Plant Zero CO₂ Emissions Challenge
Outline of 2030 Milestone

Reducing CO₂ emission from the plants by 35% or more (compared to 2013)

Promoting CO₂ reduction by ‘low CO₂ production technologies’ + ‘daily kaizen’ and ‘renewable energy + hydrogen’
Steadily promoting the zero emission goal toward 2030 while enhancing competitiveness
Promoting CO₂ reduction collaboratively by TOYOTA group companies
## Features of Approach 1

### Low CO₂ production technologies

- **Simple and slim**
  - Review the production processes
  - Reduce and integrate the processes

- **Energy transformation/recycling**
  - Replace currently-used energy with more-efficient energy
  - Recover waste energy

### Daily kaizen

- Completely eliminate
  - Muda (non-value added)
  - Mura (unevenness)
  - Muri (overburden)

- Change energy to no power/low thrust

### Benefits

- **Flexibility rise resilience improvement**
- **cost reduction energy/material/man power...**
- **CO₂ reduction**

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「Thoroughly energy reduction」→ 『enhancement of competitiveness』
Features of Approach 2

Significantly reduce CO$_2$ emission, still energy remaining

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Green and Lean

### Renewable energy

- **On-site PJT (installed in the company)**
  - Actively introduce those below purchased power cost → For higher competitiveness

- **Off-site PJT**
  - Support renewable energy spread
  - Purchase from outside company
  - Utilize depending on local status

### Hydrogen

- Introduce it to production process

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Eventually achieve ZERO CO$_2$ by using renewable energy and hydrogen
Suppressing emission increase due to increase of production volume and prevalence of next-generation vehicles and achieving the goal.
By developing high efficiency heat exchanger, change from steam (large heat loss from piping) to high temp air (gas).

Drastically improving energy efficiency by changing energy to gas >> CO₂ reduction
Eliminate waste energy by changing start up timing with the seasons

**Winter**
- Operation Start 7:00
- Start up
  - Temp: Equip. temp

**Summer**
- Operation Start 7:00
- Start up
  - Temp: Equip. temp

Heat up time: from equipment temperature to operation temperature

Eliminate waste energy >> CO₂ reduction
Introduction on our plant’s site

- Utilization of ground-heat energy system in the Honsha area

Using both the air-conditioning heat-pump system and ground-heat energy system in the new building

- Temperature is stable all year round
- Constant temperature line 18°C
- Cooler than air-temperature

Promote introduction of the facilities that can be feasible on our sites
<Specific Action> Estimate CO₂ Emissions per Vehicle at a New Plant

Incorporating our low CO₂ production technologies and daily kaizen items accumulated so far.

Reducing estimated CO₂ emission from new plants to a half of 2001 by 2020.

2020 goal: Halved (compared to 2001)

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2001
New Plant A
New Plant B
New Plant C
New Plant D
2020
<Specific Action> Renewable Energy

Generation on our plant’s site + Procurement

- Solar power generation in North America

Solar panels on the rooftop of the parking

Procurement of wind power generated in TX

Achieved 100% of renewable energy at the office building

Not only generate on our plants’, we promote procurement
<Renewable Energy> On-Site PJT in China

Staring on introduction solar power from Tianjin and Guangzhou

- Tianjin
  - Vehicle assembly plant (10MW)
  - Unit plant (1.6MW)
  - Unit plant (1.5MW)

- Guangzhou
  - Vehicle assembly plant (10MW)
  - Unit plant (5MW)

Expand similar scheme to other area in China
Achieve CO₂ ZERO, in first operated line of FCEV
Establish our leadership for hydrogen use, by introduction of various technology.
<Specific Action> Society that Toyota aims

「We promote activities to practical use of hydrogen in each process of, Produce, Store, Transport, Use.'
Our Approach for Development and Introduction of Technologies

CO₂ emissions ratio by process

Painting
Power Train (Casting)
Power Train (PWT etc.)

Undertake with the painting and power train process of higher emissions
Mainly of the innovation of the spray system, large evolution in every element