NEC's SDGs - Risks Associated with Climate Change and the NEC Group's Approach

July 6, 2016
Senior Vice President Nobuhiro Odake
Through our **business activities**, NEC is promoting **environmental management** that contributes to reducing the environmental impact of our customers and society as a whole.

In response to global trends such as SDGs (Sustainable Development Goals) and the Paris Agreement, NEC aims to reinforce environmental management **focusing on climate change** and expand the extent to which we contribute to our customers and society on the environmental front.

Additionally, NEC will endeavor to expand efforts to **continuously strengthen and improve** environmental management through communication with our stakeholders.
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1. Company Profile and the Direction of NEC Environmental Management

2. History of Environmental Activities, Mid-Term Targets and Results of Environmental Activities

3. Future of Environmental Management to Address Climate Change

4. Environmental Information Disclosure

5. Future Approach
1. Company Profile and the Direction of NEC Environmental Management
Profile

Company Name: NEC Corporation
Address: 7-1, Shiba 5-chome, Minato-ku, Tokyo, Japan
Established: July 17, 1899
Chairman of the Board: Nobuhiro Endo
President and CEO: Takashi Niino
Capital: ¥397.2 billion - As of Mar. 31, 2016 -
Consolidated Net Sales: ¥2,821.2 billion
   $25,189 million
   - Fiscal year ended Mar. 31, 2016 –

Operations of NEC Group: Public, Enterprise, Telecom Carrier,
System Platform, Others

Employees: NEC Corporation
   22,235 - As of Mar. 31, 2016 -
NEC Corporation and Consolidated Subsidiaries
   98,726 - As of Mar. 31, 2016 –

Consolidated Subsidiaries: 217 - As of Mar. 31, 2016 -

(Note: U.S. dollar amounts are translated from yen, for convenience of the reader, at the rate of ¥112=U.S. $1.)
Proportion of Sales (By Operating Segments)

**Public Business**
- 27% of FY2015 Sales
- 771.6 (B￥)

**Enterprise Business**
- 25% of FY2015 Sales
- 697.5 (B￥)
- 11% of FY2015 Sales
- 300.3 (B￥)

**System Platform Business**
- 26% of FY2015 Sales
- 728.6 (B￥)

**Telecom Carrier Business**
- 11% of FY2015 Sales
- 326.8 (B￥)

**Others**
- 11% of FY2015 Sales
- 326.8 (B￥)
7 themes for social value creation

- Sustainable Earth
- Safer Cities & Public Services
- Lifeline Infrastructure
- Communication
- Industry Eco-System
- Quality of Life
- Work Style

Orchestrating a brighter world
The Group-wide Role of the Environment Promotion Division

Vigorously promote management reforms across the entire Group value chain and innovate to create new value.

- Sales
  - Public
  - Enterprise
  - Telecom Carrier
  - Smart Energy

- RHQ (Regional Headquarters)

- System Integration, Services & Engineering Operations

- Supply Chain Management

- Business Innovation

- Central Research Laboratories

SI and service business promotion

Manufacturing, quality, procurement, and environment

System Platform

Business and technology innovation
  (Cloud, SDN, big data, security, IoT, etc.)

R&D (AI, face and fingerprint authentication, crowd behavior analysis, system invariant analysis, etc.)

Corporate

NEC Group Vision
Friendly to humans
To be a leading global company leveraging the power of innovation to realize an information society friendly to humans and the earth

Friendly to the earth

Environmental Management Action Plan 2017/2030
Low carbon
Promotion of recycling and resource saving
Ecosystem and biodiversity conservation

Making good progress towards achieving our 2017 goals.
Maximize contributions to climate change “mitigation” while providing Solutions for Society for climate change “adaptation.”

1. “Mitigation”  Hold the increase in the global average temperature to below 2°C (1.5°C) above pre-industrial levels.

   Devise innovative technologies designed to reduce CO₂ emissions.

2. “Adaptation” Prepare for the 8 risks of climate change.

   Provide specialized Solutions for Society for high-risk areas.
Attain a level of CO2 reduction that is five times the total volume of CO2 emissions from our entire supply chain in fiscal 2020 by providing Solutions for Society.

- **Mitigation**
  - 9.65 million tons
  - 11.81 million tons
  - 14.88 million tons
  - 50 million tons (Target)

- **Adaptation**
  - 9.5 million tons
  - 9.65 million tons
  - 10 million tons
  - 50 million tons (Target)

- **2014 (Actual)**
  - 9.5 million tons
  - 9.65 million tons

- **2015 (Actual)**
  - 11.81 million tons

- **2017 (Target)**
  - 14.88 million tons

- **2020 (Target)**
  - 50 million tons

Preparation for climate change (adaptation) + CO₂ emissions reductions (mitigation)

- **Supply chain CO₂ emissions (Scope 1, 2, 3)**
  - 5 times

- **Climate change: Social value created by NEC**
  - 1.2 times

- **Climate change: Impact of NEC’s businesses**
  - 1.5 times
World Environmental Trends That Will Impact Future Business

Paris Agreement on climate change measures

COP21 held in 2015 (21st Session of the Conference of Parties to the United Nations Framework Convention on Climate Change)

Sets ambitious long-term goals for achieving a no-carbon society. Aims to reduce CO\textsubscript{2} emissions in the second half of 21st century to “effectively zero.”

Impacts many SDGs

SDGs (Sustainable Development Goals)

United Nations Sustainable Development Summit held in 2015

17 goals with 169 targets related to poverty and hunger, renewable energy, climate action, and peace and justice

Changes the flow of funds
Sustainable Development Goals (SDGs)

17 goals with 169 targets
related to poverty, hunger, renewable energy, climate action, and peace and justice
7 Goals Are Directly Related to Value NEC Can Provide to Achieve SDGs

**Biometrics**

**Safer Cities (Smart City)**

**Thermography Camera against Ebola**

**Emergency Mobile Radio Network**

- Biometrics
- Safer Cities (Smart City)
- Thermography Camera against Ebola
- Emergency Mobile Radio Network

11 SUSTAINABLE CITIES AND COMMUNITIES

16 PEACE, JUSTICE AND STRONG INSTITUTIONS

3 GOOD HEALTH AND WELL-BEING

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

17 PARTNERSHIPS FOR THE GOALS
Important Themes for Future Environmental Management

Paris Agreement on climate change measures

COP21 held in 2015
(21st Session of the Conference of Parties to the United Nations Framework Convention on Climate Change)

SDGs (Sustainable Development Goals)

United Nations Sustainable Development Summit held in 2015

Review and reinforce our environmental management action plan focusing on SDGs and climate change.

NEC's approach
Pivoting to Environmental Management Focused on Climate Change

Provide value to resolve social issues

Provide value as measures to address climate change

Contributions to “mitigation”
1. Provide IT solutions that reduce carbon emissions from customers and society.
2. Improve the energy efficiency of products.

Contributions to “adaptation”
3. Prepare for climate change by providing Solutions for Society

Implement measures to address our own impact on climate change (social responsibility)

Reduce carbon emissions in business activities
4. Improve efficiency to raise the emissions base unit and switch to using renewable energy.
Using IoT to Address Climate Change: Becoming a Social Value Innovator

The use of IoT will drive our solutions for issues related to climate change.

Data collected from global environment and social infrastructure

Providing value to resolve social issues such as achieving SDGs and implementing measures to address climate change

Social value
- Reinforcing infrastructure
- Preparing disaster plans
- Using resources effectively
- Supporting industries (agriculture, etc.)
- Preserving forests
- Preserving ecosystems...etc.

Cyber Field

- AI
- Visualization
- Analytics
- Control & guidance

Visualizing

- Big Data
- Cloud

Real World

- Food shortages
- Water shortages
- Increases in CO₂ emissions
- Energy shortages
- Increases in natural disasters...etc.

Cyber Security

- IoT
- SDN/NFV

Sensing

- SDN/NFV

Analytics

- Cloud

Control

- Cyber Security

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2. History of Environmental Activities, Mid-Term Targets and Results of Environmental Activities
Changes in Environmental Activities:
Evolution of Environmental Activities in Response to Businesses Changes

- Created a department to deal with environmental issues

Environmental activities:
- Pollution prevention
- Environment conservation
- Environment control
- Environmental management

Environmental Management Vision 2010:
- Reduce product risks
- Reduce CO2 emissions
- Reduce environmental impacts and risks

Environmental Management Action Plan 2017/2030:
- Address climate change through Solutions for Society
- Reduce CO2 emissions through IT solutions
- Reduce CO2 emissions of products

Core business:
- Devices, computers, communications equipment (hardware)
- ICT solutions (software)
- Solutions for Society

Environmental issues:
- Pollution issues
- Global warming
- Climate change
- Global regulations on chemical substances contained in products
Environmental Management Concept: Contributing to Environmental Conservation through Business

NEC

- Minimize environmental impact and environmental risks
- Improve resource efficiency
- Increase employees’ environmental awareness

Sustainable company management

Eco communications

Providing NEC’s solutions
- Eco Products
- Eco Software & services

Customers & society

- Reduce environmental impact
- Improve resource efficiency

Contribute to a sustainable society
Reduce CO₂ emissions to “effectively zero” by 2010

Management to reduce environmental impact

Ecology of IT

Emissions caused by NEC products (customers)

Emissions caused by NEC's manufacturing activities

Balance

((1) + (2)) - (3) = 0

Reducing CO₂ emissions from customers and society by providing IT solutions

* Greenhouse gases other than CO₂ are calculated by converting them to CO₂ equivalent figures.

Achieved the target a year earlier in 2009
NEC Group Vision

To be a leading global company leveraging the power of innovation to realize an information society friendly to humans and the earth

Environmental Management Action Plan 2017/2030

Making good progress towards achieving our 2017 goals.

Friendly to humans
Friendly to the earth

Ecosystem and biodiversity conservation
Promotion of recycling and resource saving

Low carbon
Low Carbon: Reducing CO₂ Emissions from Society as a Whole by Providing IT Solutions

While we failed to achieve the annual target due to a slump in sales, we are making good progress towards achieving our 2017 goal.

Main solutions
NISMail, NEC Storage HS8, MO, WebSAM WinShare, Cloud Platform Suite, CSView Contact Center Cloud, etc.

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<tr>
<td>Target</td>
<td>212</td>
<td>443</td>
<td>741</td>
<td>970</td>
<td>1,171</td>
<td>1,322</td>
<td></td>
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<tr>
<td>CO₂ emissions reduction</td>
<td>212</td>
<td>443</td>
<td>741</td>
<td>970</td>
<td>1,171</td>
<td>1,322</td>
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</tr>
</tbody>
</table>

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Using energy storage systems to expand our renewable energy business.
- The first mega solar power plant to be connected to the power grid in the Kyushu region since the limitless output control system was launched -

- Supplied a large-scale energy storage system with a capacity of 1.2 MWh and output of 500 kW to COLON Company Limited.
- Plays an important role in adjusting and stabilizing the supply and demand of energy for the power grid by storing surplus electric energy (generated due to fluctuations in access to direct sunlight) that cannot be accepted by the power grid.
- The first large-scale energy storage system installed in a power station in the Kyushu region (except isolated islands) that is subject to output control.
Case Study 2: Smart Waste Management (Spain)

Joint venture with Spanish waste collection service provider ASCAN

- Implemented a sophisticated waste collection service for the city of Santander in Spain using sensors and Big Data analytics. This reduced unnecessary collection trips for garbage trucks, thereby reducing operating costs and CO₂ emissions at the same time.
Our energy efficiency has improved significantly due to increased sales of the energy-saving NEC Storage M Series.

Products with improved efficiency

* Since the target was achieved much earlier than forecast, we are reviewing the reference year with a view to setting a new target.

Low Carbon: Improving the Energy Efficiency of Products

<table>
<thead>
<tr>
<th>Year</th>
<th>CO₂ reduction rate compared with products in the reference year (2005)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>53%</td>
</tr>
<tr>
<td>2011</td>
<td>65%</td>
</tr>
<tr>
<td>2012</td>
<td>64%</td>
</tr>
<tr>
<td>2013</td>
<td>75%</td>
</tr>
<tr>
<td>2014</td>
<td>91%</td>
</tr>
<tr>
<td>2015</td>
<td>97% (Target)</td>
</tr>
<tr>
<td>2017</td>
<td>80% FY</td>
</tr>
</tbody>
</table>
Energy & space saving servers

Energy saving
- Latest Intel Xeon processor
- Energy saving parts (low-power CPU, energy saving memory, SSD, high-efficiency power supply)
- Power consumption capping supported as standard

Environmental tolerance
- Increased ambient operating temperature range of 5°C to 40°C (reduces air conditioning operating costs)

With options
110h-1: **Up to 45°C**
T110h/T110h-S: **Up to 48°C**

Ultra-small cabinet
- The volume of T110h-S is 13 liters, making it one of the smallest cabinets in the world among similar products from other companies.
Energy & Space Saving Servers

The technology we used to increase the maximum operating temperature to 45°C or 48°C

Achieved by leveraging our knowhow and experience in developing mainframe and super computers that operate stably using highly efficient and high-performance cooling technologies.

- Operation guaranteed between 5°C and 45°C or 48°C
- Previous NEC models could operate between 10°C and 40°C
- Most servers can operate between 10°C and 35°C

High-performance counter-rotating fan

Existing model (110Ri-1)

R110h-1 deploys a high-performance redundant counter-rotating fan for cooling

Redundant fans (counter-rotating fan)

Optimized air flow design

Efficient cooling system with a straight air flow design

Parts are placed in parallel with the air flow

Energy & Space Saving Servers

- Power supply fan
- CPU cooling fan
- Heat dissipation fan

Straight air flow structure

Parts are placed in parallel with the air flow

Air flow

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Environmentally Friendly Product Structure

Eco Symbol Star
- Must be environmental top runner products
- Must meet Eco Symbol Star standards

Eco Symbol
- Must meet the environmentally sound standards (Eco Product and Eco Symbol standards)
- Must be environmentally superior
- Must assure transparency

Eco Products
- Undergoing product assessment
- Must meet the Eco Product standards

ISO standards for environmental labeling

<table>
<thead>
<tr>
<th>ISO names and standards</th>
<th>Descriptions</th>
</tr>
</thead>
</table>
| Type I (ISO 14024) "Third party assessment" (Ecolabels assigned by third party assessment) | Operated by third party organizations
Third party organizations determine product categories and criteria
Third party organizations carry out assessments upon request from the business entity and grant licenses to use the label |
| Type II (ISO 14021) "Self declaration" (Self declared environmental claim by the business entity) | Claim that the product is environmentally beneficial is made to the market
Claim is used in advertisements of the product or service
Assessment by a third party is not carried out |
| Type III (ISO 14025) "Environmental declarations" (Display of quantitative data of environmental impact of the product) | Assessment to determine pass or fail is not carried out
Only quantitative data is displayed
Decision is left to the consumers |
Eco Symbol Star Products in 2015

Eight hardware products were granted Eco Symbol Star status

- Server (Express5800) R110h-1, T110h, and T110h-S
- Storage (NEC Storage) M11e, M110, and M310
- Storage (NEC Storage) M510 and M710
- Storage (NEC Storage) A3000/100
- Projector NP-P502HLJD
- Broadband router PA-MR04LN
- Broadband router Wi-Fi STATION N-01H
- Dual-frequency Precipitation Radar (DPR)

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© NASA

Orchestrating a brighter world
Fiscal 2015: 359 kilotons (10.1% year-on-year reduction)  
* 5.8% reduction in energy consumption (oil equivalent kl)

Scope 1: Standards for calculating and reporting greenhouse gases directly emitted from an organization's facilities or factories

Scope 2: Standards for calculating and reporting indirect emissions from an organization through purchased energy

- Reference:
  - Electricity conversion coefficient: 0.351
  - CO2 emissions: 292 MI
  - Energy consumption (oil equivalent kl): 250 MI

- Reference year:
  - 2010: 480 kilotons
  - 2011: 470 kilotons
  - 2012: 410 kilotons
  - 2013: 350 kilotons
  - 2014: 400 kilotons
  - 2015: 360 kilotons

- 2018-2030 (Target): -30%
Electricity Reductions at NEC Tamagawa Plant Building 9

Active deployment of the latest ICT and energy-saving equipment has reduced commercial power consumption by 50% (March 2016) (Results are on display at the Shinagawa Innovation World)

**Fiscal 2013 (1st term)**
- Human sensors
- Cloud-based BEMS
- Energy demand projection

**Fiscal 2014 (2nd term)**
- Renewable energy
- QoWL* index
- Phase change cooling unit installed
- Electric fingerprint analysis technology

**Fiscal 2015 onwards**
- Establishment of system operations
- Energy demand projection for the whole plant

* Quality of Working Life

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**Tamagawa plant building 9 Commercial power consumption**

- **2011.3**
  - OA: 282
  - Air: 142
  - Lighting: 35
  - Other: 1
  - Created energy: 2

- **2015.3**
  - OA: 142
  - Air: 142
  - Lighting: 35
  - Other: 1
  - Created energy: 2
Case study: Saving energy by using floor sensors

**Human sensors + enepal Office**

- Next-generation human sensors used to detect the presence of people.
- Infrared array sensors used to detect where stationary people are.
- Sensors cover an area of 3.6 m², enabling fine-grained control of lighting and air-conditioning.

**Light sensors + Lighting control system + enepal Office**

- LED lighting (lighting control system) linked with light sensors in the office.
- Automatically control unnecessary lighting and visualize reduction effects.
- Lights can be switched on and off using human presence information provided by human sensors.

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**Diagram captions**

- **Infrared array sensor unit**
- **Lighting control system**
- **Human sensor**
- **Logger**
- **PLC**
- **ON/OFF control (Air conditioning, lighting, power outlets)**

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Orchestrating a brighter world
History of Supply Chain CO₂ Emissions (Scope 1, 2, and 3)

Fiscal 2015: 9,650 kilotons (9,500 kilotons in the previous year)

- **Scope 1**: Standards for calculating and reporting greenhouse gases directly emitted from an organization’s facilities or factories.
- **Scope 2**: Standards for calculating and reporting indirect emission from an organization through purchased energy.
- **Scope 3**: Standards for calculating and reporting greenhouse gases emitted from all the organizations in a group (supply chain) for a particular product or service.

**Yearly emission history**

<table>
<thead>
<tr>
<th>Year</th>
<th>Scope 1 &amp; 2</th>
<th>Scope 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>350 kilotons</td>
<td>7,210 kilotons</td>
</tr>
<tr>
<td>2014</td>
<td>400 kilotons</td>
<td>9,100 kilotons</td>
</tr>
<tr>
<td>2015</td>
<td>360 kilotons</td>
<td>9,290 kilotons</td>
</tr>
</tbody>
</table>

**Breakdown of fiscal 2015 results**

- **Scope 1**: 1%
- **Scope 2**: 3%
- **Scope 3**: 96%

- **Category 1**: Emissions from procured products and services (9%)
- **Category 11**: Emissions from sold products (78%)

**Emission from other categories except categories 8, 13, and 14**: 9%
3. Future of Environmental Management to Address Climate Change
There is a gap between the scenario in the IPCC Fifth Assessment Report that will likely hold the increase in the global average temperature to below 2°C above pre-industrial levels and the sum of draft pledges so far submitted (red bold line). The following measures must be taken:

1. Submit, update, file a progress report on, and review reduction targets every 5 years according to the Paris Agreement.
2. Develop innovative technologies for mid-term measures to address global warming.

Source from the Ministry of Economy, Trade and Industry April 2016
The eight risks of climate change

i. Damage caused by rising sea levels and storm surge in coastal areas

ii. Damage caused by flooding in urban areas

iii. Breakdown of infrastructure and other societal functions due to extreme weather events

iv. Death and ill health caused by heat waves which particularly affect vulnerable groups in urban areas

v. Threat to food security caused by rising temperatures and drought

vi. Loss of livelihood and income in rural areas due to insufficient water resources and reduced agricultural productivity

vii. Loss of marine ecosystems that are vital to coastal water areas

viii. Loss of services provided by terrestrial and inland water ecosystems

Source: The 5th IPCC Report
NEC's solutions and technologies help monitor and control social infrastructure and global environments and provide appropriate information, thereby contributing to the preservation and efficient usage of resources and crisis response.
Using IoT to Address Climate Change: Becoming a Social Value Innovator

The use of IoT will drive our solutions for issues related to climate change.

- Data collected from global environment and social infrastructure
- Providing value to resolve social issues such as achieving SDGs and implementing measures to address climate change

**Social value**
- Reinforcing infrastructure
- Preparing disaster plans
- Using resources effectively
- Supporting industries (agriculture, etc.)
- Preserving forests
- Preserving ecosystems...etc.

**Real World**
- Food shortages
- Water shortages
- Increases in CO₂ emissions
- Energy shortages
- Increases in natural disasters...etc.

**Cyber Field**
- AI
- Visualization
- Analytics
- Control & guidance

**Cyber Security**
- SDN/NFV
- Big Data
- Cloud

**IoT**
- Sensing
- SDN/NFV
- Cloud
Case Study 1: Disaster Prevention System in the Philippines

Approximately 60 VSAT stations equipped with seismographs and tide indicators installed throughout the Philippines. Enables the Institute of Volcanology and Seismology in Quezon City to observe earthquakes and tsunamis in real time.

- Tsunami simulation devices and 240 IT strong-motion seismographs also delivered at the same time.

Hand-over ceremony at the Institute of Volcanology and Seismology (October 15, 2015)

Tsunami sensor station
Case Study 2: Comprehensive Disaster Control System for Toshima City

Monitoring congestion and abnormal behavior from crowd images captured by surveillance cameras
- The world’s first use of a surveillance system based on crowd behavior analysis technology -

- Analyzes changes in overall crowd behavior that may lead to incidents without identifying individuals. Detects abnormal congestion or stagnating flows from images captured by cameras.
- Detects real-time events from images captured by the 51 surveillance cameras newly installed in locations throughout the city such as main stations and major roads. This enables a quick response to help people in the case of a disaster and facilitates accident prevention in congested areas at normal times.
Maximize contributions to climate change “mitigation” while providing Solutions for Society for climate change “adaptation.”

1. “Mitigation” Hold the increase in the global average temperature to below 2°C (1.5°C) above pre-industrial levels.

Devise innovative technologies designed to reduce CO₂ emissions.

2. “Adaptation” Prepare for the 8 risks of climate change.

Provide specialized Solutions for Society for high-risk areas.
Attain a level of CO2 reduction that is five times the total volume of CO2 emissions from our entire supply chain in fiscal 2020 by providing Solutions for Society.
NEC is reinforcing “Adaptation” to climate change through Solutions for Society by:

- Creating solutions for Adaptation
- Quantitatively assessing the social value created by adaptation measures

* The method used to quantitatively assess social value is currently being developed jointly with the Waseda Environmental Institute.

### Concept of quantification

Assume that reducing impact will reduce emissions

Impact increases as emissions increase

Set the "conversion coefficient" from the correlation

### Assessment and aggregation steps

**Step 1**
Calculate the "conversion coefficient" (1) (CO₂ emission / damage costs)

**Step 2**
Calculate the "damage reduction amount" for each IT solution (2)

**Step 3**
Calculate "CO₂ emission reduction volume" (1 x 2)
Calculating an amount equivalent to the increase in CO₂ emissions that will lead to disasters caused by climate change.

**Formula for calculating effect of disaster prevention through adaptation:**
\[
\text{IT contribution rate} \times \text{cost of damage} \times \text{coefficient for increase in damage as CO}_2 \text{ increases in the atmosphere}
\]

- **Sea level rise, high tides**
  - Service resource controller: 633 kt/yr
- **Flood damage**
  - Dam monitoring control system: 23 kt/yr
  - Disaster monitoring (landslide prevention): 100 kt/yr
  - Disaster prevention communications network (last resort network): 403 kt/yr
  - Water purification set, reverse osmosis type 2: 52 kt/yr
- **Infrastructure breakdown**
  - Business continuity (BC) (crowd detection): 990 kt/yr
- **Food shortages due to droughts**
  - Agriculture ICT solutions: 354 kt/yr

- Results are being verified. Preparations for calculations based on past damage cases or appropriate models are complete and formulas are being verified based on performance records.
- Case studies are under preparation. Appropriate past cases of damage or appropriate models are not available yet. We are currently researching public data.
"NEC Group Environmental Management Action Plan 2020/2030" (Target)

The NEC Group will promote activities from three perspectives to provide social value through climate change measures.

<table>
<thead>
<tr>
<th>Contribution to “mitigation” of climate change</th>
<th>Contribution to “adaptation” to climate change</th>
<th>Reduction of emissions from business activities</th>
</tr>
</thead>
</table>
| 1. Reduction in emissions through the provision of IT solutions  
  • Contribute to reducing CO₂ emissions in all industrial areas (traffic, plants, buildings) by using IoT. | 3. Preparing for the impacts of climate change through the provision of Solutions for Society | 4. Improvement in CO₂ emissions basic unit through higher product energy efficiency and switch to renewable energy sources  
  • Smart building solutions, installation of energy-saving devices, etc. |
| 2. Improvement in product energy efficiency (compared with 2013)  
  • Reduce CO₂ emissions mainly from devices (servers, networks, monitors) as the volume of data increases. | | |

<table>
<thead>
<tr>
<th>Year</th>
<th>2020</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emissions (million tons)</td>
<td>23</td>
<td>50</td>
</tr>
<tr>
<td>Improvement</td>
<td>30%</td>
<td>80%</td>
</tr>
</tbody>
</table>

Increase contribution through more competitive solutions to problems and through business expansion

18% improvement  
30% improvement
4. Environmental Information Disclosure

- **From 1995**
  - Devised even before the "Global Reporting Initiative Guidelines" (2003 edition) and "Environmental Performance Indicators Guideline for Organizations" (2002 edition) appeared.
From Environmental Reporting to CSR Reporting and Integrated Reporting (2005 to 2015)

Group Annual Report (integrated report) from 2013
CSR sections conform to the GRI Guidelines
Progress of NEC Group “Environmental Management Action Plan 2017/2030” and New Objectives for Climate Change

In fiscal 2011, we established NEC Group “Environmental Management Action Plan 2017/2030” which defines mid- and long-term environment management targets. In addition, we have been working on new targets to strengthen our contribution to combating climate change since last year.

NEC Group Environmental Management Action Plan 2017/2030

- A cultivation management portal
- Nine solutions for biodiversity preservation

includes specific targets based on three key perspectives:

Non-Financial Section

NEC Corporation and Consolidated Subsidiaries
For the years ended March 31, 2016 and 2015

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<th></th>
<th>2014</th>
<th>2015</th>
<th>Units</th>
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<td>2,028</td>
<td>People</td>
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<tr>
<td>Japan</td>
<td>7,025</td>
<td>6,926</td>
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<tr>
<td>Greater China</td>
<td>7,584</td>
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<tr>
<td>Asia Pacific</td>
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<td>North America</td>
<td>2,082</td>
<td>1,796</td>
<td>People</td>
</tr>
<tr>
<td>Latin America</td>
<td>1,263</td>
<td>1,384</td>
<td></td>
</tr>
<tr>
<td>Ratio of outside directors to all directors</td>
<td>45.5</td>
<td>45.5</td>
<td>%</td>
</tr>
<tr>
<td>Male managers</td>
<td>390</td>
<td>396</td>
<td>People</td>
</tr>
<tr>
<td>Female managers</td>
<td>51</td>
<td>52</td>
<td>People</td>
</tr>
<tr>
<td>Ratio of female managers</td>
<td>1.56</td>
<td>1.56</td>
<td></td>
</tr>
<tr>
<td>Response rate of employees’ survey (Domestic)</td>
<td>82</td>
<td>84</td>
<td>%</td>
</tr>
<tr>
<td>Response rate of employees’ survey (Overseas)</td>
<td>-</td>
<td>-</td>
<td>%</td>
</tr>
<tr>
<td>Low accident and disasters</td>
<td>0.00</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>CO₂ emissions reduction by providing IT solutions</td>
<td>2,290</td>
<td>2,540</td>
<td>Thousand tons</td>
</tr>
<tr>
<td>Improvement in energy efficiency of products</td>
<td>75</td>
<td>91</td>
<td>%</td>
</tr>
<tr>
<td>Greenhouse gas emissions</td>
<td>60</td>
<td>58</td>
<td>Thousand tons</td>
</tr>
<tr>
<td>Energy usage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electricity</td>
<td>669</td>
<td>629</td>
<td>Million kWh</td>
</tr>
<tr>
<td>Gas</td>
<td>21</td>
<td>21</td>
<td>Million m³</td>
</tr>
<tr>
<td>Fuel (heavy oil and kerosene)</td>
<td>3.0</td>
<td>2.7</td>
<td>Thousand t</td>
</tr>
<tr>
<td>Water usage</td>
<td>2,645</td>
<td>2,375</td>
<td>Thousand m³</td>
</tr>
<tr>
<td>Industrial waste</td>
<td>23</td>
<td>25.6</td>
<td></td>
</tr>
</tbody>
</table>
Resolving Social Issues through ICT (NEC Vision)
Addressing Climate Change

Responses to Climate Change
-Supported by ICT
-Preparing for climate change adaptation-

Expansion and intensification of climate change impacts

Impact on society

What NEC can offer

Role of ICT

What ICT Can Do for Climate Change Adaptation

A variety of sensor technologies and telecommunications can help.

- Observation and monitoring
- Acquisition of data
- Prediction of events

What NEC can contribute to addressing flooding damage

Disaster risk assessments prior to the occurrence of natural disasters (earthquakes, wind and flood damage)

Sensing and predicting the occurrence of disasters

Support for disaster relief activities in the aftermath of disasters
5. Future Approach
Providing even greater value through solutions to global social issues

Reinforce and promote environmental management focused on climate change (working towards 2020/2030 targets)

Promote understanding of NEC's ESG activities and clarify key areas through regular communication with the stakeholders (Establish a PDCA cycle to reflect social needs in activities)

Continue to provide greater value for the environment to propel NEC's growth
未来に向かいた、人が生きる、豊かに生きるために欠かせないもの。
それは「安全」「安心」「効率」「公平」という価値が実現された社会です。

NECは、ネットワーク技術とコンピューティング技術をあわせ持つ
類のないインテグレーターとしてリーダーシップを発揮し、
卓越した技術とさまざまな知見やアイデアを融合することで、
世界の国々や地域の人々と協奏しながら、
明るく希望に満ちた暮らしと社会を実現し、未来につなげていきます。
Cautionary Statement with Respect to Forward-Looking Statements

This material contains forward-looking statements regarding estimations, forecasts, targets and plans in relation to the results of operations, financial conditions and other overall management of the NEC Group (the "forward-looking statements"). The forward-looking statements are made based on information currently available to NEC and certain assumptions considered reasonable as of the date of this material. These determinations and assumptions are inherently subjective and uncertain. These forward-looking statements are not guarantees of future performance, and actual operating results may differ substantially due to a number of factors.

The factors that may influence the operating results include, but are not limited to, the following:

- Effects of economic conditions, volatility in the markets generally, and fluctuations in foreign currency exchange and interest rate
- Trends and factors beyond the NEC Group’s control and fluctuations in financial conditions and profits of the NEC Group that are caused by external factors
- Risks arising from acquisitions, business combinations and reorganizations, including the possibility that the expected benefits cannot be realized or that the transactions may result in unanticipated adverse consequences
- Developments in the NEC Group’s alliances with strategic partners
- Effects of expanding the NEC Group’s global business
- Risk that the NEC Group may fail to keep pace with rapid technological developments and changes in customer preferences
- Risk that the NEC Group may lose sales due to problems with the production process or due to its failure to adapt to demand fluctuations
- Defects in products and services
- Shortcomings in material procurement and increases in delivery cost
- Acquisition and protection of intellectual property rights necessary for the operation of business
- Risk that intellectual property licenses owned by third parties cannot be obtained and/or are discontinued
- Risk that the NEC Group may be exposed to unfavorable pricing environment due to intensified competition
- Risk that a major customer changes investment targets, reduces capital investment and/or reduces the value of transactions with the NEC Group
- Risk that the NEC Group may be unable to provide or facilitate payment arrangements (such as vendor financing) to its customers on terms acceptable to them or at all, or risk that the NEC Group’s customers are unable to make payments on time, due to the customers’ financial difficulties or otherwise
- Risk that the NEC Group may experience a substantial loss of, or an inability to attract, talented personnel
- Risk that the NEC Group’s ability to access the commercial paper market or other debt markets are adversely affected due to a downgrade in its credit rating
- Risk that the NEC Group may incur large costs and/or liabilities in relation to internal control, legal proceedings, laws and governmental policies, environmental laws and regulations, tax practice, information management, and human rights and working environment
- Consequences of natural and fire disasters
- Changes in methods, estimates and judgments that the NEC Group uses in applying its accounting policies
- Risk that the NEC Group may incur liabilities and losses in relation to its retirement benefit obligations

The forward-looking statements contained in this material are based on information that NEC possesses as of the date hereof. New risks and uncertainties come up from time to time, and it is impossible for NEC to predict these events or how they may affect the NEC Group. NEC does not intend to update or revise any forward-looking statements, whether as a result of new information, future events or otherwise.
Reference Materials
Achieved CO$_2$ emissions of “effectively zero” a year earlier in 2009
<table>
<thead>
<tr>
<th>大分類</th>
<th>中分類</th>
<th>エコシンボル基準(2012年度版)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ライフサイクル思考</td>
<td>製品の環境負荷への配慮（特定、削減）</td>
<td>類似製品群または当該製品で調達から廃棄まで確実にLCAを実施している。</td>
</tr>
<tr>
<td></td>
<td></td>
<td>カーボンメータなど消費電力またはCO2の見える化機能を付加している。</td>
</tr>
<tr>
<td>地球温暖化防止</td>
<td>環境中計への対応</td>
<td>製品消費電力低減が、基準年度(2005年度)比で中期目標を達成している。</td>
</tr>
<tr>
<td></td>
<td>省エネ設計</td>
<td>製品消費電力低減が、従来製品比で削減されている。</td>
</tr>
<tr>
<td></td>
<td></td>
<td>消費電力を低減するための新たな施策または技術を設計に盛んでいる。</td>
</tr>
<tr>
<td></td>
<td></td>
<td>国際エネルギースタープログラムに準拠している。</td>
</tr>
<tr>
<td>グリーン化</td>
<td>環境影響物質の使用制限</td>
<td>部品・製品・包装材の調達に当たってはNECが定めたガイドラインの要件を満たした調達を実施している。</td>
</tr>
<tr>
<td></td>
<td>環境影響物質の適正管理</td>
<td>部品を含め製品に使用する全てのプラスチックに臭素系難燃剤プラスチックを使用していない。使用している場合はその含有部位を特定している。</td>
</tr>
<tr>
<td></td>
<td></td>
<td>製品を構成する部品やユニットに使用される化学物質のうち、NECが定める含有禁止物質、条件付含有禁止物質、含有管理物質の情報を調査し管理できている。</td>
</tr>
<tr>
<td>資源循環</td>
<td>省資源</td>
<td>省資源に配慮した設計がなされ、部品または製品質量、体積、又は占有面積が従来製品と比較して80％以下である。</td>
</tr>
<tr>
<td></td>
<td>長期使用性</td>
<td>部品または製品にエコプラスチック※を使用し、且つ使用量を把握している。</td>
</tr>
<tr>
<td></td>
<td></td>
<td>※：再生プラ、エコポリカ(再生エコポリカ含む)等</td>
</tr>
<tr>
<td></td>
<td>マニュアル/包装材</td>
<td>製品にバイオプラスチック（PLA、非PLA含む）を使用している。</td>
</tr>
<tr>
<td></td>
<td>情報開示</td>
<td>お客様が確認し易い方法、分かり易い内容で、低消費電力モードや電力消費を抑えた使用の設定方法公開している。</td>
</tr>
<tr>
<td>他社優位性</td>
<td>製品環境情報の提供</td>
<td>Type II※1以外のエコラベル※2を取得している。</td>
</tr>
<tr>
<td></td>
<td></td>
<td>※1：各社独自の基準に適合する自己宣言型エコラベル。</td>
</tr>
<tr>
<td></td>
<td></td>
<td>※2：EPEAT、エコマーク、エコリーフ(日本)、ブルーエンジェル(ドイツ)、YOC(スウェーデン)など</td>
</tr>
<tr>
<td>項目</td>
<td>エコシンボルスター基準</td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>-----------------------------------------------------------------------------------</td>
<td></td>
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<tr>
<td></td>
<td>エコシンボルスター基準</td>
<td></td>
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<tr>
<td></td>
<td>ハード製品</td>
<td></td>
</tr>
<tr>
<td>気候変動対策</td>
<td>緩和策：CO2 削減率50%以上を達成（従来製品比）</td>
<td></td>
</tr>
<tr>
<td></td>
<td>または業界初の技術を導入</td>
<td></td>
</tr>
<tr>
<td></td>
<td>適応策：気候変動のもたらす8つのリスク※のうち、2つ以上のリスクに対応あるいは支援し被害あるいは損失等を軽減できるソリューション</td>
<td></td>
</tr>
<tr>
<td>資源循環</td>
<td>バイオプラスティックを80%以上使用（筐体プラスティック総重量比）</td>
<td></td>
</tr>
<tr>
<td></td>
<td>業界初などNECの独自技術を活用し環境負荷を低減</td>
<td></td>
</tr>
<tr>
<td></td>
<td>業界初の技術、または独自性かつ先進性あるシステムを導入</td>
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</tr>
<tr>
<td>評価</td>
<td>社外表彰を受賞</td>
<td></td>
</tr>
<tr>
<td></td>
<td>社内外で高い評価を得ている等</td>
<td></td>
</tr>
<tr>
<td></td>
<td>社内表彰を受賞</td>
<td></td>
</tr>
<tr>
<td>技術的優位性</td>
<td>NECの技術を似て圧倒的に環境負荷削減に貢献</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ソフトウェア／サービスの環境情報を公開</td>
<td></td>
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</tbody>
</table>
NEC Kobe Data Center Achieves Top-class Environmental Performance

The air conditioning system based on proprietary NEC technology achieves a top-class PUE of 1.18*.

Efficiency is improved further by using natural energy, demonstrating NEC's strength as a provider of climate change resilience solutions.

- Deploys high-density power saving micro modular servers.
- Server installation space within the machine room: 1/4
- Power consumption: 1/4
- Applies NEC's proprietary phase change cooling technology to the servers and the entire machine room.
- Power consumption of air conditioning system: Reduced by 40% (compared with conventional system)

* PUE (Power Usage Effectiveness): An index that indicates the data center's power efficiency. The PUE is calculated by dividing the power consumption of the entire data center by the number of IT devices in the center. The closer the PUE value is to 1.0, the higher the efficiency.
NEC's proprietary phase change cooling technology slashes power consumption by 40%.

- In addition to cooling the high-density power saving micro modular servers specialized for data centers, phase change cooling units are also deployed to cool the entire machine room.

**Method for cooling the entire cloud machine room**

- **Dry-coil**
- **Phase change cooling**
- **Fans**
- **Heat receiving section**
- **Heat**
- **Server racks (micro modular servers)**
- **Server racks (normal servers)**

**How phase change cooling units work**

- **Phase change cooling unit**
- **Radiator** (heat exchanger)
- **Gas** to **Liquid**
- **Rises due to buoyancy**
- **Falls due to gravity**
- **Heat**
- **Gas** to **Liquid**
- **Heat (after cooling)**
An energy-efficient eco data center that deploys new technologies

- A 50% reduction in air conditioning power consumption is achieved by employing **solar power generation and using cool air from underground**.
- An efficient, inexpensive, and stable 24-hour power supply is realized by using NEC’s **energy storage system**.

### Solar power generation and energy storage

- **Solar power generation**
  - Electricity

- **Energy storage system**
  - Electricity
  - Other purposes (lighting, etc.)

### Use of the cool air from underground

- **Cool air**
  - Gradual cooling over 60 minutes

- **Electric room**
  - Air conditioning power consumption reduced by 50%

- **Fan operation**
  - Fan

- **Outside air** (normal temperature)

- **Exhaust**
事業活動に伴うCO2排出量の削減の考え方

サプライチェーン全体でのCO2排出削減への考慮が必要
Calculating the base unit in terms of flood damage

Providing value through the Reverse Osmosis Type 2 Water Purification Set

Distributing this water purification set enables access to potable water and water for medical and domestic purposes in the event of a disaster that cripples the water infrastructure.

- Assumption:
  - Provides 70 m$^3$/day (capacity) x 7 days per disaster
  - Value of potable water = 100 yen/liter

- Value (damage reduction) = 490 m$^3$ x 100 yen/liter = 49 million yen
- Value (CO$_2$ reduction) = 49 x 1.061 = 52 kilotons/set

* The coefficient is calculated from the increase from (1875 to 1941) to (1945 to 2008)

Increase in CO$_2$ emissions + 706.7 Mt - CO$_2$

Flood damage increase + 666.1 billion yen

\[ \frac{706.72 \text{ million tons-CO}_2}{666.11 \text{ million yen}} = 1.061 \text{ kg-CO}_2/\text{yen} \]

Standard coefficient for flood damage
(calculated for each disaster where data is available)
Orchestrating a brighter world

NEC