHALLENGE 6
New Vehicle Zero CO_2 Emissions Challenge	Life Cycle Zero CO_2 Emissions Challenge	Plant Zero CO_2 Emissions Challenge	Challenge of Minimizing and Optimizing Water Usage	Challenge of Establishing a Recycling-based Society and Systems	Challenge of Establishing a Future Society in Harmony with Nature

Concrete actions to be accomplished （Toyota's six challenges）

Three challenges achieving zero and three net positive impact challenges

Challenge achieving zero	①New Vehicles Zero CO2 Emissions Challenge 90% reduction by 2050 (Numerical target)	Develop and spread next-generation vehicles
	②Life Cycle Zero CO2 Emissions Challenge	Eco-friendly design from materials to disposal
	③Plant Zero CO2 Emissions Challenge Decarbonize by 2050 (Numerical target)	Low CO2-emitting innovative technology Introduce RE and hydrogen use
Net positive impact challenge	④Challenge of Minimizing and Optimizing Water Usage	Thoroughly reduce the amount of water used and clean thoroughly and return
	⑤Challenge of Establishing a Recycling-based Society and Systems	Roll out resource recycling system globally
	⑥Challenge of Establishing a Future Society in Harmony with Nature	All-Toyota joint activities to connect communities and with the world

Challenge 3 - Plant Zero CO_2 Emissions



1) Innovative Technologies & Daily Kaizens for Energy Saving
2) Use of renewable energy and hydrogen energy

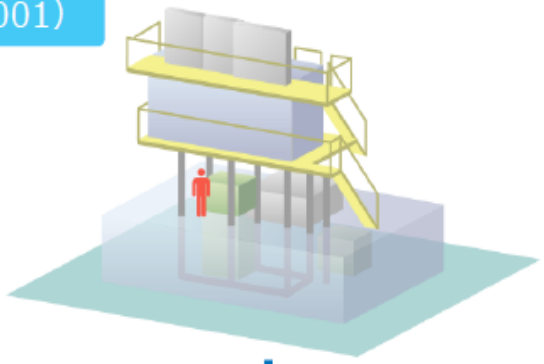
❶ Low CO2 Production Technologies

- Thoroughly shortening production process
- Minimization and energy saving of moving parts
- Recovery of wastes energy
- Increasing energy storage

Casting Process

Downsize equipment

Existing (2001)



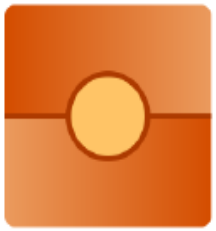
Development (2020)

Volume ▲50%

CO_2 reduction ▲30%

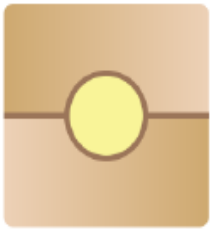
Harden sand mold at low temperature

Existing



organic sand mold harden at high temperature

Development



inorganic sand mold harden at low temperature

CO_2 reduction ▲10%

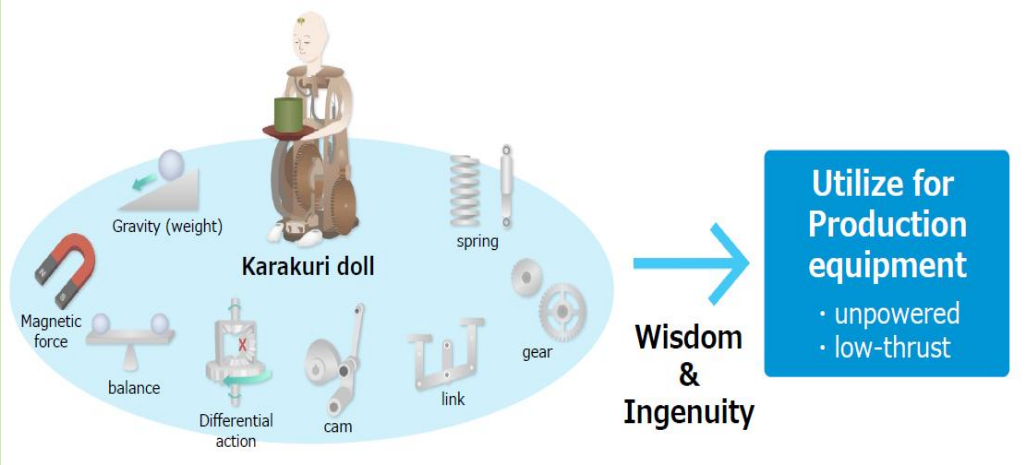
Energy saving ⇒ CO_2 reduction by 40%

❷ Daily Kaizens

- Elimination of unnecessary/inconsistent/unreasonable efforts
- Unpowered/low-thrust operation energy

Karakuri Mechanism

Using gravity or magnetic force
to move tools without any external energy



Daily Kaizen Management

One of the core principles
of Toyota Production System
“Continuous improvement “
‘Always a Better Way’

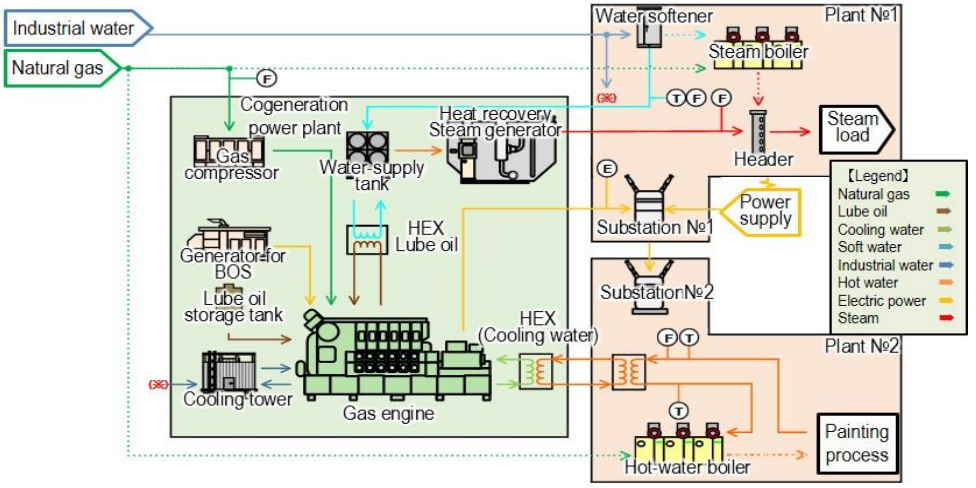
Energy Saving w/JCM

➢ Example of JCM Model

Project：Introduction of gas engine cogeneration system at automobile manufacturing plant
PP (Japan): Toyota Motor Corporation , PP (Indonesia): PT. Toyota Motor Manufacturing Indonesia

Outline of GHG Mitigation Activity

- **gas co-generator** has been installed to reduce energy consumption and CO_2 emission (year 2015)
- system with high efficiency gas-engine and heat recovery system to generate steam and hot water.



Sites of Project

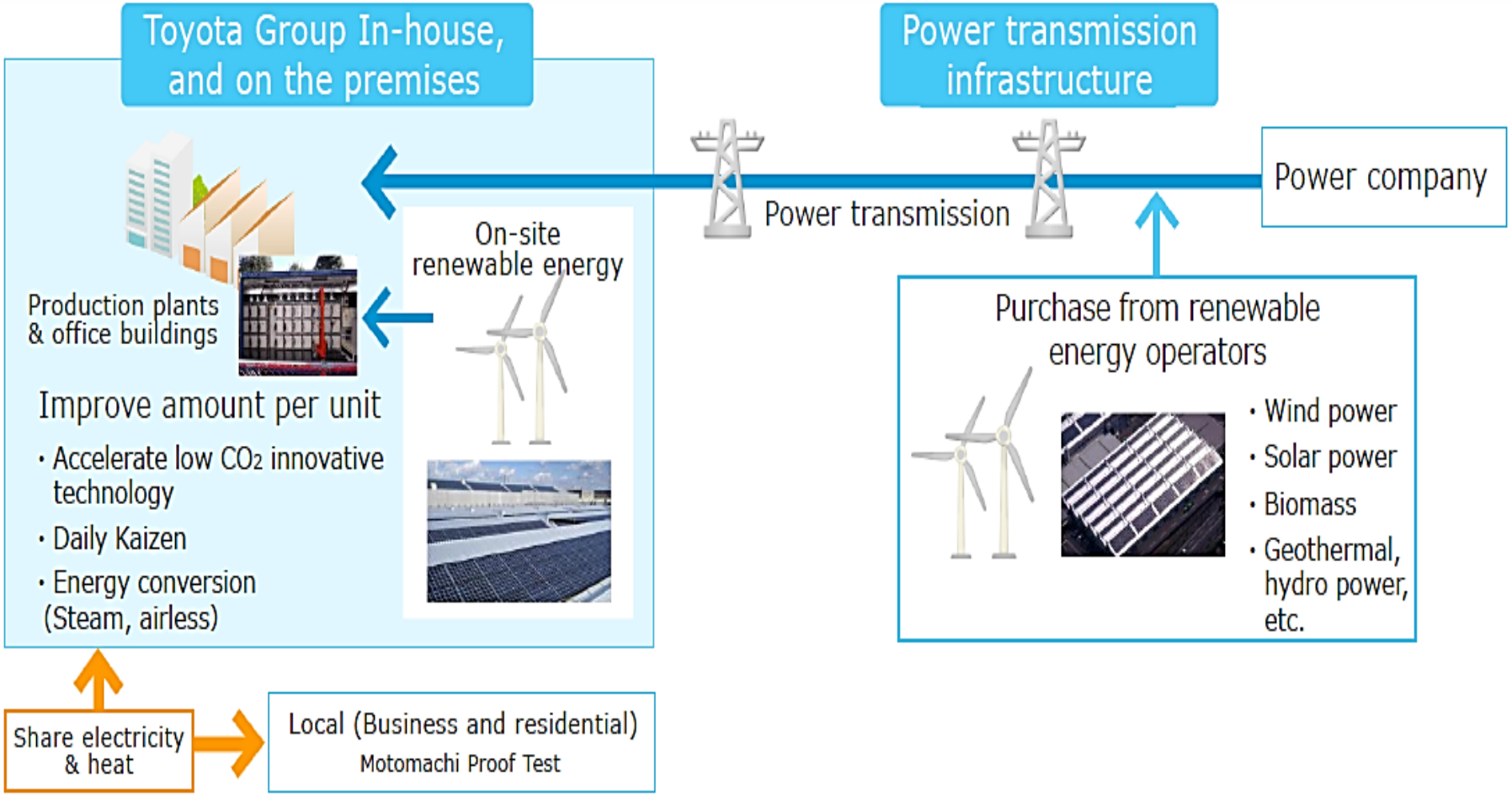
Expected GHG Emission Reductions

Expected CO_2 Emission Reductions

= 20,310 tonCO_2/ year

❸ Renewable Energy

- Elimination of unnecessary/inconsistent/unreasonable efforts
- Unpowered/low-thrust operation energy



As the first process, wind power generation will be introduced in domestic plants by around 2020, for zero CO_2 in the FCV production line

Toyota de Brazil in Brazil will be the first plant to start the use of100% renewable energy from 2015

RE Status - Other global companies

❶ RE100 Collaboration

Introduction : Global campaign working with the world's most influential companies who committed to become 100% renewable energy source

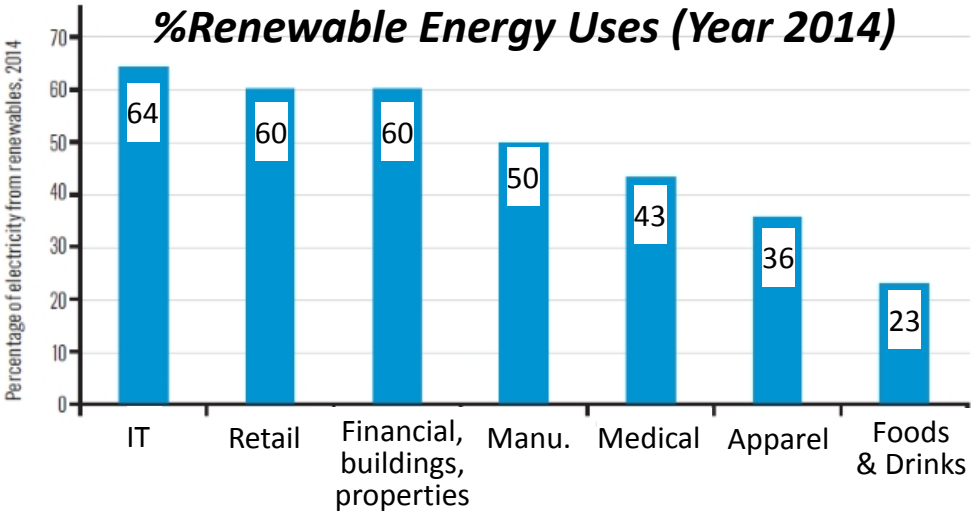
RE 100

Issuance : 2014 Climate Week at New York, USA

Requirement : 1) Set goal to use 100% of total electricity consumption from renewable sources within a specified year

2) Disclose electricity data annually (progress report by RE100)

Joining companies : Consists of a wide range of industries including telecommunications & IT, foods & drinks, cement and automobile manufacturing.



EXAMPLE

PHILIPS

P&G

Unilever

Johnson & Johnson
FAMILY OF COMPANIES

Source : http://there100.org/companies

RE Implementation Target in ASEAN

No.	Country	Target of RE implementation	Target of Solar PV installation
-	**ASEAN**	23% of RE in energy mix within 2025 *From 2016-2025 Action Plan of ASEAN Energy Cooperation (APAEC)	-
1	**Myanmar**	15-20% of power capacity within 2030	-
2	**Thailand**	30% of alternative energy in energy consumption within 2036 *From Alternative energy development plan (Sep 2015)	6,000 MW within 2036 *From Alternative energy development plan (Sep 2015)
3	**Laos**	30% of total energy consumption within 2025	-
4	**Cambodia**	>2 GW of Hydroelectric power within 2020	-
5	**Vietnam**	27 GW within 2030 (129.5 GW) *From Power Development Plan 7th revision (Mar 2016)	• 4 GW within 2025 • 12 GW within 2030 *From Power Development Plan 7th revision (Mar 2016)
6	**Malaysia**	• 2,080 MW within 2020 • 4,000 MW within 2030 *From 2010 National RE Action Plan	• 175 MW within 2020 • 4,000 MW within 2030 *From 2010 National RE Action Plan
7	**Singapore**		350 MW of PV within 2020
8	**Indonesia**	23% of total energy consumption within 2025	-
9	**Brunei**	10% of power generation within 2035	-
10	**Philippines**	15 GW of power capacity within 2030	• 500 MW within 2016 • 1,528 MW within 2030

RE introduction w/JCM

➢ Example of JCM Model

Project：Introduction of 1MW Rooftop Solar Power System in Vehicle Assembly Factory

PP (Japan): Toyota Motor Corporation , PP (Philippines): Toyota Motor Philippines Corp.

Outline of GHG Mitigation Activity

This project aims the reduction of CO2 emission by installing 1.1MW solar panel on the rooftop of the vehicle assembly factory of Toyota Motor Philippines Corp. in the south of Manila. Electricity generated by solar power system is consumed in house and replaces part of grid electricity consumption.

Case Example: Toyota Tsutsumi Factory, Japan
（Source ：Toyota Company Profile）

(Source:http://www.toyota.com.ph)

Expected GHG Emission Reductions

859 tonCO_2/year

= (Reference CO_2 Emission) － (Project CO_2 Emission)

= ((Reference Power consumption) － 0)

× CO_2 Emission Factor

Unit: CO_2 Emission [tCO2/year]

Power Consumption [MWh/year]

CO_2 Emission Factor [tCO2/MWh]

Sites of Project

Site of TMP, Quezon city (approx. 40km from Manila)