

Green IT Initiative as a policy to provide a solution

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Current Status of the Global Environmental Issue and Measures for Improvement

- Problems concerning the environment and energy limitations, including global warming, are top priority issues that need to be examined from medium and long-term perspectives by countries around the world, with a major focus on technological innovation.
- Various measures are being implemented, including voluntary action plans by Japanese industries, to achieve the Kyoto Protocol target of reducing greenhouse gases by 6%.
- Active discussion has been held at various meetings, including the COP, G8 summits and United Nations sessions, with the aim of establishing a framework to succeed the Kyoto Protocol (post-Kyoto framework).
- At the Heiligendamm Summit held in June this year, Japan proposed to reduce CO₂ emissions at least by half by 2050.

○ Promotion of measures for achieving the Kyoto Protocol target of reducing greenhouse gases by 6%

- The emission of greenhouse gases in Japan amounted to 1.36 billion tons in 2005, up by 7.8% from the reference year.
- Additional programs were reviewed, including improving voluntary action plans by Japanese industries (such as raising the level of goals and expanding the scope of programs).

○ Proposal of the “Beautiful Star 50”

[Proposal of a long-term strategy for reducing global emissions]

- A long-term vision for reducing the current global emissions by half by 2050 and the development of technologies designed to achieve that goal Examination of “Cool Earth: Energy Innovation Technology Plan”

[Proposal of the “Three Principles” for establishing an international framework subsequent to 2013]

- Three Principles: ① participation by major green house gas (GHG) emitting countries, ② flexible and diversified framework tailored to the circumstances of individual countries, and ③ energy saving aimed at environmental protection and economic development at the same time
- Programs for improving energy efficiency

[Development of a national movement aimed at achieving the Kyoto Protocol goal]

○ Many IT-related corporations in overseas countries, such as Google, Sun, and IBM, are facing a serious problem concerning power consumption for IT devices, including those used by data centers.



- Google, which has approximately 450,000 servers, * is estimated to be using more than 1 billion kWh per year (about one-thousandth of the amount of electricity annually generated in Japan) for its data centers alone.
- Google is building new data centers near hydraulic power plants in order to reduce power loss.

* See *Estimating total power consumption by servers in the U.S. and the world*



- Sun's Colorado Office, which consumes electricity nearly four times as much as other buildings, is by far the largest power consumer in the area.
- Sun developed an energy-saving server system contained in a container to reduce energy consumption by data centers. It has spent 45 billion yen in collaboration with 11 IT-related corporations in Japan to launch a project aimed at saving energy and ensuring security at the same time by installing the system in a subterranean space 100 meters underground.



- IBM data centers are among the largest data centers in the world, with a total area of 720,000 m² (55 times the area of the Tokyo Dome).
- IBM has launched Project Big Green, spending 1 billion dollars a year, with the aim of reducing the total power consumption of data centers by 40%. IBM's own data centers will reduce their consumption by more than 5 billion kWh per year.

○ Various attempts to reduce environmental loads by using IT and electronics.

(Examples)

Production activities

- A 12% reduction in energy consumption required for the manufacture of automobiles, achieved by using a system that synchronizes operations of machines and peripheral facilities (Automaker A)
- A reduction of about 20% in energy consumption, achieved by the real-time optimization of controls of the operation system of an oil refinery (Petrochemical manufacturer B)

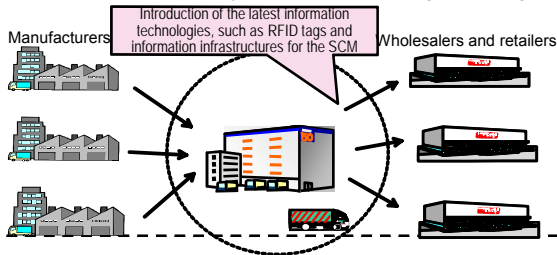
Utilization (business)

- A reduction of more than 40% of the maximum of power consumption, achieved by the unified management and optimally coordinated operation of freezers and air conditioners at supermarkets and other stores (Electric manufacturer C)
- A 35% reduction of energy consumption, achieved by controlling air conditioners of air terminal buildings in line with flights by gate (Airport D)

Distribution and transportation

- A reduction of about 5% in energy consumption* made possible through unified management based on the SCM using technologies such as radio frequency identification (RFID), and allocation of vehicles through the most efficient routes

* Field experiments on the efficiency of distribution using RFID tags



Utilization (home)

- Promoting energy saving in homes using the world's highest-level energy-saving technologies



LCD and plasma TVs

Reduction by more than 30% in three years



Refrigerators

Reduction by 50% in ten years



Air conditioners

Reduction by 40% in ten years

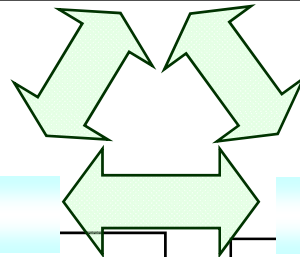
Summary of Green IT Initiative

- The Green IT Initiative is being developed to create a 21st-century society where “environmental protection and economic growth are compatible” and to make changes in every aspect of production, society, and national life using technologies for “manufacturing” and for the “environment and energy saving,” in which Japan has a high level of proficiency.

Enhancement of the collaboration of industry, academia, and government

- Examination of how to create opportunities for enhancing the collaboration of industry, academia, and government
(Green IT Promotion Council (tentative name))

(Opportunities for enhancing the partnership between IT and electronics-related industries (manufacturers, users, and business organizations), research organizations, universities, and the government)



Government initiatives

- Breakthroughs by innovative technologies
 - Promotion of the “Green IT Project”
 - Development of cutting-edge energy-saving technologies, such as semiconductors and displays
- Education and promotion of environmental management and IT management
- Visualization of environmental contributions of IT to society as a whole

International leadership

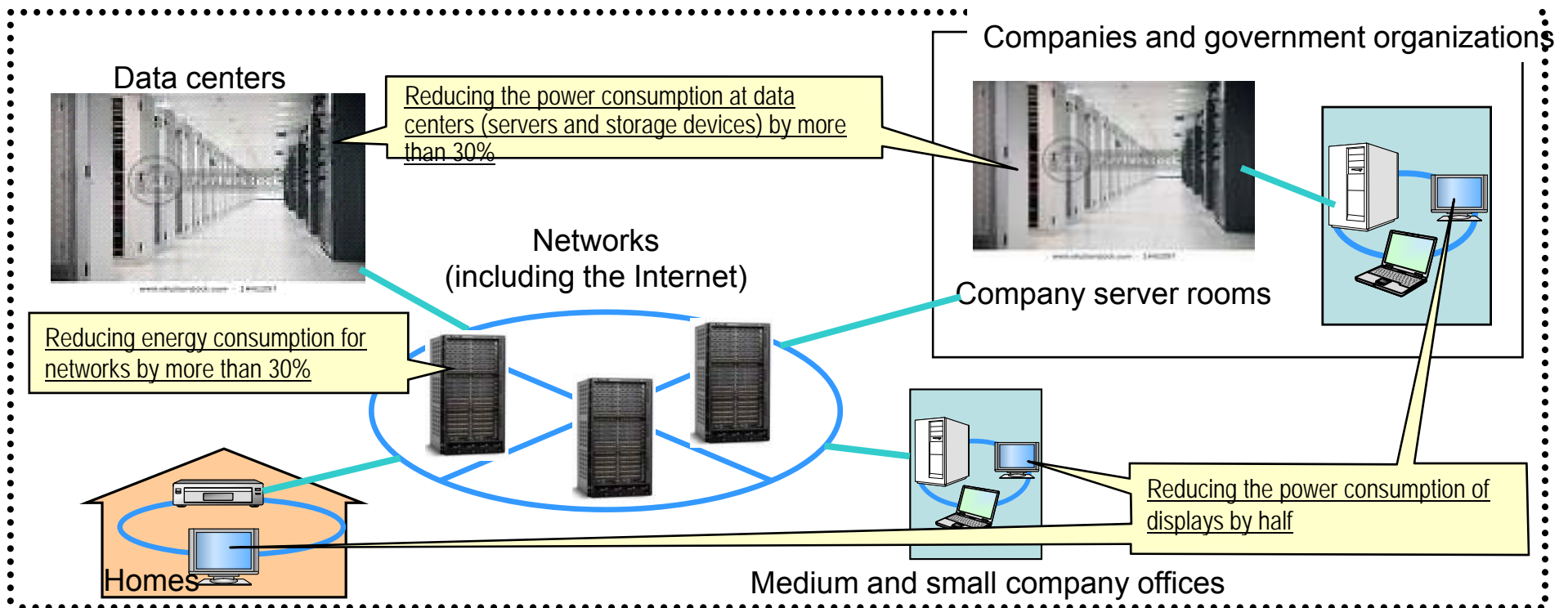
- “Green IT International Symposium”
- Collaboration with overseas organizations
(Collaboration with the -World Semiconductor Council (WSC) and overseas forums (such as the Green Grid and Climate Savers, etc.))

Major R&D Projects for Innovative Technology

- The development of advanced energy-saving technologies, such as semiconductors and display technologies, has been supported by the collaboration of industry, academia, and government.
- In addition to existing programs, the "Green IT Project" will be started to develop innovative information technologies based on medium and long-term perspectives (budget requested for fiscal 2008: 3 billion yen).

Green IT Project

Development of innovative technologies to achieve a drastic reduction of energy consumption for entire network systems including data centers, in addition to saving energy for IT devices

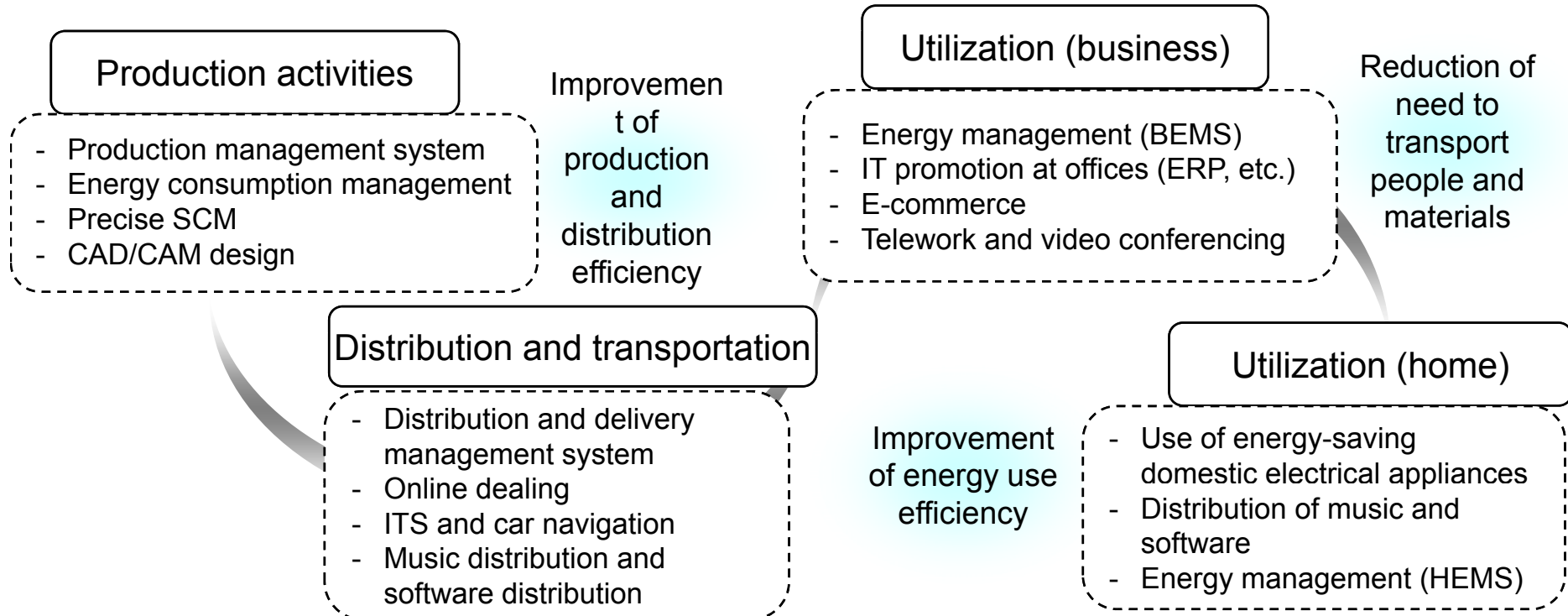
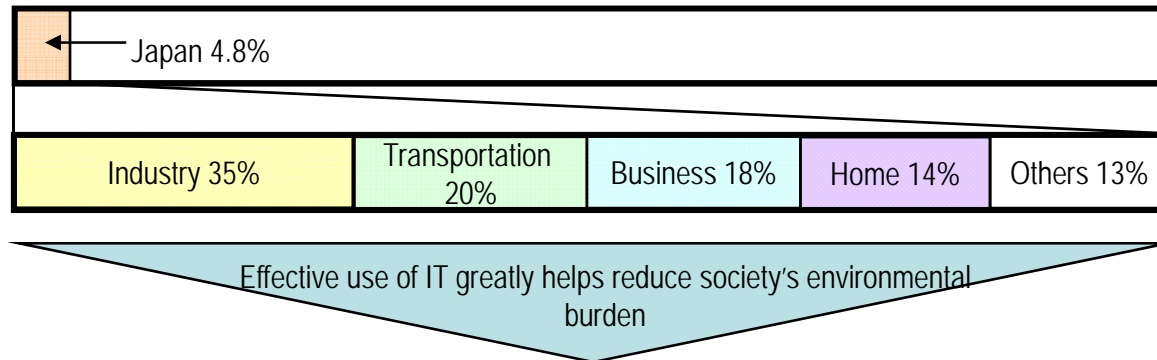


Positive Impact on environment of Effective Use of IT

Information technologies are actively used in quite a large number of fields including industry, transportation, business, and homes and greatly help reduce the environmental burden by improving the operational efficiency of those fields.

Worldwide: About 26.5 billion tons of CO₂

In Japan: About 1.29 billion tons of CO₂

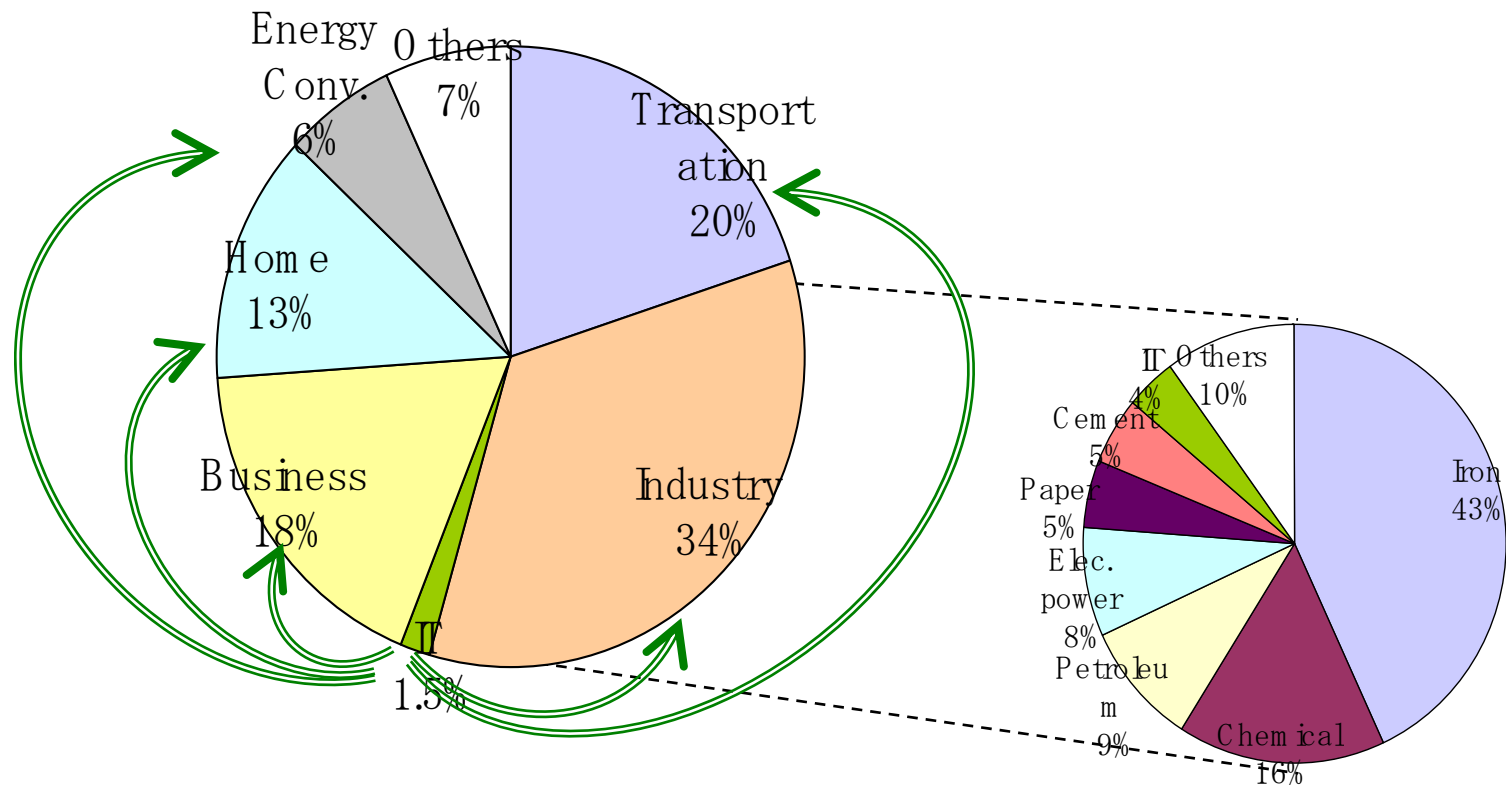


- IT is more contributor than polluter.

- CO2 emission by IT industry is only 4% of that of Industry as a whole, or 1.5% of that of whole Japan. However, IT contributes to reduction of emissions of other industries, civil use (business and home) and transportation.

Total CO2 emissions of Japan in each sector

1.3 billion t



Challenge: 3 trade-offs

	Ecology	VS	Economy
Consumer (Demand Side)	① Desire for more energy-conserving products		Expensive
Producers (Supply Side)	② Introduction of technology to reduce the Carbon Footprint (products, processes) ③ More sales in environment-friendly products or services while overcoming ①②		Costful (Uneasy to sell or negative profit) More production leads to more CO2 emission, resulting in negative reputation or more cost

Case 1 Mechanism to encourage environmentally friendly business activities

Production Item: Air conditioner

Last Year	Current Year
<p>Company A</p> <p>Production: 1 million units</p> <p>CO2 Emissions</p> <p>Production process: 100kt-CO2</p> <p>Operation process in homes: 300kt-CO2</p>	<p>Production: 500 thousand units</p> <p>Decrease in production by 500 thousand units affected by the boom of energy-saving air conditioner.</p> <p>CO2 Emissions</p> <p>Production process: 50kt-CO2</p> <p>Operation process: 150kt-CO2</p>
<p>Company B</p> <p>Production: 1 million units</p> <p>CO2 Emissions</p> <p>Production process: 100kt-CO2</p> <p>Operation process: 300kt-CO2</p>	<p>Production: 1.5 million units</p> <p>Increase in production by 500 thousand units with launching of energy-saving air conditioner which halves CO2 emissions</p> <p>CO2 Emissions</p> <p>Production process: 150kt-CO2</p> <p>Operation process: 225kt-CO2</p>
<p>Total</p> <p>Production: 2 million units</p> <p>Production process: 200kt-CO2</p> <p>Operation process: 600kt-CO2</p>	<p>Total</p> <p>Production: 2 million units</p> <p>Production process: 200kt-CO2</p> <p>Operation process: 375kt-CO2</p>

Point 1

Point 2

Point 1 Should Company B need to buy emission credit from Company A?

Point 2 Is this reduction in CO2 emission allowed to be used by Company B as a credit?

Case 2

Mechanism to prevent a negative impact on leakage to foreign countries

Production Item: Air conditioner

Last Year	Current Year
<p>Company A</p> <p>Production: 1 million units</p> <p>CO2 Emissions</p> <p>Production process: 100kt-CO2</p> <p>Operation process in homes: 300kt-CO2</p>	<p>Production: 500 thousand units</p> <p>Decrease in production by 500 thousand units affected by the boom of energy-saving air conditioner.</p> <p>CO2 Emissions</p> <p>Production process: 50kt-CO2</p> <p>Use in homes: 150kt-CO2</p>
<p>Company B</p> <p>Production: 1 million units</p> <p>CO2 Emissions</p> <p>Production process: 100kt-CO2</p> <p>Operation process: 300kt-CO2</p>	<p>Production: 1.5 million units</p> <p>Increase in production by 500 thousand units through the introduction of energy-saving air conditioner, but the additional production is done in low-efficiency overseas factory.</p> <p>CO2 Emissions</p> <p>Production(domestic): 100kt-CO2</p> <p>(overseas): 80kt-CO2</p> <p>Operation process: 225kt-CO2</p>
<p>Total</p> <p>Production: 2 million units</p> <p>Production process: 200kt-CO2</p> <p>Operation process: 600kt-CO2</p>	<p>Total</p> <p>Production: 2 million units</p> <p>Production process: 230kt-CO2</p> <p>Operation process: 375kt-CO2</p>

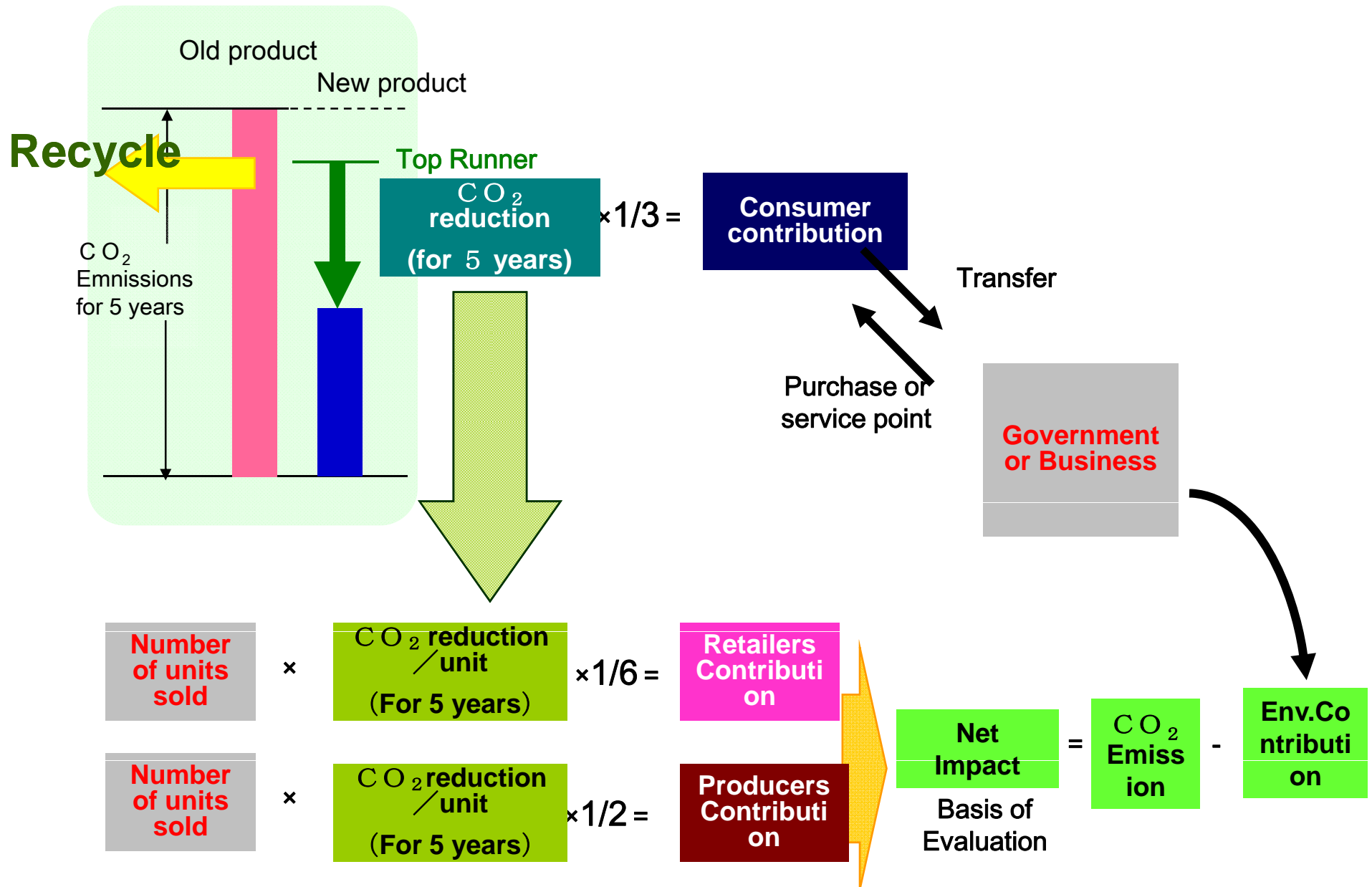
Point 3

Point 3

Point 3

Is the effect of highly efficient domestic production available as emission credit?
 Is the influence of Company B's emission of Company B by shifting production overseas regarded as discredit?
 Is it reasonable to levy taxation on import caused by transfer of production basis to a low-efficiency overseas factory?

- new mechanism to be considered



Measurement of Contribution

① Focus more on the reduction of CO2 emission rather than on total amount of CO2 emission
= Approach based on efficiency

② Pay attention to the total sum of each contribution as is represented in the following formula in every stage of the company's whole supply chain

$$\begin{array}{|c|} \hline \text{Efficiency} \\ \hline \text{Ration} \\ \hline \end{array} \times \begin{array}{|c|} \hline \text{Number of} \\ \hline \text{sales} \\ \hline \end{array} \times \begin{array}{|c|} \hline \text{Contribution} \\ \hline \text{Ratio} \\ \hline \end{array} = \begin{array}{|c|} \hline \text{Environmental} \\ \hline \text{Contribution} \\ \hline \end{array}$$

- ③ Efficiency Ratio is measured by the amount of CO2 emission reduced by the products/activities over the original emission without them
It is realistic to start from some final products whose efficiency is clearly defined in some system like top runner criteria
- ④ Contribution Ratio is decided by how deeply the company was involved in the final output. It is shared by supplier of components, final producers, distributors and consumers.

Merits of the new system ~ From Trade-offs to Compatibility ~

	Current Status		→	Merit of New System
	Ecology	VS		Ecology + Economy
Consumer (Demand side)	① Desire for energy-conserving products	Expensive		Decrease in substantial price
Producers (Supply side)	② Introduction of technology to reduce carbon Footprint (Products, Processes)	Costful (Uneasy to sell or negative profit)		Decrease in substantial cost or rooms for raising price
	③ More sales in environment-friendly products or services while overcoming ①②	More production → more CO2 emission → negative reputation or more cost		Decrease in net environmental burden → improve reputation and economic benefit

Many aspects to be considered as environmental contribution of IT-related Companies

