Toyota Environmental Challenge 2050

2025 Target

-7th Toyota Environmental Action Plan-
To realize the Sustainable Development Goals (SDGs)

Many issues that threatens the lives of people all over the world such as climate change, health and economy, correlates to each other deeply

1. **Promote the Toyota Environmental Challenge 2050**, based on the idea that this challenge will also lead to solve the above various issues

   Aim to **contribute to the realization of the SDGs through our initiatives**

2. View **problems of the world as our own**, and **accelerate** our environmental initiatives

3. For a sustainable future, **keep on challenging by having a long-term perspective**

Realize the SDGs through the Toyota Environmental Challenge 2050
Toyota Environmental Challenge 2050

- Realize zero CO$_2$ emissions using electrified vehicles and renewable energy
- Establish a future society in harmony with nature by conserving our Home Planet’s resources

Going beyond zero environmental impact and achieving a net positive impact
Aiming to meet the challenge by establishing the Toyota Environmental Action Plan, which sets specific action plans and targets for every five-year period.
2025 Target

Set Targets of the Six Challenges

**CO₂**

- Reduce average CO₂ emissions from new vehicles by 30 percent or more compared to 2010 levels
- Make cumulative sales of 30 million electrified vehicles or more

**CO₂**

- Reduce CO₂ emissions from global plants by 30 percent compared to 2013 levels
- Achieve a 25 percent introduction rate for renewable electricity

**CO₂**

- Reduce CO₂ emissions by 18 percent or more throughout the entire vehicle life cycle (including manufacturing and driving) compared to 2013 levels

**CO₂**

- Reduce water usage by 3 percent per vehicle produced compared to 2013 levels
- Thoroughly manage water discharge quality under internal standards that are stricter than regulatory standards

- Complete set up of 15 model facilities for appropriate treatment and recycling of End-of-life vehicles
- Establish a safe and efficient system for battery 3R

- Realize “Plant in Harmony with Nature” — Six in Japan and four overseas

**Challenge of Establishing a Future Society in Harmony with Nature**
New Vehicle Zero CO₂ Emissions Challenge

Reduce global average CO₂ emissions from new vehicles by 90 percent or more by 2050

【2025 Target】
- Reduce average CO₂ emissions from new vehicles by 30 percent or more compared to 2010 levels
- Make cumulative sales of 30 million electrified vehicles or more
Global average CO$_2$ emissions from new vehicles reduction rate versus 2010 (Japan, U.S., Europe, Chin, Canada, Brazil, Saudi Arabia, India, Australia, Taiwan, Thailand and Indonesia)

Initiatives to Date: 2020 Result

CO$_2$ emissions from new vehicles: Reduced by 23 percent

2020 Result

New Vehicle Zero CO$_2$ Emissions Challenge

23% Reduction
Initiatives to Date: 2020 Result

Cumulative global sales of electrified vehicles

Cumulative sales of electrified vehicles
17.62 million units (by March 2021)

Achieved the 2020 target of cumulative sales of 15 million or more
**Toward a Realistic CO₂ Reduction: Vehicle Usage**

CO₂ emissions varying depending on mileage (Comparison between gasoline vehicles and HEVs)

<table>
<thead>
<tr>
<th>Purpose of use</th>
<th>Average mileage (per day)</th>
<th>Annual mileage</th>
<th>Annual CO₂ reduction$^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Commuting use</strong></td>
<td>25 km</td>
<td>9,000 km</td>
<td>0.43 tons</td>
</tr>
<tr>
<td>(Short distance)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Corporate use</strong></td>
<td>192 km</td>
<td>70,000 km</td>
<td>3.30 tons</td>
</tr>
<tr>
<td>(Long distance) Refer to taxi$^1$</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 Estimated based on vehicle use in Japan

2 (Annual CO₂ reduction) = (Annual CO₂ reduction during operation from gasoline vehicles) – (Annual CO₂ reduction during operation from HEVs)

Vehicles for long distance use have greater CO₂-reduction effects

7 times more CO₂-reduction effects
Toward a Realistic CO₂ Reduction: CO₂ Emission from Electrified Vehicles (WtW*)

CO₂ emissions during driving (WtW) vary depending on the fuel and power generation methods.

CO₂ emissions from BEVs vary significantly depending on the power generation methods.

* Well to Wheel: Includes CO₂ emissions during driving as well as CO₂ emissions during the production stage of fuel and electricity (CO₂ emissions vary depending on the power supply configuration and hydrogen production method, in the case of battery electric vehicles and fuel cell electric vehicles)

* Created by Toyota, based on the Stated Policy Scenario in the 2019 version of the World Energy Outlook (WEO), which is released by the International Energy Agency (IEA) each year.
Plant Zero CO₂ Emissions Challenge

Achieve zero CO₂ emissions at all global plants by 2050

【2025 Target】
- Reduce CO₂ emissions from global plants by 30 percent compared to 2013 levels
- Achieve a 25 percent introduction rate for renewable electricity

CO₂ Emissions at Global Plants

- Reduce by 30%
- Innovative technology + Daily kaizen
- Use of renewable energy + Use of hydrogen
- Zero CO₂ emissions

Achieving carbon neutrality

2013 2025 2035年 2050
Initiatives to Date: Thorough Energy-saving

Energy usage per unit at newly established plants

- Approximately halved at newly established plants

**Innovative Technology + Daily Kaizen**

Approximately halved at newly established plants
Initiatives to Date: Innovative Technology (Painting Process)

Achieved globally unrivaled coating efficiency while reducing CO$_2$ emissions by approximately 7 percent.
Initiatives to Date: Renewable Energy

Global introduction rate for renewable electricity increased to approximately 11 percent in 2019

- **Plants in Japan** (Motomachi/Honsha/Shimoyama)
  - **100% Renewable Energy** at the FCEV Production Line
  - Mirai
  - High-pressure hydrogen tank
  - FC stack

- **Plants Overseas** (Eight in Europe/four in South America)
  - **100% Renewable Electricity**
  - TMMF (France)
  - TMMT (Turkey)
  - TDB-PFZ (Brazil)
  - TDB-SOR (Brazil)

- **Plant in Japan** (Tahara)
  - Began Constructing a Wind Power Generator

- **Technical Centers in Japan** (Honsha/Higashi-Fuji)
  - **100% Renewable Energy**

[Japan] Mirai FCEV production line is using 100 percent renewable energy
[Overseas] Switched to renewable electricity in Europe and South America
Toward a Realistic CO₂ Reduction: Energy Transition

Target zero CO₂ emissions through renewable electricity and CO₂-free hydrogen
Toward a Realistic CO₂ Reduction: Developing Hydrogen Usage Technologies

2013

Hydrogen Burner

2025

Promote technological development and increase verification tests for the full-scale use of hydrogen

2050

Plant Zero CO₂ Emissions Challenge

Hydrogen usage as a thermal energy

Technological development and verification test

Phase I

Introduction to the production process

Phase II

Example of hydrogen technology

Hydrogen Fuel Cell Forklift

FCEV Bus for visitors

Fuel Cell (FC) Generator (SOFC-MGT)

Hydrogen Burner

Oxygen

Pre-combustion

Main combustion

Hydrogen

Small volumes of hydrogen and oxygen are pre-combusted to reduce the oxygen concentration

Promote technological development and increase verification tests for the full-scale use of hydrogen
Toward a Realistic CO₂ Reduction: Renewable Energy Power Generation Business

Initiatives to Date

- Installed solar power and wind power facilities on company premises
- Invested in the “Mirai Renewable Energy Fund” in November 2018 and developed power plants outside the company premises
  ⇒ Looking toward future electricity supplies for its own production plants and those elsewhere

New Initiatives

- Build a framework expanding the investment targets (newly established power plants outside the company premises ⇒ newly established and operating power plants)

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Popularize and expand the use of renewable energy throughout Japan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Promotion structure</td>
<td>Establish a joint venture (Toyota Green Energy LLP) between three companies: Toyota Motor Corporation, Chubu Electric Power Co., Inc. and Toyota Tsusho Corporation</td>
</tr>
<tr>
<td>Business description</td>
<td>• Developing and operating newly established and existing renewable energy power plants • Target: Solar power, wind power, hydroelectric power, biomass power and geothermal power plants</td>
</tr>
<tr>
<td>Foundation date (plan)</td>
<td>July 2020</td>
</tr>
</tbody>
</table>

Start major investments in the renewable energy power generation business
Life Cycle Zero CO₂ Emissions Challenge
Completely eliminate all CO₂ emissions throughout the entire vehicle life cycle in the future

- Reduce CO₂ emissions by 18 percent or more throughout the entire vehicle life cycle (including manufacturing and driving) compared to 2013 levels.
Scope of Life Cycle Zero CO\textsubscript{2} Emissions Challenge

Entire Vehicle Life Cycle (Life Cycle Zero CO\textsubscript{2} Emissions Challenge)

- **Manufacturing**
  - Material manufacturing
  - In-house parts manufacturing
  - Purchasing parts manufacturing
  - Vehicle manufacturing

- **Driving**
  - New Vehicle Zero CO\textsubscript{2} Emissions Challenge

- **Disposal and Recycling**
  - Disposal/Recycling
  - Purchasing/Logistics
  - Fuel and electricity production

Life Cycle Zero CO\textsubscript{2} Emissions Challenge in cooperation with stakeholders
Initiatives to Date: Assessments at the Development Stage

Continued assessments of life cycle CO₂ emissions from 2005

Assessed 130 models over the past 15 years and reduced CO₂ emissions throughout the entire vehicle life cycle.
Toward a Realistic CO$_2$ Reduction: Issues of Electrified Vehicles

Life Cycle CO$_2$ Emissions from Electrified Vehicles

- Manufacturing
- Driving (during fuel and electricity production)
- Driving (during driving)
- Disposal and Recycling

- Gasoline vehicles of the same class
- Mirai

Increased by electrification parts
(by using CO$_2$-free hydrogen fuels)

Examples of Electrification Parts

- Secondary battery
- Fuel cell (FC) stack
- High-pressure hydrogen tank

Challenge of reducing CO$_2$ emissions from electrification parts
Toward a Realistic CO₂ Reduction: Eco-friendly Design

Promote Technological Development

- Develop and expand the use of low-CO₂ emission materials
- Reduce material usage
- Reduce the number of parts
- Increase the use of recycled materials

CO₂ Emissions During Material Manufacturing

Vehicle materials

- Steel
- Aluminum
- Plastic

<table>
<thead>
<tr>
<th>Material</th>
<th>CO₂ Emissions (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel</td>
<td>0</td>
</tr>
<tr>
<td>Aluminum</td>
<td>10</td>
</tr>
<tr>
<td>Plastic</td>
<td>0</td>
</tr>
</tbody>
</table>

Strengthen Management During the Development Process

- Specify and manage prioritized management parts upon setting CO₂ reduction targets during the development planning stage

Promote technological development and strengthen target management to reduce CO₂ emissions
Challenge of Minimizing and Optimizing Water Usage

Minimize water usage and implement water discharge management based on individual local conditions.

【2025 Target】
- Reduce global water usage by 3 percent per vehicle produced compared to 2013 levels
- Thoroughly manage water discharge quality under internal standards that are stricter than regulatory standards

Become No. 1 regional plant leading to prosperity throughout the entire society

- Thoroughly reduce the amount of water usage
  Minimize the impact on regional water resources by minimizing water withdrawal and utilizing rainwater

- Purify wastewater thoroughly and return
  Have a net positive impact on the environment by returning clean water in the local water environment
Initiatives to Date: Reduced Water Usage

- Established the Toyota Water Environment Policy
- Identified the four high water risk plants overseas and started thorough water management

Example of Water Reduction

Before Kaizen

- Municipal water

Wastewater

After Kaizen

- Utilize wastewater generated from a different process

Wastewater

[Water Usage]
- Annual: Reduced by 3,143 tons
- Per unit: Reduced by 15.9 liters

Zero use of municipal water in the body-washing process
Future Initiatives

Promote activities that impact positively on the water environment in each region.

Thoroughly Reduce Water Usage

- Use water efficiently
- Recycle wastewater
- Utilize rainwater and others

Purify Wastewater Thoroughly and Return

- Reduce the use of environmentally harmful substances
- Purify wastewater thoroughly
- Continuously monitor water quality

Challenge of Minimizing and Optimizing Water Usage
Challenge of Establishing a Recycling-based Society and Systems

Two global projects:
- Prevent pollution from End-of-life vehicles
- Measures for resource risks
Promoted Toyota’s original initiatives (appropriate treatment of End-of-life vehicles and reuse of batteries)

<table>
<thead>
<tr>
<th>Initiative</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Toyota Global 100 Dismantlers Project</strong></td>
<td>Completed set up of model facilities for appropriate treatment of End-of-life vehicles (Thailand and Vietnam)</td>
</tr>
<tr>
<td><strong>Toyota Global Car-to-Car Recycle Project</strong></td>
<td>Started battery rebuilds for service parts (Japan)</td>
</tr>
<tr>
<td></td>
<td>Resource recycling of nickel (Japan, the U.S., Europe, China and Asia)</td>
</tr>
</tbody>
</table>

- **Initiatives to Date**

- Promoted Toyota’s original initiatives (appropriate treatment of End-of-life vehicles and reuse of batteries)
Future Initiatives

Establish a system for battery rebuilding, reusing and recycling
Global deployment (image)

Global deployment of the system established in Japan for battery collection through resource recycling
Challenge of Establishing a Future Society in Harmony with Nature

Three global projects:
Develop projects with "connecting" as a key word
Initiatives to Date: Toyota Green Wave Project

Activities in collaboration with each Toyota affiliate’s employees, local community and organization

A cumulative total of approximately 12 million trees were planted inside and outside of plant sites (April 2005-March 2020)
Future Initiatives: Toyota Green Wave Project

In Japan, it started from the Tsutsumi Plant

Change to “Plant in Harmony with Nature” from “Creation of Forest at Plant Sites”

Pyramid of Ecosystem

- Monitor indicator species
- Creation of forest at plant sites
- Biodiversity conservation activity

Biotope at the Tsutsumi Plant

- Log house (administrative office)
- Neo-natural river reconstruction method

In Japan, it started from the Tsutsumi Plant

Increase plants in harmony with nature and promote “biodiversity conservation activities”
## Toyota ESD* Project

Foster environmentally conscious persons through hands-on nature programs

<table>
<thead>
<tr>
<th>Toyota Shirakawa-Go Eco-Institute</th>
<th>Forest of Toyota</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cumulative total of users:</td>
<td>Cumulative total of users:</td>
</tr>
<tr>
<td>Achieved 227,000 people</td>
<td>Achieved 182,000 people</td>
</tr>
</tbody>
</table>

*Education for Sustainable Development

Enhance “Connecting to the Future” environmental education activities
Toyota Environmental Challenge 2050

- Realize zero CO₂ emissions using electrified vehicles and renewable energy
- Establish a future society in harmony with nature by conserving our Home Planet's resources

Going beyond zero environmental impact and achieving a net positive impact
Toyota Environmental Challenge 2050
2025 Target
-7th Toyota Environmental Action Plan-
(Appendix) 2025 Target Full Text
# New Vehicle Zero CO₂ Emissions Challenge

<table>
<thead>
<tr>
<th>Target</th>
<th>1. Average CO₂ emissions from new vehicles</th>
<th>Reduce global* average CO₂ emissions (TtW* g/km) from new vehicles by 30 percent or more compared to 2010 levels</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>* Japan, U.S., Europe, China, Canada, Brazil, Saudi Arabia, India, Australia, Taiwan, Thailand and Indonesia</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Tank to Wheel: CO₂ emissions during driving (CO₂ emissions during the production stage of the fuel is not included; TtW emissions are zero in the case of battery electric vehicles and fuel cell electric vehicles)</td>
</tr>
</tbody>
</table>
|   | 2. Electrified vehicles | • Make cumulative sales of 30 million electrified vehicles or more, targeting annual sales of 5.5 million units in 2030  
• Provide all models in the Toyota and Lexus lineups worldwide to be available either as a dedicated electrified model or with an electrified option, by around 2025 |
| Contribution to SDGs | 7.3 improvement in energy efficiency | 13.1 reduction of CO₂ |
### Plant Zero CO₂ Emissions Challenge

<table>
<thead>
<tr>
<th>Target</th>
<th>3. Plant CO₂ emissions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- Reduce CO₂ emissions by implementing innovative technologies and daily <em>kaizen</em> and introducing renewable energy</td>
</tr>
<tr>
<td></td>
<td>- Reduce CO₂ emissions from global plants by 30 percent compared to 2013 levels</td>
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<tr>
<td></td>
<td>Achieve a 25 percent introduction rate for renewable electricity</td>
</tr>
<tr>
<td></td>
<td>Promote proactive technological development to utilize hydrogen</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contribution to SDGs</th>
<th>7.3 improvement in energy efficiency</th>
<th>9.1 infrastructure development</th>
<th>13.1 reduction of CO₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>SDG 7</td>
<td></td>
<td>SDG 9</td>
<td>SDG 13</td>
</tr>
<tr>
<td>Affordable and clean energy</td>
<td>Ind. innovation and infrastructure</td>
<td>Climate action</td>
<td></td>
</tr>
<tr>
<td>Target</td>
<td>4. Life cycle CO$_2$ emissions</td>
<td>Reduce CO$_2$ emissions by 18 percent or more throughout the entire vehicle life cycle compared to 2013 levels</td>
<td></td>
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<tr>
<td>--------</td>
<td>--------------------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
</tbody>
</table>
|        | 5. Logistics                   | *<Japan>* Reduce CO$_2$ emissions by 7 percent by improving transport efficiency compared to 2018 levels (average of 1 percent reduction per year)  
*<Overseas>* Reduce CO$_2$ emissions by vessels for export (introduce two LNG-powered pure car carriers) |
|        | 6. Suppliers                   | Promote CO$_2$ emissions reduction activities among major suppliers |
|        | 7. Dealers                     | Achieve 100 percent introduction rate for CO$_2$ emissions reduction items at newly-constructed and remodeled dealers |
| Contribution to SDGs | 12.6 sustainable practices 12.8 sustainable lifestyles | 13.1 reduction of CO$_2$ |
### Challenge of Minimizing and Optimizing Water Usage

#### Target

| 8. Water quantity | • Reduce water usage taking the water environment in each country and region into consideration  
|                   | • Promote wastewater recycling, rainwater use and various activities including daily *kaizen*  
|                   | • Reduce global water usage by 3 percent per vehicle produced compared to 2013 levels (reduce by 34 percent compared to 2001 levels)  
|                   | • Complete measures at two Challenge-focused plants where the water environment is considered to have a large impact |
| 9. Water quality  | • Thoroughly manage water discharge quality under internal standards that are stricter than regulatory standards  
|                   | • Continuously assess the impact of wastewater at all plants where it is discharged directly into the river |

#### Contribution to SDGs

| 6.3 improvement in water quality |
| 6.4 ensuring water resources |
## Challenge of Establishing a Recycling-based Society and Systems

<table>
<thead>
<tr>
<th>Target</th>
<th>10. Toyota Global 100 Dismantlers Project</th>
<th>11. Toyota Global Car-to-Car Recycle Project</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Complete set up of 15 model facilities for appropriate treatment and recycling of End-of-life vehicles</td>
<td>Establish a safe and efficient system for battery 3R (Rebuilt, Reuse and Recycle), eyeing the widespread use of electrified vehicles</td>
</tr>
<tr>
<td></td>
<td>Continuously accelerate easy-to-dismantle designs - Integrate easy-to-dismantle designs to respond to appropriate treatment and recycling of End-of-life vehicles and resource issues, and provide appropriate information (large batteries, fuel cell (FC) hydrogen tank and others)</td>
<td>- Aim to maximize collection and detoxification of End-of-life batteries globally - Start operating battery 3R throughout five regions — Japan, U.S., Europe, China and Asia</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Develop technologies to utilize recycled materials (especially plastics) in accordance with the conditions in each region - Promote utilization by technological development to optimally exploit recycled materials in Europe and to increase the supply of recycled materials in Japan</td>
</tr>
</tbody>
</table>

## Contribution to SDGs

<table>
<thead>
<tr>
<th>9 INDUSTRY, INNOVATION AND INFRASTRUCTURE</th>
<th>12 RESPONSIBLE CONSUMPTION AND PRODUCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.1 infrastructure development</td>
<td>12.2 sustainable management and efficient use of natural resources</td>
</tr>
<tr>
<td>9.4 sustainable industrial processes</td>
<td>12.4 management of wastes</td>
</tr>
<tr>
<td></td>
<td>12.5 reduction of waste</td>
</tr>
</tbody>
</table>
## Challenge of Establishing a Future Society in Harmony with Nature

### Target

| 12. Toyota Green Wave Project | • Realize “Plant in Harmony with Nature” – six in Japan and four overseas  
| | • Promote activities to connect with local communities in collaboration with Toyota Group companies and other affiliated companies  
| | • Start activities promoting harmony with nature in collaboration with local communities and companies toward biodiversity conservation |

| 13. Toyota Today for Tomorrow Project | Globally strengthen conservation of endangered species, which symbolize biodiversity in collaboration with NGOs and others |

| 14. Toyota ESD* Project  
* Education for Sustainable Development | Implement globally unified initiatives to foster environmentally conscious persons responsible for the future  
| | - Offer environmental education opportunities by utilizing biotopes and others in collaboration with “Plant in Harmony with Nature”  
| | - Foster environmentally conscious persons at both in-house and outside sites, including plants and the Forest of Toyota, by utilizing educational tools in harmony with nature for the next generation |

### Contribution to SDGs

| 12.8 sustainable lifestyles | 15.1 conservation of terrestrial ecosystems  
| | 15.a ensuring financial resources |
## Environmental Management

<table>
<thead>
<tr>
<th>Target</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>15. Chemical substances</td>
<td>Implement thorough management by carefully considering legal trends in each country and region</td>
</tr>
</tbody>
</table>
| 16. Air quality  | **<Product>** Steadily introduce low-emission vehicles and boost further improvement by introducing and increasing zero emission vehicles (ZEVs)  
                   **<Production>** Continue volatile organic compound (VOC) emissions reduction activities and maintain industry-leading level |
| 17. Waste       | Promote activities to thoroughly reduce waste globally and aim to minimize the volume of resource input and waste, with the environment and economy in balance |
| 18. Logistics packaging | Implement initiatives to reduce and recycle plastics used in packaging and recycle them                                                   |
| 19. Risk management | Thoroughly comply with environmental laws and regulations and strengthen proactive prevention activities for environmental risks in each country and region |

<table>
<thead>
<tr>
<th>Contribution to SDGs</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.9 reduction of environmental pollution</td>
<td>3 Good Health and well-being</td>
</tr>
<tr>
<td>11.6 reduction of environmental impact of cities</td>
<td>11 Sustainable cities and communities</td>
</tr>
<tr>
<td>12.4 management of wastes 12.5 reduction of waste</td>
<td>12 Responsible consumption and production</td>
</tr>
</tbody>
</table>
更新履歴

2020/04/28 初版
2020/08/07 更新
2020/10/06 更新
2020/10/26 更新
2021/11/30 更新

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07/August/2020 Update
06/October/2020 Updated
26/October/2020 Updated
30/November/2021 Updated