EXPO 2025 Green Vision (2024 Overview)

Japan Association for the
2025 World Exposition
Sustainability Department

March 2024

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EXPO 2025 Green Vision (2024 Edition)

Sustainability Policy (April 2022)

- Based on the Expo 2025 Osaka, Kansai, Japan theme of "Designing Future Society for Our Lives," the concept and stance of a sustainable Expo were formulated based on the deliberations of the Expert Committee on Sustainability (Chair: ITO Motoshige, Professor Emeritus, University of Tokyo).
- Describes the direction to be taken based on the five P's of the SDGs. The following outlines P (Planet) in relation to the environment. Aims to prepare and operate the Expo site in a way that contributes to the realisation of international agreements (Paris Agreement, Osaka Blue Ocean Vision, Kunming-Montreal Biodiversity Framework).

【Direction to take】

1. Thoroughly work to reduce greenhouse gas emissions by introducing CO_2 reduction and energy-saving technologies and utilising renewable energy.
2. Reduce, Reuse, and Recycle, as well as actively use possible materials and components, etc., to achieve the 3Rs and Renewable initiatives for the effective use of resources.
3. Work on the conservation and restoration of the natural environment and ecosystems in the Expo site, which is an important centre for the ecosystem network in the coastal zone.

Composition of Green Vision

- This was reviewed by the Expert Committee on Sustainability, the Decarbonisation Working Group (chair: Professor SHIMODA Yoshiyuki, Osaka University), and the Resource Recycling Working Group (chair: SAKITA Yuko, journalist and environmental counsellor), etc.
- Composed of four sections: Decarbonisation Section, Resource Circulation and Circular Economy Section, Natural Environment Section, and Cross-cutting Issues
- Scheduled to be revised before the opening of Expo 2025 Osaka, Kansai, Japan.

Basic Concept of Green Vision

1. Introduction of advanced/economic technologies and systems
2. Introduction of technologies and systems for both supply and demand
3. Introduction of systems to promote understanding and bring about behaviour change among visitors
4. Implementation of demonstration and implementation projects not only inside the Expo site but also covering extensive areas outside the Expo site
5. Promotion of initiatives on both supply and demand in the Green Growth Strategy and key industry sectors
6. Promotion of participation by various stakeholders such as start-up companies, private companies, and private organisations

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Background of Decarbonisation Efforts

Background

- ❑ At the 21st Conference of the Parties to the United Nations Framework Convention on Climate Change (COP21) in 2015, the Paris Agreement was adopted as a fair and effective framework for all countries to participate in.
- ❑ Under the Paris Agreement, efforts are made to keep the average temperature increase since pre-industrial times well below 2°C (2°C target) and to limit it to 1.5°C.
- ❑ In its Global Warming Action Plan (October 2021), Japan aims to achieve “carbon neutrality by 2050” and to reduce greenhouse gas emissions by 46% by FY2030 from FY2013 levels.
- ❑ The 6th Strategic Energy Plan (October 2021) sets out the challenges and measures in the energy sector to achieve carbon neutrality by 2050, as shown on the right.
- ❑ The Strategy for Promoting Transition to a Decarbonised, Growth-Oriented Economic Structure (known as the GX[Green Transformation] Promotion Strategy) (July 2023) calls for the economy to be put on a growth trajectory through the realisation of Green Transformation, which will contribute to achieving carbon neutrality on a global scale by utilising the strengths of decarbonised technologies and strengthening Japan's industrial competitiveness, leading to economic growth, employment and income growth.

- As we move towards 2050, it is important to take action in the energy sector, which accounts for more than 80% of greenhouse gas emissions.
  - ➢ (Omitted) A concerted effort is required by all levels of the population, including industry, consumers, and the government.
- The power sector is steadily decarbonising through the use of decarbonised power sources at the practical stage, such as renewable energy and nuclear power, and is pursuing innovations such as hydrogen and ammonia power generation and thermal power generation based on carbon storage and reuse by CCUS/carbon recycling.
- Non-power sectors will be electrified with decarbonised electricity. Sectors that are difficult to electrify (due to reasons such as high-temperature heat demand) will be decarbonised through the use of hydrogen, synthetic methane and biomass. (Omitted)
  - ➢ Finally, sectors where CO_2 emissions are unavoidable will be addressed by DACCS, BECCS, and forest sinks.
- Securing a stable and affordable energy supply is important for achieving the goal of carbon neutrality by 2050, on the basic premise of ensuring safety. Based on this premise, and in order to achieve carbon neutrality by 2050, we will promote thorough energy conservation. With regard to renewable energies, we will work to introduce them to the maximum extent possible under the principle of giving them top priority as main power sources. With regard to nuclear energy, we will work to secure public trust and sustainably utilise nuclear energy on the necessary scale, with safety as a major prerequisite.

Source: 6th Strategic Energy Plan (October 2021)

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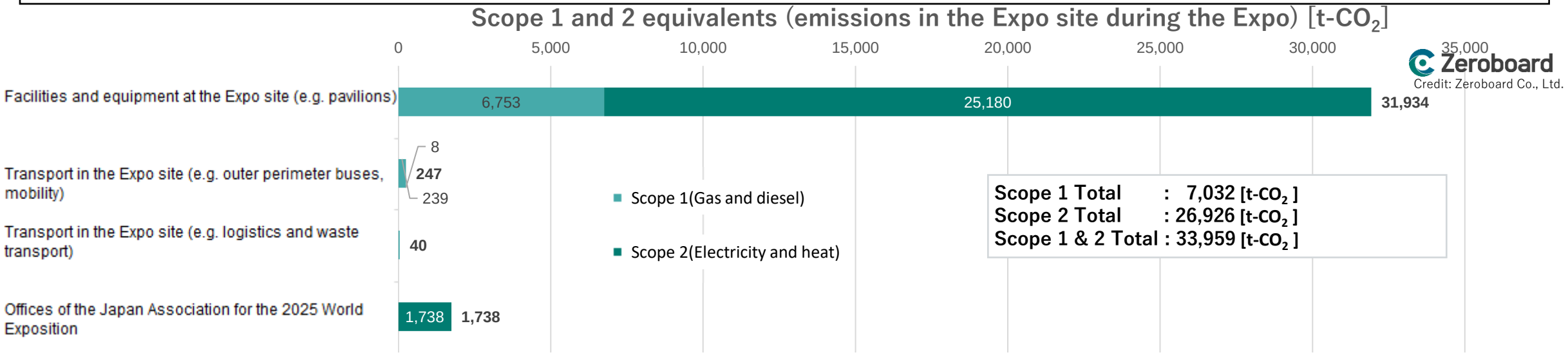
Emission Estimates of Greenhouse Gases and Target Setting
(Equivalent to Scope 1 and 2 [such as emissions at the Expo site during the Expo, etc.])

The estimations of greenhouse gas (GHG) emissions of Expo 2025 Osaka, Kansai, Japan will make it the first World Expo and large-scale event in Japan to refer to the GHG Protocol as the main protocol, and include emissions specific to major events with reference to the Tokyo 2020 Summer Olympics and Expo 2020 Dubai.

Emissions equivalent to Scope 1 and 2 (such as emissions at the Expo site during the Expo) will be reduced through energy conservation measures and the use of electricity with an emission factor of zero. The use of gas, diesel, and electricity outside the Expo site will be reduced through measures such as energy conservation, electrification, and the introduction of biodiesel, while carbon credits will be used to cover the areas where there are no other means available, with the aim of achieving carbon neutrality.



Reduction Measures

- ❑ Energy conservation in buildings, such as the use of materials with high thermal insulation and heat shielding properties, CASBEE A equivalent designs, etc.
- ❑ Introduction of chilled water plants for air conditioning, cooling systems, energy consumption visualisation technology, etc.
- ❑ Electrification of transport systems, etc. and use of electricity with zero emission factors
- ❑ Use of gas with offset certificates as the gas used for air conditioning (Issue for future consideration)
- ❑ Introduction of biodiesel into logistics where electrification is difficult
- ❑ Allowance of credits for areas not covered

*Emissions are estimated based on budget and project plans **without measures (BAU).** Emission estimates and reduction methods will be refined annually in conjunction with the future refinement of future budgets and projects. (Same on next page)

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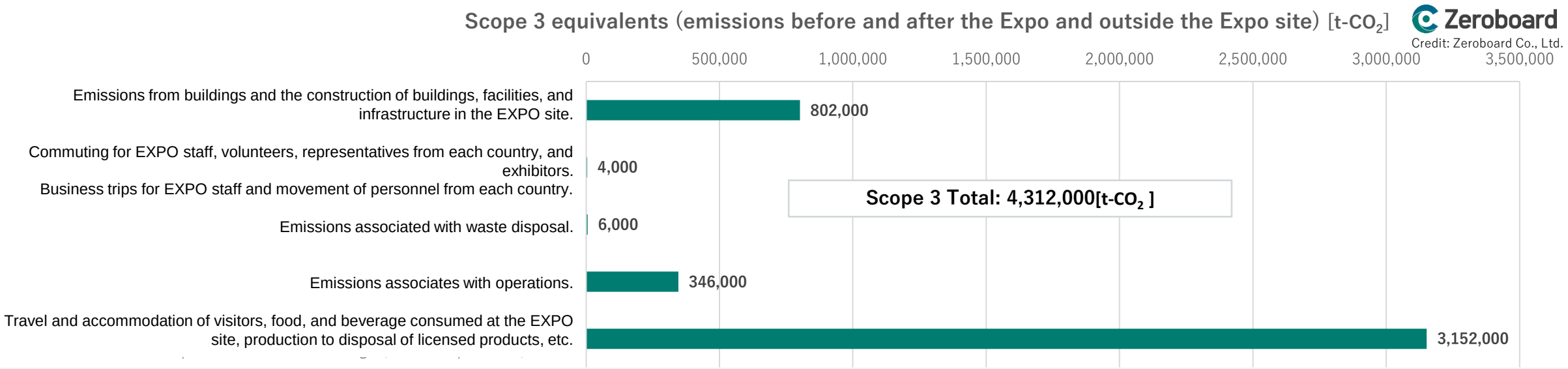
Emission Estimates of Greenhouse Gases and Target Setting

(Scope 3 equivalent [emissions before and after the Expo and outside the Expo site])

Expo 2025 Osaka, Kansai, Japan's Scope 3 emissions (emissions before and after the Expo and outside the Expo site) will be estimated in accordance with the GHG Protocol, but will also include emissions from the travel and lodging of visitors, based on the Tokyo 2020 Games, etc.

Reductions in emissions equivalent to Scope 3 will be addressed by reusing buildings, reducing food loss, reducing plastic use, and promoting the purchase of carbon credits for emissions during transportation. In addition, emissions from diesel fuel used by heavy machinery and other equipment during construction of the Expo site and emissions from traffic directly accessing the Yumeshima venue will also be focused on, including offsetting emissions with carbon credits. The remaining emissions will be used as an opportunity to make efforts to reduce emissions outside the Expo site, such as through the use of personal bottles and reducing food waste, in order to build on the legacy of the Expo (Green Challenge).



Reduction measures

- ❑ Recommendation to purchase carbon credits when travelling
- ❑ Use of low-emission means of transportation
- ❑ Introduction of fuel-efficient vehicles, electric vehicles, synthetic fuels, biodiesel, etc. in cooperation with external operators
- ❑ Reuse of buildings ・Active use of leasing and wood
- ❑ Active use of low-carbon materials, etc.・ BOO contracts
- ❑ Use of fuels with offset emissions and promotion of fuel-efficient vehicles
- ❑ Recommending the purchase of carbon credits when travelling
- ❑ Use of fuels with offset emissions and promoting the introduction of fuel-efficient vehicles
- ❑ Reducing food loss in addition to food recycling
- ❑ Reduc ing plastic use (e.g., reusable tableware)

*Emissions are estimated as **emissions without measures (BAU).** The planned reduction measures are only those that have been planned to date.
Individual estimates have not been possible because operational details, etc. have not yet been determined, but several hundred thousand tonnes are planned so far. Further enhancements are planned in the future.

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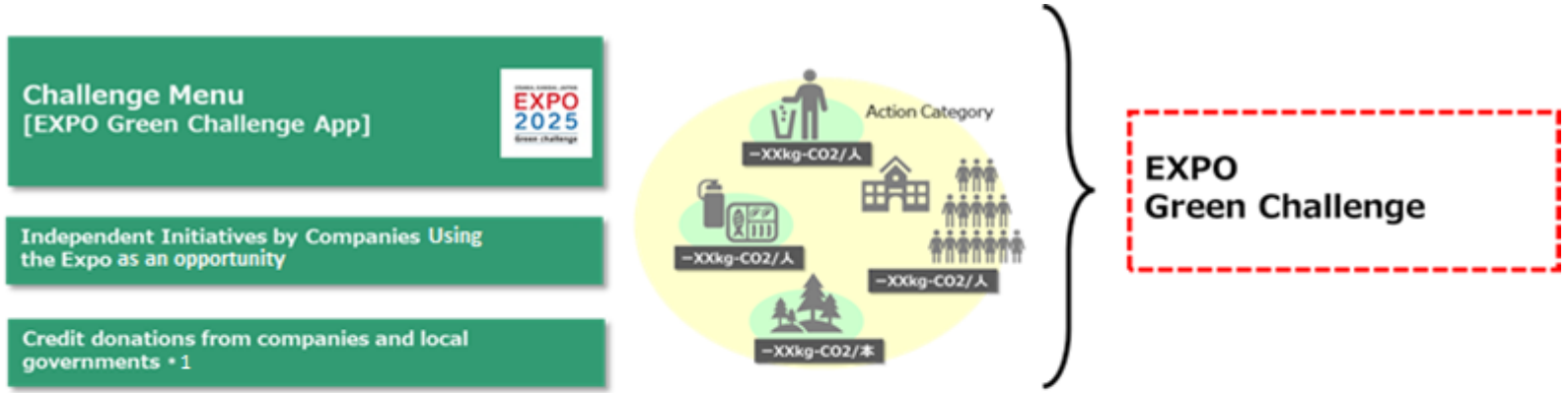
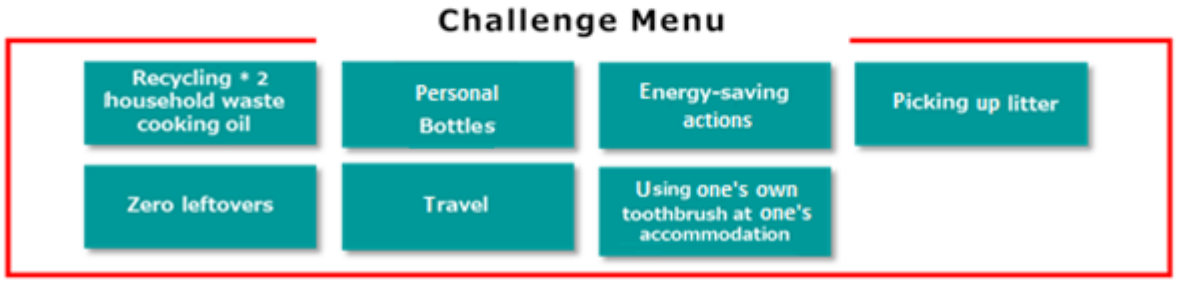
Behaviour Change for the Future (EXPO Green Challenge)

Even before the Expo, we will call on companies, schools, local governments, and other organisations outside the Expo site to work together to reduce CO_2 emissions and contribute to future reductions, “using the Expo as a catalyst” to create a legacy for a decarbonised society.
This initiative is designated as the "EXPO Green Challenge," and the reductions will be counted, compiled, and monitored (this service will start on 7 March, 2024).

EXPO Green Challenge

- Activities to promote behaviour change to contribute to reducing CO_2 emissions, using the Expo as an opportunity
- Provide a “Challenge Menu” through the EXPO Green Challenge App (released on 7 March, 2024)
- Companies, schools, and local governments register and carry out activities
- Calculation of CO_2 reductions from each activity





*(1) Credits and other credits certified by a third-party certification organisation shall be used as offsets from the GHG emissions of the Expo.
*(2) The use of high-purity biodiesel refined from waste oil in the Expo site and construction equipment of the Expo site will contribute to the reduction of GHG emissions at the Expo.

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Presenting a Concrete Vision of a Decarbonised Society Towards 2050 ①

Based on the 6th Strategic Energy Plan (2021), advanced technologies to be developed and implemented towards a society that has achieved carbon neutrality by 2050 will be shown to visitors in a memorable way for them to experience. Particular focus will be placed on 1) hydrogen society, 2) thorough use of renewable energy, 3) carbon recycling technologies and 4) energy conservation.

1) Hydrogen Society

- ❑ Hydrogen and ammonia power generation introduced from outside the Expo site
- ❑ Exhibition of fuel cells with hydrogen made from renewable energy sources, also in cooperation with several Pavilions for Private Sectors

[Hydrogen gas turbine]

Source: Mitsubishi Heavy Industries, Ltd.

[Ammonia gas turbine]

Source: IHI Corporation

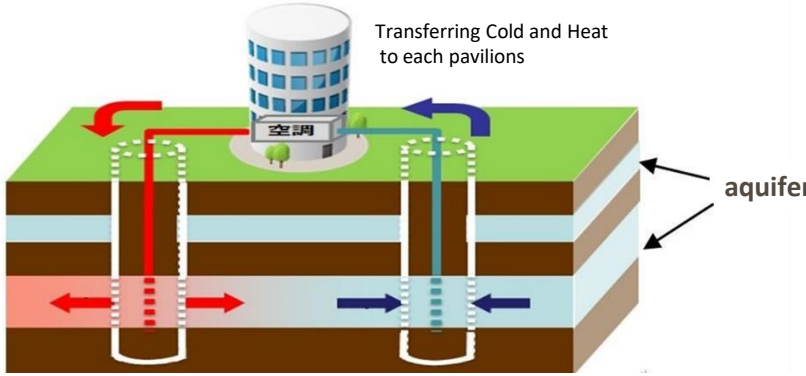
2) Thorough Use of Renewable Energy

- ❑ Implementation and exhibition of perovskite photovoltaic systems
- ❑ Introduction of equipment to utilise aquifer thermal energy storage and seawater cooling for on-site air conditioning at the Expo site

[Mounted Perovskite solar cells image]

Source: Sekisui Chemical Co., Ltd.

[Aquifer thermal energy storage image]



Source: Osaka City Environment Bureau, Consulate-General of the Kingdom of the Netherlands in Osaka

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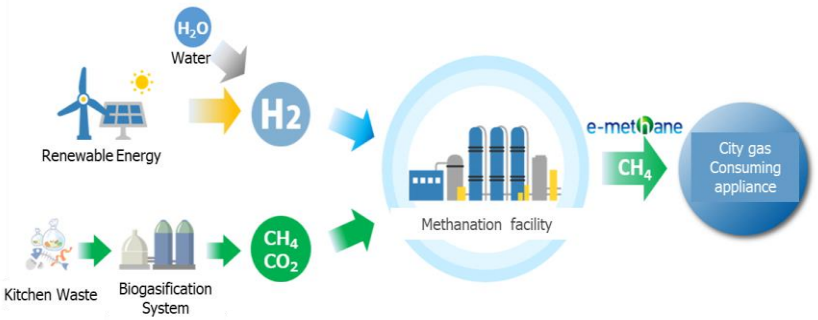
Presenting a Concrete Vision of a Decarbonised Society Towards 2050 ②

Based on the 6th Strategic Energy Plan (2021), advanced technologies to be developed and implemented towards a society that has achieved carbon neutrality by 2050 will be shown to visitors in memorable way for them to experience. Particular focus will be placed on 1) hydrogen society, 2) thorough use of renewable energy, 3) carbon recycling technologies and 4) energy conservation.

3) Carbon Recycling Technology

- Utilisation of methanation technology: e-methane (synthetic methane) is produced by methanation technology using electrolytic hydrogen from electricity from renewable energy sources, and CO_2 from food waste and CO_2 obtained from DAC (Direct Air Capture)
  → used in the water heating systems and kitchens at the Expo site
- Direct Air Capture (DAC): installation of equipment for capturing CO_2 directly from the atmosphere
- CO_2 capture equipment: installation of equipment to capture CO_2 from exhaust gases
- Sustainable fuels: promotion of the use of synthetic fuels and biodiesel
- Energy conservation by promoting the use of concrete to reduce CO_2 emissions and maximise fixed amounts

[Methanation flow]

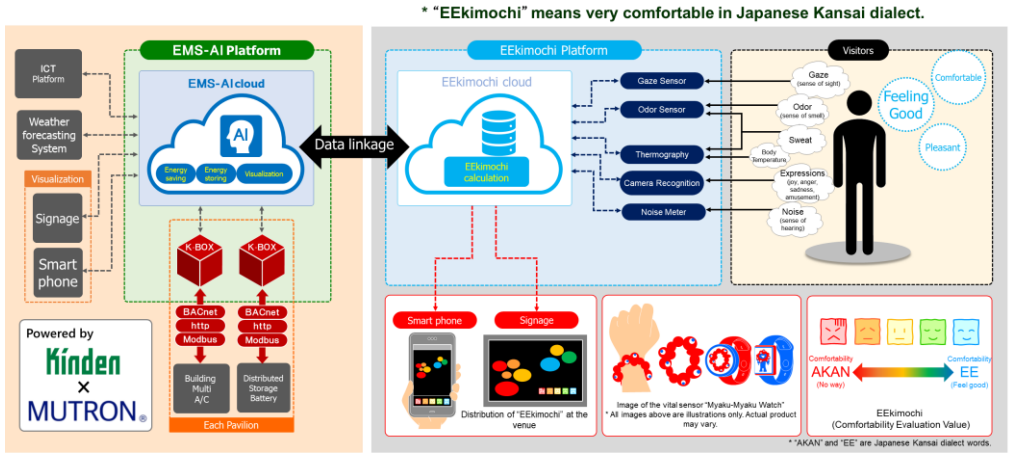


Source: Osaka Gas Co., Ltd.

4) Energy Conservation

- Energy used in the air conditioning at each pavilion to be reduced through the introduction of advanced energy management using AI and sensors.

[EMS-AI Energy Management System]



Source: 2023 Kinden Corporation

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Developments in Japan and Abroad and Basic Concepts on Resource Circulation and Circular Economy

Developments in Japan and Abroad Concerning Resource Circulation and Circular Economy

- Global resource consumption is increasing due to economic growth in emerging market economies and other factors, and it is estimated that global consumption will more than double by 2060.
- The Sustainable Development Goals (SDGs) set the “guarantee of sustainable forms of consumption and production” as one of the 17 goals to be achieved by 2030.
- At the G20 Osaka Summit held in June 2019, the participants shared the Osaka Blue Ocean Vision, which aims to reduce additional pollution from marine plastic waste to zero by 2050.
- In Japan, initiatives for eliminating and reducing plastic waste have been progressing due to the formulation of the Resource Circulation Strategy for Plastics and the enforcement of the Act on Promotion of Resource Circulation for Plastics
- With regard to food, the Act on Promotion of Food Loss and Waste Reduction and the Basic Policy of the Food Waste Recycling Act were revised, setting targets for reducing food loss.
- With regard to construction recycling, the Ministry of Land, Infrastructure, Transport and Tourism formulated the Construction Recycling Promotion Plan 2020 and is promoting construction recycling.

Basic Concept of Initiatives Based on Developments in Japan and Abroad

- Based on the government's basic policy of 3R+Renewable and prioritising food recycling, the following should be taken into consideration: 1) plastic measures, 2) food loss measures, 3) paper consumption reduction, and 4) reuse of equipment and facilities.
- With regard to plastic measures, the targets for 2030 set out in the Resource Circulation Strategy for Plastics, such as reducing single-use plastics, reusing and recycling containers and packaging, introducing biomass plastics, etc., will be aimed for years ahead of schedule, focusing on the specific plastic products set out in the Resource Circulation Strategy for Plastics.
- With regard to food loss and food recycling measures, targets based on the law will be set as a minimum, with reference to the most advanced initiatives in Japan, and initiatives on par with the most advanced initiatives will be implemented.
- With regard to paper, although there are no recent important targets in Japan, as Expo 2025, Osaka, Kansai, Japan advocates itself as a Digital Expo, paper consumption will be reduced to a level comparable to international conferences and events.
- With regard to the reuse of facilities and equipment, the adoption of building structures and construction methods that are easy to separate when dismantling, and the simplification and weight reduction of buildings will be promoted, as well as the use of renewable resources such as wood.

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Emissions Estimates and Target Setting for Resource Recycling (Related to venue management)

Waste emissions (BAU) for Expo 2025 Osaka, Kansai, Japan were estimated based on the per capita waste emissions of the 2005 World Exposition, Aichi, Japan and domestic entertainment facilities as well as the expected 28.2 million visitors. In this revision, we set a waste emissions reduction target. By ensuring thorough recycling, for example, by aiming for 100% recycling of all waste except for “burnable waste" and "non-burnable/mixed waste," the overall recycling target currently stands at about 57%. We will continue to work towards increasing this further.

Type	BAU	Reduction target				Recycling target	
	Emissions [t]	Reduction [t]	Reduction [%]	Amount after reduction [t]	Unit consumption [g/person]	Amount recycled [t]	Recycling rate [%]
Cans	42.8	-	-	42.8	1.5	699.3	100.0
Bottles	611.5	-	-	611.5	21.7		
Commercial cans	45.0	-	-	45.0	1.6		
Plastic bottles	562.8	188.2	30.3	433.5	15.4	433.5	100.0
Plastic bottle lids	58.8						
Styrofoam/Foam trays	5.6	139.9	25.0	419.8	14.9	419.8	100.0
Plastics	554.1						
Corrugated cardboards	1,711.7	-	-	1,711.7	60.7	1,711.7	100.0
Paper	110.4	61.1	55.4	49.2	1.7	49.2	100.0
Food waste	1,501.2	321.2	21.4	1,179.9	41.8	1,179.9	100.0
Waste cooking oil	110.4	-	-	110.4	3.9	110.4	100.0
Burnable waste	4,181.4	721.9	17.3	3,459.5	122.7	-	1.9
Compostable tableware		-				64.8	
Disposable chopsticks							
Wooden pallets							
Disposable diapers							
Non-burnable waste / Mixed waste	212.8	10.0	4.7	202.8	7.2	19.3	9.5
Sludge (grease trap)							
Total	**9,708.5**	**1,442.3**	**14.9**	**8,266.2**	**293.1**	**4,687.9**	**56.7**

Note: Figures may not match real values due to rounding.

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Specific Initiatives Under Consideration for Resource Recycling (Related to venue management)

To achieve a resource-recycling society, we will reduce waste by reducing and reusing it to the maximum extent possible, and thoroughly recycle resources that have been separated and disposed of. Specifically, we are working on initiatives such as concrete operational plans for the use of reusable tableware, encouraging people to bring their own water bottles, prohibiting the handouts of plastic bags at checkout, and concrete measures against food loss as well as the recycling of food loss and waste.

Plastic Measures

❑ Initiatives for tableware and beverage containers
- Introduction of reusable tableware in food trucks, etc.
- Introduction of compostable single-use tableware and composting
- Development of an environment where own water bottles can be used in the Expo site
- Thorough sorting and collection of plastic bottles in addition to horizontal recycling

❑ Plastic such as containers and packaging, novelty items, handouts, etc.
- Measures to prohibit the handouts of plastic bags at checkout in shops
- Measures to prevent the handouts of umbrella bags, hand fans, non-woven wet towels, etc.

Food sales in food trucks also will use reusable tableware

Food Measures

❑ Food loss measures
- Procurement of food quantities according to the estimated number of visitors
- Providing dishes on menus in portions and sizes that can be fully eaten
- Calling on visitors to reduce leftover food (Introduction of nudges)
- Measures to sell lunchboxes and other items likely to remain unsold under food hygiene and quality control
- Cooperation with food banks while ensuring shelf life and quality

❑ Recycling food loss and waste
- Recycling of resources such as composting, methane conversion, and its residues
- Use of food recycling loops in cooperation with contractors for the disposal of food waste during the Expo

Others

- Reducing paper use through digitisation
- Expo site decoration based on recycling
- Sustainability considerations for uniforms
- Encouraging the reduction of plastic amenities (toothbrushes, combs, shaving razors, and shower caps) in accommodation outside the Expo site
- Specifying expected behaviour and communicating it to visitors

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Reuse Initiatives for Facilities, Building Materials, Equipment, Furniture and Fixtures (Related to facilities and equipment)

Reducing and reusing is a priority for facilities and equipment. In addition to the active use of leases, we have established a system for their reuse. Specifically, after the end of the Expo, we will 1) carefully dismantle and reuse the Grand Ring and other wood, 2) create a web-based platform for the reuse of building materials and equipment, not only for Association assets but also for the entire Expo site.

(1) PHASE 1: From fiscal year 2024

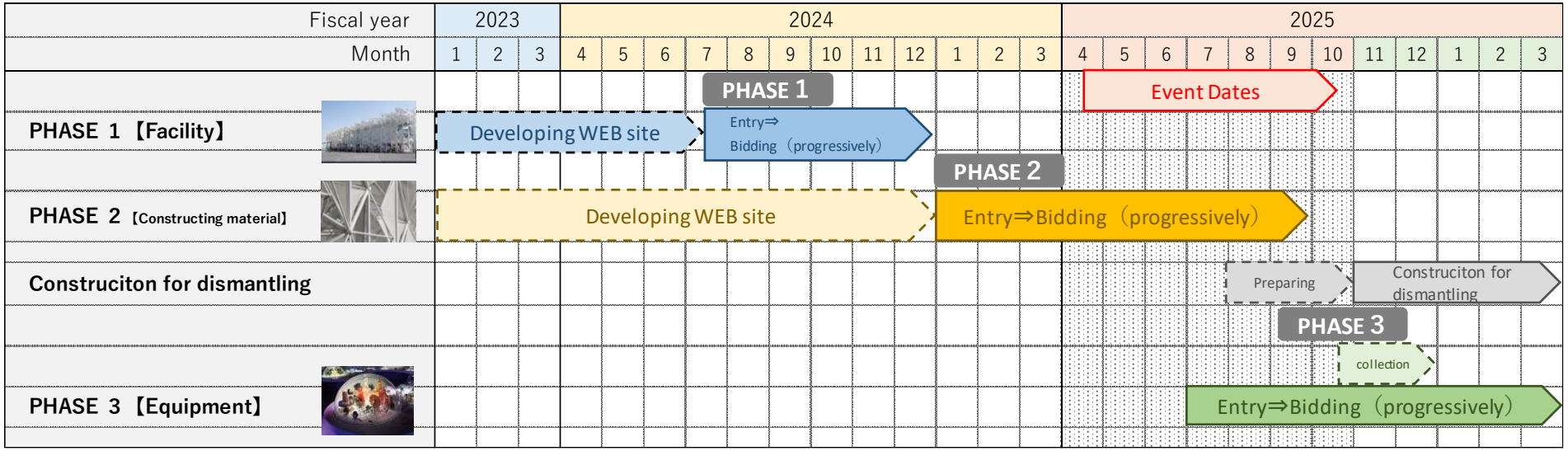
Open calls for applications for each facility (Starting with the 8 Signature Pavilions and 20 facilities designed by young architects, and gradually including other facilities.) conducted in two steps. (Starter: local governments, etc.; later: the private sector).The target is to exceed the number of facilities reused after Japan World Exposition Osaka 1970.

(2) PHASE 2: Around January 2025

The matching platform will be developed, and the system will be operated in collaboration with Expo site operation sponsors.
The aim is to make the system available not only to Association assets but also to other buisinesses in the Expo site.
Preparation is required for the dismantling of objects for reuse, as the system is intended for facilities, building materials, equipment and other objects that require construction work to be removed.
(Examples: estimating dismantling costs, arranging craftspersons for manual dismantling, arranging contractors for transport to buyers, etc.)

(3) PHASE 3: Around October 2025

An open call for applications for remaining furniture and fixtures (large enough to be collected by a moving company) will be made on the matching platform after the Expo closes.



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Emission Estimates, Target Setting and Initiatives for Resource Circulation (Related to facilities and equipment)

High-level recycling targets have been set based on government targets. Recycled materials that are easy to separate during demolition will be used. The recommendations made in the guidelines will be thoroughly implemented, including building structures and construction methods, the reuse of materials, equipment, and building materials; and the active use of recyclable materials.

Type of waste	Amount generated [t]	Recycling rate [%]	Amount recycled [t]	Amount disposed [t]
Waste plastics	1,688	59.0	996	692
Scrap metal	56,318	96.0	54,065	2,253
Wood waste	17,397	97.0	16,875	522
Rubble and debris	669,929	99.5	666,580	3,350
Mixed waste	20,774	63.2	13,129	7,645
Total	**766,106**	**98.1**	**751,644**	**14,462**

Note: Figures may not match real values due to rounding.

Emission estimates for demolition (after the Expo) if no measures were taken for demolition work and recycling targets

Waste volumes were estimated from commonly used basic units and area (during construction work / before the Expo), and based on the basic design (during demolition work / after the Expo).

Target values were determined by the government's targets and actual values.

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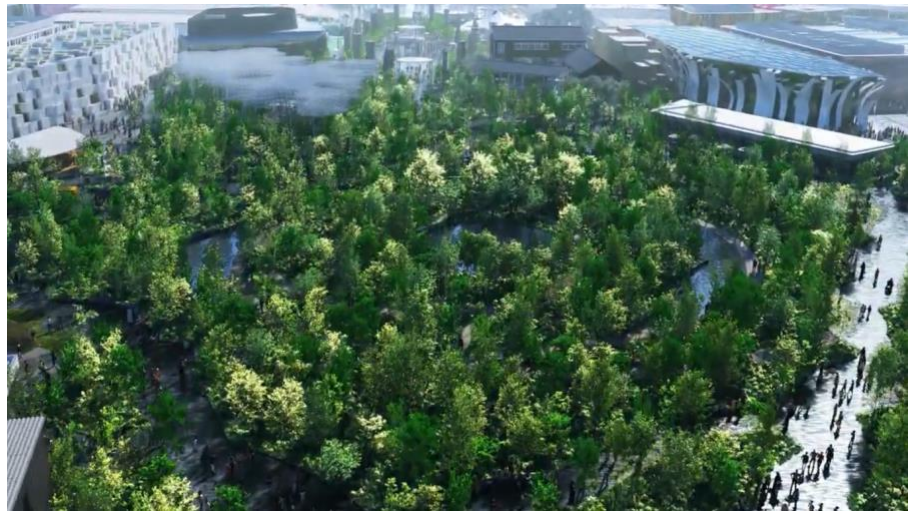
Natural Environment

- Implementation of appropriate projects in accordance with the environmental impact statement
  - ・Prevention of unnecessary entry into areas outside construction zones
  - ・Use of low-noise and low-vibration construction machinery wherever possible
  - ・Adoption of appropriate shading hoods and proper placement of lighting fixtures
  - ・Adoption of low-noise and low-vibration air-conditioning equipment, etc.
  - ・Since the southeastern part of the Expo site is a shallow area, consideration will be given to making it accessible to birds that use the waterfront.
  - ・Consideration will be given to the habitats of birds as much as possible, such as bare areas (gravel areas), green areas, and waterfront areas (shallow areas), both inside and outside the Expo site.
- ・Confirmation of the implementation status of conservation measures: confirmation of bird migration status in and around the planned Expo site from April to July

- Establishing sustainability-conscious procurement standards, including biodiversity conservation, in the Sustainable Procurement Code

- Conducting joint studies with NGOs, including nature conservation groups, on the conservation of the natural environment and ecosystems

- Collaboration with the Osaka Bay MOBA (Members of the Osaka Bay Blue Carbon Ecosystem Alliance) project being promoted by Osaka and Hyogo Prefectures to achieve the Osaka Bay MOBA Link Vision, which aims to surround the coast of Osaka Bay with seagrass beds, etc., to promote biodiversity conservation and nature positivity
- Trees to be planted in the Forest of Tranquility that is being developed in the centre of the Expo site will be transplanted from the Expo Memorial Park and other parks in Osaka Prefecture, including trees scheduled for thinning in the future



[Conceptual image of the Forest of Tranquility]

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Cross-Sectional Issues

Initiatives for Youth and Children

- ❑ Planning experiential programmes
- ❑ Planning tours in the Expo site
- ❑ Expansion of web content

Other (Cooperation with companies, etc.)

- ❑ Co-Design Challenge Program

  A project that uses Expo 2025 Osaka, Kansai, Japan as an opportunity to create new things through co-creation with a wide range of players, based on the concept of “Designing Future Japanese Lifestyles (Community)”
- ❑ Tours outside the Expo site

  A portal site called the “Expo 2025 Official Experiential Travel Guides” will be launched in April 2024 to attract tourists outside the Expo site.
- ❑ Theme Weeks

  Aims to bring wisdom to solve global issues and explore solutions through dialogue, and work together with the world to create a future society for our lives.

Issues To Be Considered Before the Expo

- ❑ Specifying ways to encourage behaviour change in the Expo site
- ❑ Promotion of cooperation with outside venues for food recycling, etc.
- ❑ Consideration of how to protect rare species before the Expo in collaboration with nature conservation groups and citizens
- ❑ Consideration of exhibitions and events in collaboration with external organisations such as nature conservation groups
- ❑ Discussions on the Post-2020 Global Diversity Framework, the expansion and specification of TNFD and SBTs for Nature initiatives, and the possibility of setting indicators in line with the specification of the content of exhibitions at Expo 2025 Osaka, Kansai, Japan

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