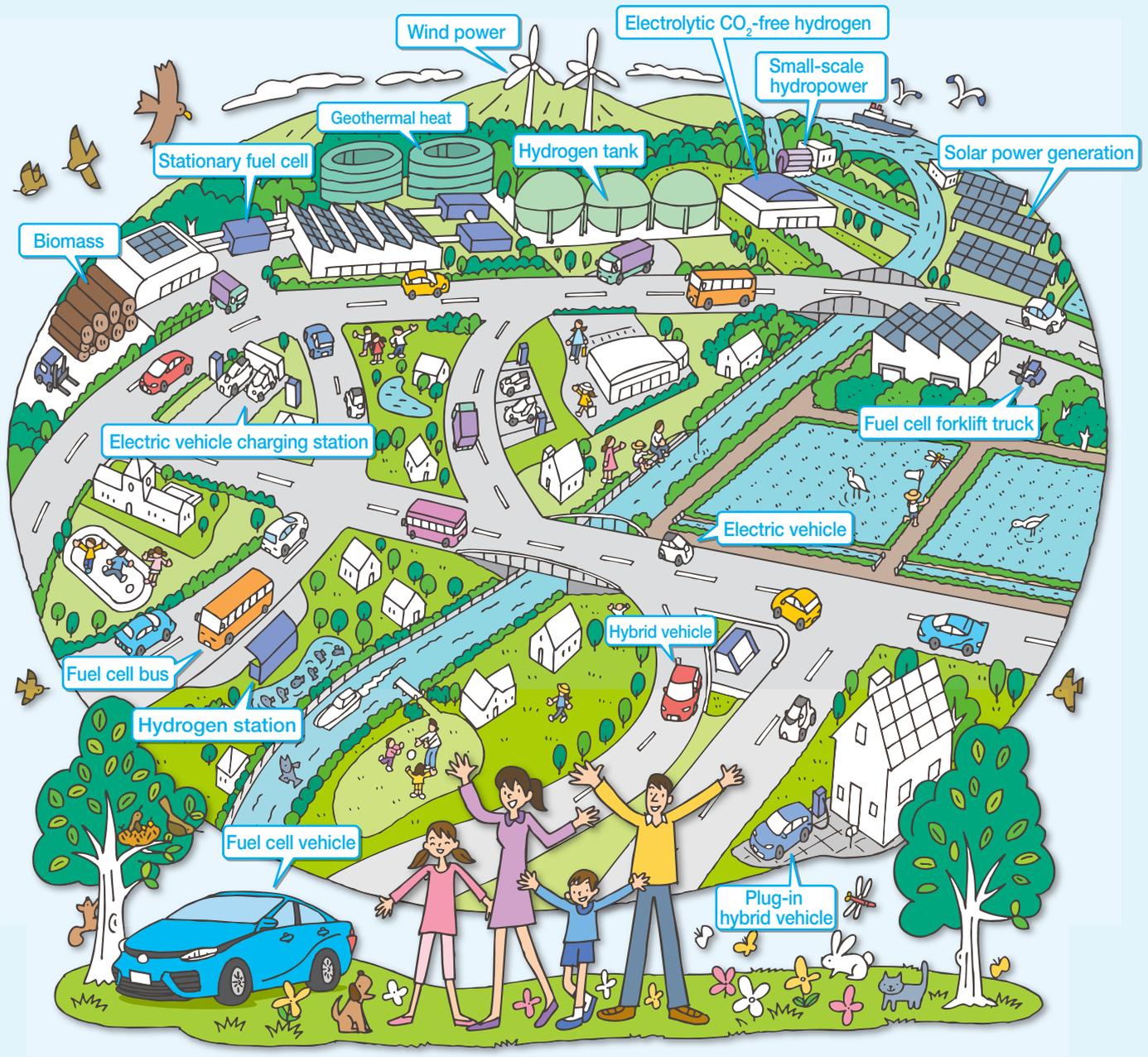


# Toyota Environmental Challenge 2050

Challenge for Establishing a Future Society in Harmony with Nature



## Toyota Environmental Challenge 2050

Challenge to Zero & Beyond

# Aiming to Establish a Future Society in Harmony with Nature

Since its foundation, in 1937, Toyota has been consistently committed to the idea of contributing to society by manufacturing automobiles, and leading innovation through technology and creativity. This spirit of challenge that stands up to change has been handed down to us today through the company's DNA. Looking forward too, we would like to continuously contribute to society through our business activities and to carry on being a company that customers choose and that brings a smile to every customer.

We have considered the ideal form of a new mobility society and tackled serious environmental issues head-on, while positioning our contribution to the development of a sustainable society as a key challenge for management. The development of the world's first mass-produced hybrid vehicle, the Prius, and the fuel cell vehicle MIRAI, reflect this spirit of unprecedented challenge. We were able to overcome numerous difficulties and launch these cars due to the strong support we have received from many people.

Despite these energetic initiatives, the global environment remains in a critical situation. Extreme weather conditions attributed to climatic changes driven by greenhouse gases threaten our livelihood.

Meanwhile, the seriousness of environmental issues is increasing over a wide area, with population growth, accompanied by water shortages and resource depletion, and degradation of biodiversity due to the fragmentation of ecosystems.

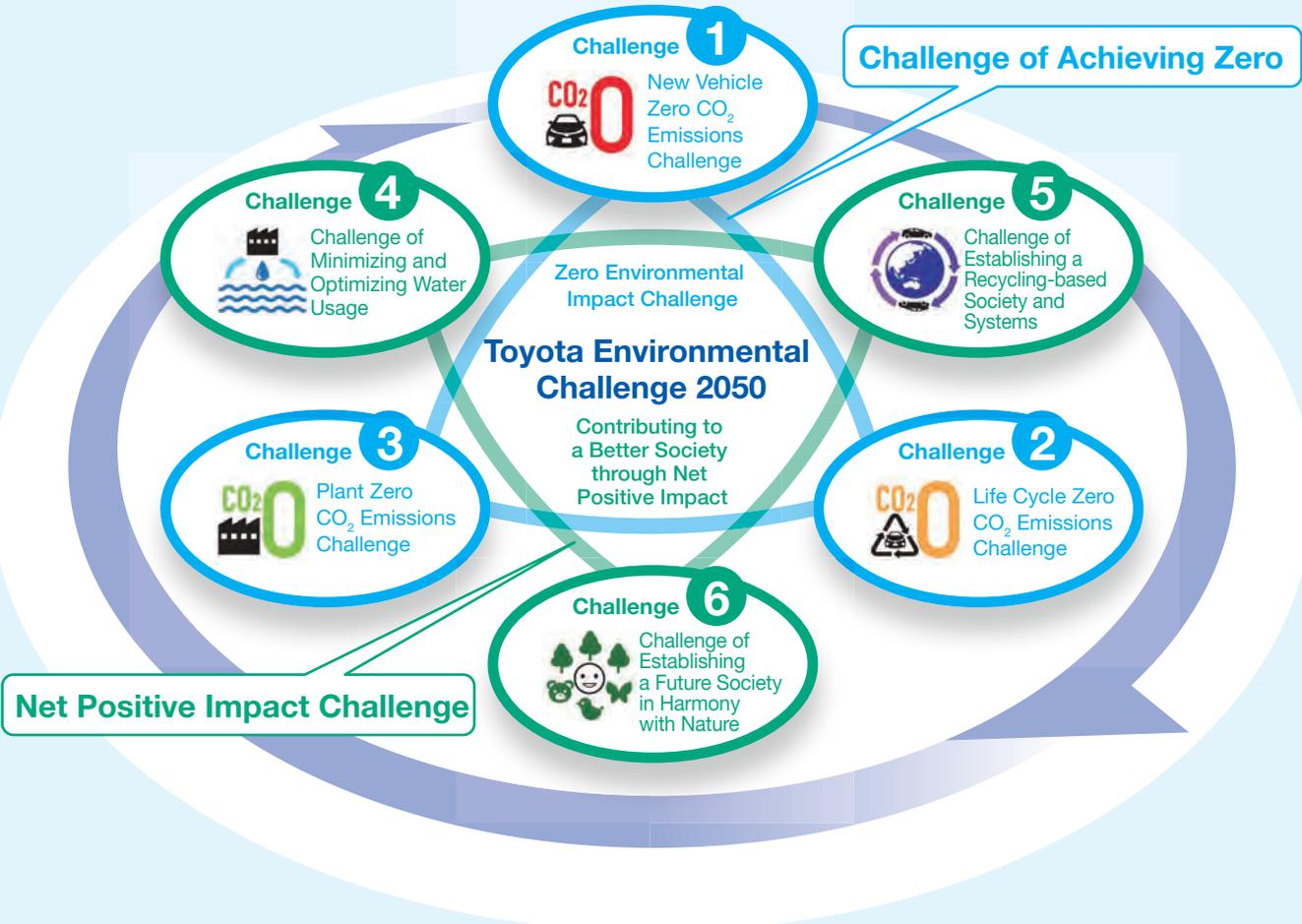
In response to the situation, we need to take on new challenges that consider the world 20 or 30 years in the future, in order to remain closely aligned with the global environment. This means not merely trying to reduce negative factors associated with automobiles as close to zero as possible, but at the same time, looking beyond zero, challenging ourselves in all-Toyota initiatives toward a net positive impact.

It also means a further strengthening of these initiatives in collaboration with all stakeholders who share our aspirations. We will consolidate new ideas, dynamism and technology to tackle together the realization of a truly sustainable society.

We have started to take on this new challenge aimed at a society where people, automobiles and nature coexist in harmony, providing a bright future for our children, with clear skies.

## Six Challenges of Toyota

To move toward a net positive impact rather than just trying to reduce negative factors to zero, 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

New Vehicle Zero CO<sub>2</sub> Emissions Challenge



As if to demonstrate the fact of global warming, extreme weather patterns worldwide have been provoking successive disasters. If current conditions continue and increased measures are not taken to reduce greenhouse gases, it is estimated that by 2100 the world's average temperature will have risen by 3.7–4.8°C. It is further estimated that, to hold the temperature rise since before the Industrial Revolution to “below 2°C,” we will not only have to reduce additional CO<sub>2</sub> emissions to zero, but will need to achieve an actual positive trend through absorption.\* While the world is trying to move toward “below 2°C” scenario, Toyota has, under the “New Vehicle Zero CO<sub>2</sub> Challenge,” decided to challenge itself to reduce vehicle CO<sub>2</sub> emissions by 90 percent in comparison with 2010 levels, by 2050. To realize this, in addition to mileage improvement of engine-driven vehicles, Toyota will promote the development of next-generation vehicles with low or zero CO<sub>2</sub> emissions—hybrid, plug-in hybrid, electric, and fuel cell vehicles and further accelerate the spread of these vehicles. When these eco-friendly vehicles come into widespread use, they can start making a contribution to society. Toyota will also cooperate with relevant stakeholders to provide possible support as an automobile manufacturer toward the provision of the infrastructure for widespread adoption of electric and fuel cell vehicles.

\* 5th Assessment Report of IPCC Working Group III (2014)

Challenge 2

Life Cycle Zero CO<sub>2</sub> Emissions Challenge



By Lifecycle Zero CO<sub>2</sub> Emissions Challenge, we mean efforts to reduce to zero not simply the CO<sub>2</sub> emissions produced in traveling and manufacturing, but all CO<sub>2</sub> emissions including in the processes of materials production, and disposal and recycling of vehicles. For instance, there are some next-generation vehicles that do achieve reduced CO<sub>2</sub> emissions when driven, but actually cause increased CO<sub>2</sub> emissions at the material and vehicle production stages. Because of this, we will further promote environmentally friendly design such as by choosing appropriate materials. In this way, we are going to pursue “Always Better Cars.” For example, we will develop and expand the use of materials with lower CO<sub>2</sub> emissions during production and will reduce the quantity of materials and number of parts used in a vehicle. We will also adopt more recycling and biological materials for vehicle production and enhance the initiative aimed at easy to dismantle design.

Challenge 3

Plant Zero CO<sub>2</sub> Emissions Challenge



Not only do vehicles emit CO<sub>2</sub> while traveling; CO<sub>2</sub> is also generated during their manufacture process. Reducing CO<sub>2</sub> to restrain climate change is therefore also a challenge for the plants that manufacture automobiles. The two main pillars of our strategy to achieve zero CO<sub>2</sub> emissions at our plants are improvement of manufacturing technology and switching to different forms of energy. Taking first the manufacturing technology, we will carry out simplification and rationalization of the manufacturing process to shorten it and reduce the time, thus cutting CO<sub>2</sub> emissions. Improved efficiency in energy use can also reduce CO<sub>2</sub> emissions. We will further reduce CO<sub>2</sub> emissions in all process types, for instance by introducing mechanisms that do not use energy. Regarding the energy sources used, we will cut CO<sub>2</sub> emissions by adopting renewable energy sources such as solar and wind power, and by utilizing hydrogen energy.

Challenge 4

Challenge of Minimizing and Optimizing Water Usage



According to forecasts, the world's population will climb to 9.1 billion by 2050, demand for water will increase by 55 percent from current levels, and as a result, the percentage of the total population suffering water shortages will reach 40 percent. In automobile manufacturing, water is used in painting, forging and other processes. Therefore, even a small reduction of its impact on the water environment is important. Our two measures to achieve this are comprehensive reduction of the amount of water used and comprehensive water purification and returning it to the earth. So far, Toyota has implemented rainwater collection to reduce the amount of water used by production plants, filtering to increase the water recycling rate, and re-use of wastewater through recycling. The local water environment differs greatly depending on region. Going forward, we intend to roll out a range of measures globally to deal with the water environment in a way that is sensitive to local needs.

Challenge 5

Challenge of Establishing a Recycling-based Society and Systems



With the worldwide increase in population and the pressure for economic growth and convenient lifestyles, the consumption of resources is accelerating. If present trends continue, large-scale exploitation of natural resources will result in depletion, and appropriate disposal will be unable to keep pace with the increasing amounts of waste generated by mass consumption, resulting in environmental pollution. To improve resource efficiency toward an ideal resource-recycling based society (circular economy), initiatives are needed in four key areas: (1) utilization of eco-friendly materials; (2) making use of parts longer; (3) development of recycling technology; (4) making vehicles from the materials of end-of-life vehicles. These last two apply to the whole of the automotive industry. Toyota has been working for 40 years on the challenge of resource recycling, leading the world by developing world-first technologies and in terms of scale of operations. Going forward, by rolling out to the world the technology and systems evolved in Japan and developing them into the future, we will continue working on the challenge of establishing a recycling-based society.

Challenge 6

Challenge of Establishing a Future Society in Harmony with Nature



If humans and nature are to coexist into the future, we need to conserve forests and other rich natural systems in all regions. However, deforestation is progressing around the world, so that every year, forest equivalent to 14 percent of Japan's land area is lost. To realize our aim of “enriching lives of communities” in each region, the Toyota group companies have engaged in planting trees at plants, environmental conservation activities in their surrounding area, and environmental education. Going forward, the insights gathered so far will be used to promote activity at Group, region, and organization level. Among the variety of activities we are rolling out are the Toyota Green Wave Project, which aims to connect regions with green corridors; the Toyota Today for Tomorrow Project, providing assistance for environmental activities that connect to the world; and the Toyota ESD Project, contributing to environmental education that connects to the future. Our aim is to establish a society where humans and nature coexist in harmony.

## Six Challenges and the Sixth Toyota Environmental Action Plan

Activities to be implemented in FY2016–2020 in order to meet the six challenges are outlined in the Sixth Toyota Environmental Action Plan. In formulating the plan, environmental activities were categorized according to the three priority themes of the Fifth Plan: “contribution to a low-carbon society,” “contribution to a recycling-based society,” and “environmental protection and contribution to a harmony with nature society.” Embracing these three themes, Toyota will contribute to the sustainable development of society and the planet by ensuring harmony with the global environment in its *monozukuri* (manufacturing), *kurumazukuri* (car-making) and delivery of products and services.

### Relationship between the Six Challenges and the Sixth Toyota Environmental Action Plan

| Themes   | Six Challenges  |  | Sixth Toyota Environmental Action Plan  |              |
|--|---|--|---|--------------|
|  |   |  | No.   | Action Items |
| Low Carbon<br>(Climate Change, CO <sub>2</sub> ) | (1) New Vehicle Zero CO <sub>2</sub> Emissions Challenge              | 1  | Develop technologies to achieve the best fuel efficiency performance  |              |
|  |   | 2  | Promote development of next-generation vehicles that use electric power, and widespread use of them according to their features                           |              |
|  | (2) Life Cycle Zero CO <sub>2</sub> Emissions Challenge               | 3  | Promote environmental management in product development (Eco Vehicle Assessment System, Eco-VAS)  |              |
|  |   | 4  | Practical use development of catalyst technology-based CO <sub>2</sub> absorption/new material creation (artificial photosynthesis, etc.)                 |              |
|  |   | 5  | Pursue increased transport efficiency and reduce CO <sub>2</sub> emissions in logistics activities  |              |
|  |   | 6  | Contribute to local communities through the expansion of local grid energy management technologies  |              |
|  |   | 7  | Promote an “integrated approach” to reduce CO <sub>2</sub> emissions in road transport sectors  |              |
|  | (3) Plant Zero CO <sub>2</sub> Emissions Challenge                    | 8  | CO <sub>2</sub> emission reduction in production activities   |              |
| Recycling<br>(Resources, Water)                  | (4) Challenge of Minimizing and Optimizing Water Usage                | 9  | Reduce water consumption in production activities   |              |
|  | (5) Challenge of Establishing a Recycling-based Society and Systems   | 10   | Reduce consumption of dwindling natural resources through use of renewable resources and recycled materials   |              |
|  |   | 11   | Achieve industry-leading level in easy to dismantle design for effective resource recycling   |              |
|  |   | 12   | Contribute worldwide by end-of-life vehicle treatment and recycling technology developed in Japan   |              |
|  |   | 13   | Overseas rollout of original recycling system for end-of-life vehicle resources   |              |
|  |   | 14   | Reduce waste and use resources efficiently in production activities   |              |
|  | 15  | Reduce packaging materials and use resources efficiently in logistics activities |   |              |
| Harmony with Nature                              | (6) Challenge of Establishing a Future Society in Harmony with Nature | 16   | Promote nature conservation activity “Connecting regional conservation activities with region and community”  |              |
|  |   | 17   | Boost grant program for environmental activities “Connecting nature & biodiversity conservation activity to the world”                                    |              |
|  |   | 18   | Boost contribution to environmental education “Connecting environmental activities to the future”   |              |
|  |   | 19   | Promote environmental contribution through biotechnology and afforestation business, automotive peripheral technology, and forest conservation activities |              |
| Environmental Management                         | Management  | 20   | Promote strengthening of consolidated environmental management  |              |
|  |   | 21   | Reduce exhaust emissions to contribute to improvement of air quality in urban areas in each country and region  |              |
|  |   | 22   | Reduce VOC emissions in production activities   |              |
|  |   | 23   | Promote environmental activities in cooperation with business partners (suppliers)  |              |
|  |   | 24   | Promote environmental activities in cooperation with business partners (dealers and distributors)   |              |
|  |   | 25   | Further strengthen global employee education and awareness activities   |              |
|  |   | 26   | Enhance active disclosure of environmental information and communication  |              |