Toshiba Group and the SDGs

The cornerstone text of the Basic Commitment of Toshiba Group is “Committed to People, Committed to the Future.” This underlines Toshiba Group’s timeless commitment to contributing to the development of society through our business activities and is consistent with the United Nations Sustainable Development Goals (SDGs) that aim to realize a sustainable society.

Toshiba Group always acts with integrity and has a passion for changing the world for the better, envisioning a future for generations to come and joining with stakeholders to build a new tomorrow. Based on this ideal, we will continue as before to combine the creative power and technological expertise we have built up over the years to tackle social issues that are becoming increasingly complex and serious with the aim of launching a new future.

Contributing to the SDGs through Our Corporate Activities

In 2018, an SDGs Promotion Team drawn from Toshiba’s corporate divisions led efforts to clarify the relationship between our business and the SDGs in conjunction with key Group companies. Opinions were exchanged on the impact across the value chain on society in order to promote understanding of the SDGs and advance initiatives throughout Toshiba Group. As a result, eight goals were identified as providing the platform to contribute to the achievement of the SDGs through Toshiba Group’s business, with plans to accelerate these initiatives announced in The Toshiba Next Plan (FY2019-23 Business Plan).
Contribution to the SDGs through Environmental Management

Many of the SDGs that Toshiba Group focuses on such as response to climate change, urban development, and sustainable consumption and production are closely related to environmental management.

### Contributing to the SDGs with Toshiba Group’s (current and future) solutions

**De-carbonized Society**
- **Aim at virtually zero greenhouse gas emissions**

**Social issues to solve**
- Increase in greenhouse gas emissions (Energy sector)
- Difficulty in accessing energy

**Circular Economy**
- **Establish a sophisticated production and resource recycling system**

**Social issues to solve**
- Declining working age population
- Increasing logistics and labor shortage
- Resource depletion and increasing waste
- Increasing cost to comply with environmental laws and regulations

**Sustainable City**
- **Maintain both environmental impact reduction and safe, secure, and comfortable environment**

**Social issues to solve**
- Deterioration of traffic environment
- Increasing urban population
- Increasing resource and energy consumption
- Information explosion
- More frequent unusual weather and natural disaster
- Aging social capital and assets

From the viewpoint of environmental management, we group our contribution to SDGs through Toshiba Group’s solutions into three categories: “De-carbonized Society,” “Sustainable City,” and “Circular Economy.” For each category, we present related social issues, SDGs, and our product and service fields that can lead to the solution of such issues. For example, under “De-carbonized Society,” toward the achievement of “Goal 7: Affordable and clean energy” and “Goal 13: Climate action,” we provide solutions to make the most of renewable energy through power generation and transmission as well as energy management, and at the same time, we develop advanced technologies toward achieving virtually zero emission of greenhouse gas.

Another category of our contribution to SDGs is "Manufacturing and Basic Activities," which is an initiative to minimize our environmental impacts and foster a foundation to work on SDGs.

While developing business activities and environmental management in line with issues set out for each category in this way, we will contribute to achievement of SDGs.
Actions for the Achievement of Sustainable Development Goals (SDGs)

**De-carbonized Society**

- **Energy system**
  It is essential to eliminate dependence on fossil fuel in stages while ensuring energy access across the world. We provide solutions to make the most of renewable energy through power generation and transmission as well as energy management.
  - Hydrogen solution
  - Energy IoT/Renewable energy
  - High voltage direct current (HVDC) transmission technology
  - Geothermal power generation system (FY2017)

- **Advanced technologies to support a de-carbonized society**
  Toward achievement of virtually zero greenhouse gas emission, we have been developing advanced technologies such as recycling and capturing of CO₂, new solar cells, and AI-based forecast technology to support virtual power plant (VPP).
  - Recycling of carbon dioxide using renewable energy
  - Perovskite film-based solar cell
  - AI technology for accurate forecasting of power demand and solar power output
  - Zero emission thermal power generation

**Sustainable City**

- **Mobility**
  We develop component technologies such as battery, motor, and semiconductor to support a sustainable transportation system. The system will lead to eliminating adverse effects on the traffic environment (increased energy consumption, traffic accidents, traffic jams, etc.) that arise due to the increase in urban population.
  - Next generation propulsion system for railway rolling stock
  - Rechargeable battery SCiB™
  - High efficiency on-board motor
  - Automotive semiconductor components
  - Locomotive and freight transportation system supporting modal shift (FY2017)
  - Intelligent transportation system (ITS) (FY2017)
  - Visconti™ image recognition processor (FY2017)
  - Share-ride demand responsive transport system using AI technology (FY2017)

- **Buildings and facilities**
  Some 68% of the global population will likely be concentrated in urban areas by 2050. By applying component technologies to maintain both achievement of zero energy buildings (ZEBs) and creation of safe, secure, and comfortable environment, we support life in urban areas.
  - Toshiba machine-room-less elevator SPACEL-GR II
  - Spot and zone air-conditioning system "FLEXAIR"
  - LED high-bay lighting fixture (lightweight type)
  - Lazona Kawasaki Toshiba Building Smart Community Center (FY2017)

- **Information communication**
  We provide robust storage products featuring high capacity and high energy efficiency that serve as the foundation for dealing with the information explosion and a big data society. These products support the spread and expansion of IoT and cloud services.
  - Enterprise HDD

- **Disaster prevention and adaptation measures**
  There is concern that climate change will increase the risk of natural disasters such as from guerrilla rainstorms and tornadoes. We provide solutions that will help predict natural disasters at an early stage and communicate disaster information as one measure to adapt to disasters.
  - Disaster information system
  - Multi parameter phased array weather radar (FY2017)

- **Advanced technologies to enhance city resilience**
  We have been developing a technology to detect damage inside structures and thereby improve the efficiency of infrastructure repair work. This technology will help suppress the aging of social assets and resources and increased maintenance and management costs associated with such aging.
  - Structure health monitoring using AE sensing

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Toshiba Group Environmental Report 2019

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09
**Circular Economy**

- **Improving productivity/Increasing operational efficiency**
  
  We provide solutions that will help improve various business processes including production, maintenance, inspection, and service, and increase operational efficiency. The solutions will lead to solving the problem of the declining working-age population as well as creating new added-value.

  - Manufacturing IoT solution "Meister Series"
    
    Refer to page 15
    
    Refer to page 16
  - Electronic receipt service SMART RECEIPT
    
    Refer to page 17
  - Mixed reality (MR) technology for power plants
  - Toshiba communication AI RECAIUS™ Field Voice Intercom Express
  - Paper reuse system Loops (FY2017)

- **Water and resource recycling**
  
  We provide underlying technology to achieve a sophisticated resource recycling system. The technology will contribute to solving problems such as increasing quantities of waste and serious water pollution.

  - Zero liquid discharge (ZLD) system
    
    Refer to page 18
  - Plastic sorting system for home appliance recycling

- **Logistics**
  
  To deal with issues such as an increase in logistics and a labor shortage, we provide solutions that visualize, automate, and increase efficiency of logistics processes with AI and IoT as well as mechatronics. These solutions support optimization and production improvement of the entire supply chain.

  - Logistics system solution
    
    Refer to page 17
  - Logistics IoT solutions: DADCsuite and LogiTrace tracing and location management services
    
    Refer to page 18

- **Advanced technology to support competitiveness of companies**
  
  We use our unique image analysis technology to support fields facing a serious shortage of skilled workers. By applying our analysis technology, we improve efficiency in complying with environmental laws and regulations that continue to increase around the world.

  - Simplified screening method for phthalates
    
    Refer to Page 56
  - Toshiba analytics AI SATLYS™ for combustion image analysis at waste treatment facilities

**Manufacturing and Basic Activities**

- **Reducing environmental impacts in manufacturing**
  
  - Certified as Top Level Facilities by the Tokyo Metropolitan Government
    
    Refer to page 36
  - Reducing abrasive used with abrasive concentration sensing
    
    Refer to page 38
  - Waste management in overseas production site
    
    Refer to page 38
  - Reducing industrial water and chemicals through optimization of water purification system operating method
    
    Refer to page 39
  - Environmental Impact Reduction Measures at Toshiba Subsidiaries in India (FY2017)

- **Building foundation for environmental management**
  
  - Environmental Communication
    
    Refer to page 63
  - Environmental Education and Human Resource Development
    
    Refer to page 57
  - Conservation of Biodiversity
    
    Refer to page 67
**De-carbonized Society**

### Case 1: Hydrogen solution

In response to the trend toward low-carbonization and de-carbonization that is underway around the world following the Paris Agreement, Japan has also set the goal of reducing CO2 emissions 80% by 2050 and is working to introduce renewable energy nationwide. To solve this challenge, however, a new technology such as the hydrogen solution needs to be introduced due to issues including a decline in the operating rate of renewable energy due to increased restrictions on connection to the power grid and additional implementation of output control, increased investment in batteries by renewable power generation operators and power transmission and distribution operators, and a drop in the operating rate of thermal power plants to adjust the power supply.

The hydrogen solution utilizes power storage capability to cope with unstable renewable energy, and also can convert renewable energy power into hydrogen for multiple purposes. By taking advantage of these characteristics, we provide two solutions: "off-grid power supply using hydrogen energy storage" and "hydrogen supply chain aimed at wide area use."

As an off-grid power supply, we have the H2One™ hydrogen-based autonomous energy supply system, which has been installed in local government offices, baseball parks, beer factory tour facilities, and so on. In addition, our H2Rex™ pure hydrogen fuel cell system has also been installed in factories, markets, hotels, and so on and further success in the installation of the system is expected.

As a representative case of the hydrogen power-to-gas (P2G) supply chain*, Fukushima Hydrogen Energy Research Field (FH2R) is being constructed in Namie-machi, Fukushima in Japan. This research is a project assigned to Japan’s New Energy and Industrial Technology Development Organization (NEDO), and the world’s largest class water electrolyzer is used to produce hydrogen. The demonstration operation and hydrogen transportation are planned to commence by July 2020 and the hydrogen produced in the FH2HR will also be used for the 2020 Tokyo Olympics and Paralympics.

*Power to gas: A technology to store surplus power produced from renewable energy by converting it into gaseous fuel such as hydrogen.

**Related pages:**
- NEDO, Toshiba, Tohoku Electric Power and Iwatani Start Construction of Fukushima Hydrogen Energy Research Field
- Hydrogen-based Autonomous Energy Supply System: H2One™
- Pure Hydrogen Fuel Cell System: H2Rex™

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### Case 2: Recycling of carbon dioxide using renewable energy

Among the efforts for the elimination of the increasing CO2 emissions in Japan, CO2 reduction in the industrial sector, including factories, has also become a major issue. To deal with this situation, CO2 is effectively used by converting it into a raw material.

We have been developing such a carbon dioxide recycling technology to produce green chemical products such as methanol from renewable energy and carbon dioxide by using our unique catalyst electrodes. Recently, we have successfully developed a CO2 recycling cell with drastically improved CO2 conversion rates, enabling a substantially reduced CO2-recycling system installation area. Using this technology, we will reduce carbon dioxide emissions more economically and contribute to achieving a de-carbonized society.

We are conducting a system demonstration of this technology and will construct a model carbon recycling society via the "Carbon Dioxide Recycling Model Project using Artificial Photosynthesis Technology," a project commissioned from the Ministry of the Environment, with the aim of putting the technology into practical use in the late 2020s.

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**Related pages:**
- Toshiba Corporation Corporate Research & Development Center
- Toshiba Energy Systems & Solutions Corporation

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**Image 1:** Hydrogen supply chain (Example)

**Image 2:** Hydrogen-based Autonomous Energy Supply System H2One™

**Image 3:** Pure Hydrogen Fuel Cell System H2Rex™

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**Table:**

<table>
<thead>
<tr>
<th>P2G’s benefits</th>
<th>P2G’s benefits</th>
</tr>
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<tbody>
<tr>
<td>- Relief grid restrictions</td>
<td>- Relief grid restrictions</td>
</tr>
<tr>
<td>- Renewable energy introduction</td>
<td>- Renewable energy introduction</td>
</tr>
<tr>
<td>- Demand-side capability</td>
<td>- Demand-side capability</td>
</tr>
<tr>
<td>- Use of surplus renewable energy</td>
<td>- Use of surplus renewable energy</td>
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<tr>
<td>- Inexpensive hydrogen production</td>
<td>- Inexpensive hydrogen production</td>
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<tr>
<td>- Reduced dependence on thermal power and nuclear power</td>
<td>Reduced dependence on thermal power and nuclear power</td>
</tr>
<tr>
<td>- Improved rate of domestic energy</td>
<td>- Improved rate of domestic energy</td>
</tr>
</tbody>
</table>

**Image 4:** Hydrogen recycling cell

**Image 5:** CO2 is recycled into high-added value chemical products

**Image 6:** Carbon dioxide recycling cell

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**Diagram:**

- Hydrogen supply chain
- Interconnecting system
- Power adjustment
- Battery
- Power grid
- Hydrogen solution chain

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**Text:**

- We use CO2 from CO2 emitting facilities as a raw material.
- CO2 is converted into chemical products electrochemically using our unique catalyst
- CO2 is recycled into high-added value chemical products

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**Note:**

1. Power plants, steelworks, cement plants, waste incineration plants, etc.
**Case 3**  
**Perovskite film-based solar cell**

We have developed the world’s largest film-based perovskite\(^1\) photovoltaic module, which are expected to help reduce costs and achieve high efficiency due to the use of the printing technology. With a newly developed process, in addition to our unique printing technology, we have achieved both the world’s largest\(^2\) area of 703 cm\(^2\) and high energy conversion efficiency of 11.7%, although coexistence of large area and high efficiency is difficult. Due to their flexibility and lightweight, the film-based perovskite photovoltaic modules can be installed in many installation situations, including installation in buildings with low load bearing capacity and on walls, in which hard crystal Si solar cells could not be installed previously, and these will lead to the spread of zero energy buildings.

These results have been obtained by “Development of technology of power generation cost reduction for high-performance and high-reliability solar power generation,” project commissioned from Japan’s New Energy and Industrial Technology Development Organization (NEDO).

Related page:  
[Related page](https://example.com)

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**Case 4**  
**AI technology for accurate forecasting of power demand and solar power output**

Electric utility companies usually operate power stations while forecasting the amount of power that will be needed. Since a power shortage may cause a serious accident such as a major power outage, stand-by operation of thermal power stations is performed so as to immediately respond to power demand that exceeds the forecast. If the forecast is accurate, unnecessary stand-by operation will no longer be needed thus resulting in improved power generation efficiency and therefore a reduction in CO\(_2\) emissions. To achieve this we will apply AI in a system to accurately forecast power demand and solar power output.

Power demand and solar power generation are largely dependent on weather conditions. Therefore, by teaching AI weather conditions such as temperature and the amount of solar radiation that affect power demand and solar power output, we improved the accuracy needed to forecast future power demand and solar power output. We participated in the “First Electricity Load Forecasting Technology Contest” hosted by Tokyo Electric Power Company Holdings (TEPCO) and the “PV in HOKKAIDO Contest on Technology for Predicting Solar Energy Production” jointly hosted by TEPCO and Hokkaido Electric Power and received both best award and grand prize. Looking forward from here, we will aim to introduce a system to support utility companies in operating efficiently in anticipation of renewable energy to serve as a major power source.

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1. A type of crystal structure.
Case 5  Next generation propulsion system for railway rolling stock

Toshiba Infrastructure Systems & Solutions Corporation

Even in the railroad industry, further energy saving is required in response to an increasing number of users. To accomplish this, we have developed the world’s first propulsion system that combines: (1) VVVF*1 inverter using All-SiC (silicon carbide) devices*2 that contribute to high efficiency and smaller size; (2) totally enclosed permanent magnet synchronous motors (PMSM) that achieve even higher efficiency; (3) power supply for emergency run equipped with SCiB™*3 featuring regeneration*4 and absorption functions as well as a power*5 assist function. This system is installed on the 2000 series new train of the Tokyo Metro Marunouchi Line, reduces power consumption by 27% compared with the current 02 series train.

*1 Variable voltage-variable frequency
*2 Manufactured by Toshiba Electronic Devices & Storage Corporation
*3 Manufactured by Toshiba Corporation
*4 To transform a braking force of rolling stock into electric power
*5 Train car accelerates after receiving electrical power

Case 6  Toshiba machine-room-less elevator

SPACEL-GR II

Toshiba Elevator and Building Systems Corporation

The SPACEL-GR II is an elevator developed with the aim of improving ride safety, security, and comfort. Equipped for the first time in the industry with a feature to eliminate the gap between the elevator and the building when passengers get on and off the elevator, the SPACEL-GR II prevents accidents caused for example by a cane or shoe caught in the gap or dropped items. In addition, by grasping the movement of people around the elevator using advanced image analysis technology, it efficiently opens and closes the door and prevents a passenger from becoming caught there.

In terms of environment, while reducing power consumption by up to 50% through the use of regenerative electric power and adoption of LED lighting, as well as by reducing stand-by current with a controller and improving system efficiency, it also reduces hazardous substances by the use of the following: guide rails needing no lubrication through use of a roller guide shoe, by reducing the lead content, and adopting mercury-free LED lighting, and use of non-vinyl chloride decorated steel plates.

* Comparison of elevator with a speed of 105 m/min for 15 passengers which uses regenerative electric power function versus the conventional model (SPACEL-EX) (A survey by Toshiba)

Case 7  Spot and zone air-conditioning system "FLEXAIR"

Toshiba Carrier Corporation

In addition to energy saving performance, air-conditioning a large space such as a warehouse, exhibition hall, and factory, requires high efficiency products to deal with issues in installation restrictions, environmental improvement effects, and others. To accomplish this, we worked to develop a product that does not require a ceiling duct, can effectively use columns and wall surfaces as the installation locations, and can create more appropriate air-conditioning environment based on high-speed airflow control for each spot and zone requiring air-conditioning while maintaining excellent energy saving performance and have completed the spot and zone air-conditioning system “FLEXAIR.”

This product features an annual performance factor (APF) of 4.86 and can reduce the power consumption per period by as much as 26% when compared with the floor installation, direct blowing type* used in many workplaces and the like. These factors were highly rated and the product received the METI Minister’s Award in the FY2018 Energy Conservation Grand Prize.

* When the system is operated in a space extending 60 m x 40 m at a necessary cooling capacity of about 300 kW

Evaluations  Refer to page 72
**Case 8**  
**LED high-bay lighting fixture (lightweight type)**  
*Toshiba Lighting & Technology Corporation*

Conventionally high-bay lighting fixtures had been assembled with HID lamps*1 (hereafter, conventional fixture) and were used at large space facilities such as arenas, gymnasiums, factories, and warehouses. The conventional fixture has generally been used in between the luminous flux range of 1 kW metal halide lamp (96,000 lm total luminous flux*2 at 1,050 W rated wattage) and of 250 W metal halide lamp (22,000 lm total luminous flux at 275 W rated wattage). However, in accordance with the implementation of the planned electric outage consequent upon the Great East Japan Earthquake, conventional fixtures which have inefficient energy consumption have been rapidly replaced with high efficiency LED high-bay lighting fixtures. Also, it is required to reduce weight load on ceiling for the prevention of damages caused by the possible next severe earthquake, when the existing buildings are repaired and the aseismic capacity are improved. In the view of this situation, we have developed LEDJ-21001N-LD9 LED high-bay lighting fixture (lightweight type) featuring both high efficiency and light weight. As a result, we have achieved approximately 62% lighter weight and around 4.3 times higher efficiency compared to the conventional fixture equivalent to a 400 W metal halide lamp. This product was awarded the Energy Conservation Center, Japan Chairman’s Award in the FY2018 Energy Conservation Grand Prize.

*1 High intensity discharge lamp  
*2 Amount of light per unit of time

**Evaluations**  
Refer to page 72.

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**Case 9**  
**Structure health monitoring using AE sensing**  
*Toshiba Corporation  
Corporate Research & Development Center*

The market scale for infrastructure maintenance and management technology is expected to reach approximately 700 billion yen in 2030. As for 25% of the domestic bridges over 2-meter length, more than 50 years has passed since they were built by 2018, and also 68% of them by 2033. Under these circumstances, more efficient technology is newly required that takes place of conventional technique such as visual and hammering inspections. Toshiba has developed new monitoring system that is made to realize preventive maintenance by sensing the progressive damage of structures. The system detects Acoustic Emission (AE)*1 generated from inside structural components, like micro crack, wear, and flake, enabling us to detect internal damages that may cause massive destruction. Now we are targeting at Reinforced Concrete (RC) deck of a highway bridge. AE sensors are installed on the surface of the bottom panel, and AE waves generated from internal cracks in concrete are detected on passage of the vehicles. AE signals are sent to distant server via palm-sized wireless sensing units and accumulated. The signals are analyzed with our original signal processing technique in order to visualize the location and the scale of the cracks. Through the long-term verification test at the public highway bridge, we have good prospects of detecting the internal cracks.

*1 Acoustic Emission refers to the generation of transient elastic waves generated by a sudden redistribution of stress or other stimulus in a material.

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**Damage rank map based on actual measurement of a concrete deck**  
*(1: Sound to 4: Deterioration limit)*

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**Remote monitoring of deterioration in the bridge deck**

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**Structure health monitoring using AE sensing**

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**Toshiba Group Environmental Report 2019**
The environment surrounding manufacturing throughout the world is undergoing a drastic change and the manufacturing industry is required to not only achieve higher than ever productivity and quality through optimization of the entire value chain, but also increase the usage value by knowing how individual customers use products. Based on our knowledge and practical skill that only a manufacturing company possesses, we provide Meister Series manufacturing IoT solutions as ICT solutions that support such a change.

The solutions provide an integrated information platform that associates diverse and massive data generated from manufacturing sites and maps the past and present data related to each product on a digital space in fine detail. This allows visualization and analysis of data covering the entire product lifecycle, thus contributing to the total optimization of manufacturing including further improvement of productivity and quality as well as operation and maintenance.

* IoT: Internet of Things

Related page:
Manufacturing IoT solutions "Meister Series"
In the field of operation and maintenance (O&M*1) of factories and infrastructure facilities in Japan, response to issues such as aging workers and a lack of younger successors is required. In addition, improving the O&M processes and increasing the capacity utilization ratio with digital technologies, such as IoT and AI*2, and transformation to a new business model where products and the maintenance and operation services are integrated are expected. Meanwhile, we provide solutions by combining Toshiba Group’s experience in practicing O&M as a facility and industrial equipment manufacturer as well as a facility and equipment user in factories with our digital technology. By providing the “IoT Standard Pack” for remote monitoring of facilities and equipment and supporting operations and “Meister Digital Field Work” and “Meister AR*3 Suite” to support workers in the field through converting the knowledge and skills of experienced workers into digital information, we promote sustainable O&M for factories and infrastructure facilities.

*1 O&M: Operation & Maintenance
*2 AI: Artificial intelligence
*3 AR: Augmented reality

Using IoT and digital technology, Toshiba brings facility maintenance work to a more advanced level

Visualization and remote monitoring of the status of equipment in the field

Is there any abnormality in the operation status?

Viewing facility history required in the field

What about the maintenance history of this facility?

Performing work without errors using the AR manual

Is this inspection procedure correct?

IoT Standard Pack

Meister Digital Field Work

Meister AR Suite
**Electronic receipt service SMART RECEIPT**

SMART RECEIPT is a system that digitizes receipts that customers receive when they make purchases at a cash register and manages and provides these receipts as data from SMART RECEIPT Center. While customers can check their shopping histories anytime and anywhere via smartphones, stores can improve the efficiency of cash register tasks performed by their employees, and eliminate the cost of issuing paper-based receipts. In addition, promotion services such as paper-based receipt coupons and stamp cards can be digitized thus reducing the operational cost as in the case of receipts.

The volume of receipt paper consumed in Japan in one year amounts to approximately 5.4 tons which corresponds to as many as 13.5 billion sheets of A4 copy paper.* Reducing the amount of receipt paper through SMART RECEIPT will contribute to reducing paper resources wasted after receiving such receipts as well as lead to reducing CO₂ emissions and the amount of water used associated with manufacture of paper. Furthermore, reducing receipt paper can reduce the amount of pulp used, which will control the harvesting of forest resources, the raw material for receipt paper, and thus lead to protection of precious forest resources.

* A survey by Toshiba (The volume of paper shipped for cash registers is estimated based on the volume of thermal paper shipped within Japan)

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**Logistics system solution**

In recent years in Japan, the demand for logistics services has sharply increased due to the growth of e-commerce, causing labor shortages in the logistics industry such as the lack of drivers.

In order to solve this problem, by utilizing our postal automation technologies, we provide various robotic solutions including unloading, picking, and loading systems in the logistics fields where there is a high demand for automation. We also propose solutions that contribute to the automation of entire warehouse, which improves operational efficiency by multi-linked robots and by connecting to automated warehouses. Eventually, using IoT and AI, we aim to realize a labor-saving automation and optimization for the entire logistics value chain.
**Case 14** Logistics IoT solutions: LADOCsuite and LogiTrace tracing and location management services

Toshiba Digital Solutions Corporation

In the field of logistics where labor shortage continues, expectations for improved logistics processes and overall optimization through information sharing between stakeholders involved in transportation and delivery work (shipper, warehouse company, transportation company, etc.) are increasing. Reflecting the surge in transportation costs, and cutting the cost of purchasing additional transportation equipment due to lost or insufficient inventory of such equipment has become an issue.

We provide LADOCsuite and LogiTrace, transportation equipment tracing and location management services for dealing with such issues. These services automatically collect location data of transportation equipment handled in the field of logistics and visualize their movement by using RFID* to contribute to improving the efficiency of transportation and distribution work and reducing logistics costs through automating work for associating transportation equipment and delivery destinations, reducing the burden of location management for transportation equipment at delivery destinations or the shipper’s own sites, appropriately managing assets by curbing loss of transportation equipment or uneven distribution of equipment between locations.

* RFID: Radio frequency identifier

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**Case 15** Zero Liquid Discharge (ZLD) System

Toshiba Infrastructure Systems & Solutions Corporation

Among developing countries where population and industries are sharply concentrated in cities, water pollution due to industrial wastewater is becoming increasingly serious and the needs for improving wastewater quality and preserving the water environment are increasing. Especially in countries like India where laws and regulations are imposed, introduction of a zero liquid discharge (ZLD) system for treating and reusing discharged wastewater within the factory and reducing water to be discharged from the factory to outside to zero is getting popular.

We are promoting technology development aimed at further sophistication of the system, such as improving the recovery rate with prevention measures for membrane clogging and reducing soluble fractions with the adoption of appropriate pre-treatment process.

By increasing installation achievement of the ZLD system in developing countries, we will contribute to reducing the risk of river water pollution and to effectively using water resources.

Related page:
Solutions for Industrial Field: ZLD with HERO™

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Flow of the ZLD (zero liquid discharge) system process

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In Response to Climate Change

Material issues

Since FY2015, Toshiba Group has set three high priority responsibilities (Materiality). In reference to opinions from stakeholders as well as assessment reviews by third-party organizations and including self-evaluations conducted based on the international guidance standard ISO 26000 which concerns the social responsibilities of organizations, we evaluated these responsibilities in terms of material issues for both Toshiba Group and its stakeholders, and identified the following three high priority responsibilities. One of them is “Environmental Management,” and among various environmental issues, we have chosen the following three items having both risks and opportunities with relatively high priority responsibilities: “Climate change mitigation and adaptation,” “Sustainable resource use,” and “Prevention of pollution.”

Significance of Environment-related Items in Toshiba Group’s High Priority Responsibilities

As for “Sustainable resource use,” risks, such as introduction of laws and regulations regarding resource efficiency as well as energy efficiency, resource price hikes, and procurement, are expected. While reducing costs by improving resource efficiency, we will work to shift to a business model with a higher resource efficiency as well as lower our dependency on resources through reuse and recycling.

In regard to “Prevention of pollution,” we will ensure that chemicals contained in products are managed with the aim of minimizing the risk from the chemical substance. Since various related laws and regulations are being fully implemented on a global basis, we will prevent the risk of business suspensions due to delays in compliance by ensuring information transmission along the supply chain. Meanwhile, we have developed a simplified screening technology for the four phthalates since we consider that compliance with laws and regulations to be introduced also represents a business opportunity.

With the aim of achieving Environmental Vision 2050, Toshiba Group’s environmental management will continue to take initiatives mainly for these high priority responsibilities.

气候变化リスクと機会

As described above, climate change risks and opportunities are important management issues and multiple KPIs are included in the action plan for 2020 (the Sixth Environmental Action Plan) as responses to climate change. To manage greenhouse gas emissions we set KPIs in terms of both business processes and products and services by taking into account that in addition to compliance with policies such as carbon tax and energy-saving regulations, the companies’ commitment to climate change will affect their environmental brands and even selection of their products and services by customers.

Greenhouse gas management by business processes is effective in reducing transition risks in the course of future enhancement of regulations (for example, future introduction or enhancement of a carbon tax system). In addition, we consider increasing our competitiveness by improving productivity while reducing transition risks, and also boosting our reputation by promoting GHG reduction activities that exceed the industry level as representing opportunities for us.

For products and services, the enhancement of energy-saving regulations poses risks. However, we have been monitoring and evaluating global trends of environmental laws and regulations by using industrial associations and external services, and also developing human resources that specialize in this area. In addition, since we have set CO2 emission reductions from both the demand and supply sides as numerical targets so that opportunities such as expanding energy-saving markets and increasing energy
demand in regions can be optimized, we will expand the renewable energy business and increase our offerings of products and services having high energy efficiency.

Furthermore, under the Sixth Environmental Action Plan, we also included “Improvement of information disclosure” in light of risks and opportunities associated with reputation.

We will continue to work on these KPIs, whose progress is managed at meetings of the Corporate Environmental Management Committee held once semi-annually in light of external trends. In addition, the target values for the various KPIs for FY2019 onward will be reviewed in order, according to the medium-term management plan, Toshiba Next Plan, announced in November 2018.

Toshiba Group has also been comprehensively assessing risks and opportunities on a mid- to long-term basis in line with recommendations made by the Task Force on Climate-related Financial Disclosures (TCFD). Toshiba Group has four business domains, namely energy, electronic devices, digital solutions, and social infrastructure as the core, so each business has different risk drivers. For this reason, Toshiba Group companies individually identify risks and opportunities in light of their business situations. We assess the following items according to the risk items defined by the TCFD: introduction or enhancement of a carbon tax system (policy and regulation risks), replacement of technologies (technology risk), lawsuits on climate change (legal risk), further emphasis on energy-saving performance (market risk), damage to environment brands (reputation risk), and business suspensions due to flooding, etc. and an increase in fuel and lighting expenses (physical risk). We assess the probability of each of these risk items on a 10-point scale, further assess the extent of their impacts on a 5-point scale, and list the risk measures as well. As for opportunities, Toshiba Group companies evaluate their own businesses from the viewpoint of both areas that are driven as a result of transiting to a de-carbonized society and further market expansion of disaster prevention solutions including weather radars and rainwater drainage systems in preparation for urban floods, and global development of air conditioner sales for heat stroke prevention will help expand our business.

The reputation risk must now be taken more seriously. It is important to enhance information disclosure related to climate change and maintain communication with various stakeholders. Toshiba Group supports the TCFD recommendations and participates in the “TCFD Consortium” established with the aim of promoting the implementation of initiatives among supporting institutions in Japan in a unified manner. Through this consortium, we will discuss initiatives for effectively evaluating and disclosing climate related financial information as well as for enabling financial institutions, etc. to make appropriate investment decisions based on disclosed information and in this way enhance the disclosure of ESG information.

Although there are no physical risks that have yet surfaced at the moment, we recognize that the impacts from unusual weather conditions on production and logistics are on a gradually increasing trend from hereon into the future. In the event of a large-scale disaster such as flooding and typhoons at the production and sales sites of Toshiba Group, the operation of such production sites may be suspended due to damage to production facilities, suspension of procurement of raw materials and parts, and paralyzed distribution and sales functions. We formulate a business continuity plan (BCP) for each business and production site and work with multiple suppliers to deal with such risks.

On the other hand, since our core operation is a social infrastructure business, we believe it is our mission to implement low carbon and de-carbonized systems in our society as quickly as possible and to accelerate the transition to a de-carbonized society. We believe that pursuing that mission will lead to great business opportunities. Under the Toshiba Next Plan, we regard de-carbonization in the mobility field as a growth market and aim to increase sales of e-Mobility equipped with our unique rechargeable battery SCiB™. By taking advantage of SCiB™ features such as its fast charging, long life, and safety, we have already achieved various applications for this battery, including in electric vehicles (EV) and EV buses.

In addition, de-carbonization of buildings and other facilities is also an area where our strength can be utilized and long-term growth can be expected. Since FY2019, our elevator, lighting, and air conditioner businesses have been integrated into one business as a result of establishment of the Group Relations Division and in this way shifted to a system where cooperation between the three business domains will be strengthened even further.

On the other hand, needs for adaptation to climate change are expected to further increase and so we believe that expansion of disaster prevention solutions including weather radars and rainwater drainage systems in preparation for urban floods, and global development of air conditioner sales for heat stroke prevention will help expand our business.
In Response to Climate Change

Making Supply Chain GHG Emissions Visible for All Categories

As climate change becomes an increasingly serious issue, companies must manage not only their own greenhouse gas (GHG)*1 emissions but also emissions generated throughout their entire supply chain. Based on the GHG Protocol*2, which provides international standards for calculating GHG emission, and the Ministry of the Environment’s Basic Guidelines for Calculating GHG Emissions throughout the Supply Chain, Toshiba Group calculates indirect GHG emissions generated outside the scope of its own business activities (Scope 3) in addition to its own emissions (Scopes 1 and 2).

Toshiba Group will continue working effectively throughout product lifecycles by quantitatively analyzing emissions per category as described above. GHG emissions especially during use of sold products account for many of GHG emissions from across the entire value chain. We will therefore continue to improve energy-saving performance of products and take other measures as needed.

*1 CO2, CH4, N2O, HFCs, PFCs, SF6, NFl

*2 The Greenhouse Gas Protocol (GHG Protocol): Guidelines for calculating and reporting GHG emissions formulated by companies, NGOs, and government organizations under the leadership of the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD)

(FY2018)

<table>
<thead>
<tr>
<th>Upstream</th>
<th>Toshiba</th>
<th>Downstream</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Scope 3</strong></td>
<td><strong>Scope 1, 2</strong></td>
<td><strong>Scope 3</strong></td>
</tr>
<tr>
<td>Purchased goods and services</td>
<td>Direct GHG emissions via fuel use at Toshiba and its industrial processes</td>
<td>Transport and delivery</td>
</tr>
<tr>
<td>Capital goods</td>
<td>Fuel- and energy-related activities</td>
<td>Processing of sold products</td>
</tr>
<tr>
<td>Waste generated in operation</td>
<td>Business travel</td>
<td>Use of sold products</td>
</tr>
<tr>
<td>Employee commuting</td>
<td>Employee commuting</td>
<td>End-of-life treatment of sold products</td>
</tr>
<tr>
<td><strong>18.26 million t-CO2</strong></td>
<td><strong>1.24 million t-CO2</strong></td>
<td><strong>45.09 million t-CO2</strong></td>
</tr>
<tr>
<td>Category</td>
<td>Categories covered by calculations</td>
<td>FY2017 calculation results (10,000 t-CO₂)</td>
</tr>
<tr>
<td>----------</td>
<td>-----------------------------------</td>
<td>----------------------------------------</td>
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<tr>
<td>Upstream</td>
<td>1 Purchased goods and services</td>
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<td></td>
<td>2 Capital goods</td>
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<td></td>
<td>3 Fuel- and energy-related activities (not in Scope 1 or 2)</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>4 Upstream transportation and distribution</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>5 Waste generated in operation</td>
<td>1</td>
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<tr>
<td></td>
<td>6 Business travel</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>7 Employee commuting</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>8 Upstream leased assets</td>
<td>—</td>
</tr>
<tr>
<td>Toshiba</td>
<td>9 Direct GHG emissions (Scope 1)</td>
<td>33</td>
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<tr>
<td></td>
<td>10 Indirect emissions associated with energy-derived emissions (Scope 2)</td>
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<tr>
<td>Downstream</td>
<td>11 Downstream transportation and distribution</td>
<td>7</td>
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<tr>
<td></td>
<td>12 Processing of sold products</td>
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<tr>
<td></td>
<td>13 Use of sold products</td>
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<td></td>
<td>14 End-of-life treatment of sold products</td>
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<td></td>
<td>15 Leased assets (Downstream)</td>
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</tr>
<tr>
<td></td>
<td>16 Franchises</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>17 Investments</td>
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<tr>
<td></td>
<td>Total</td>
<td>6,952</td>
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