AIM/Material Japan
Activities in 2002

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Progresses of AIM/Material in FY2002

- **Structure (AIM/Material Japan)**
  - **Waste from stock and reuse : with Ms. Miyashita (TIT)**
  - **Reproduction of detailed waste flow**
- **Simulation (AIM/Material Japan)**
  - **Reform of taxation in Japan**
  - **Simulation of environmental policies**
- **Others: with Dr. Rana & Dr. Yang**
  - **Simple AIM/Material (for India Workshop)**
  - **Comparison analysis (India & China, not yet completed)**
  - **Introduction of natural assets: with Ms. Suwa (TIT)**

Background of AIM/Material

- **Various environmental problems should be solved simultaneously.**
  - **CO_2 reduction, solid waste management, air pollution, water management, ...**
  - **These problems ... trade-off/independent/concurrent**
- **Various environmental protection activities can be projected.**
  - **Which is the most effective?**
  - **How much are direct/indirect impacts to economy and other environment?**

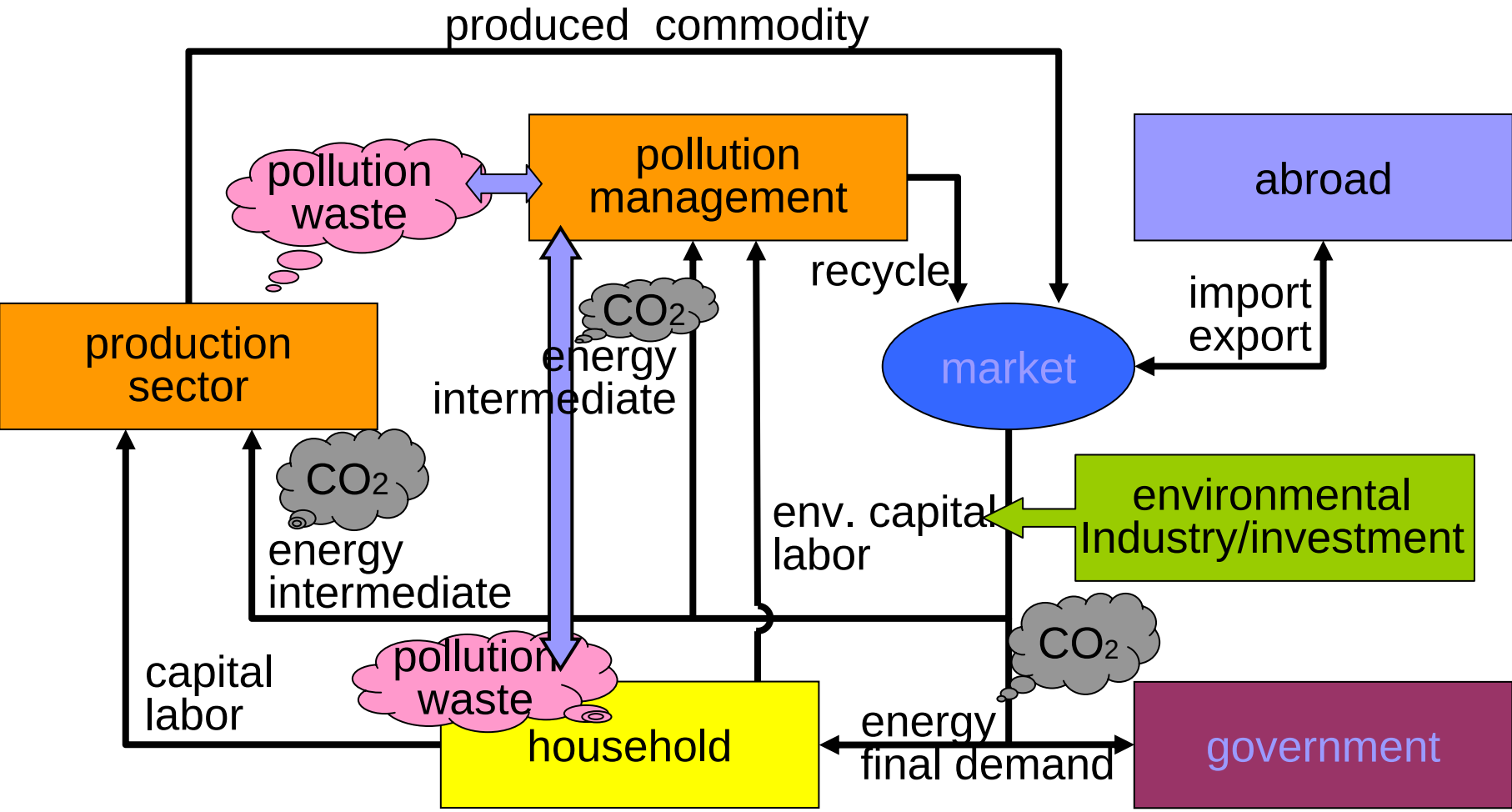
➜ **Quantification of benefits from environmental policies including environmental industry/investment by using environment-economy (AIM/Material) model**

  - **CO_2 reduction and solid waste reduction**

Overview of AIM/Material Japan

- Computable general equilibrium model
- Japan
- 1995 to 2010, year by year (recursive dynamic)
- 41 sectors and 49 commodities
- 18 waste types of industrial waste and 8 types of municipal waste
- Environmental industry and environmental investment
- Keep economic balance and material balance
- Environmental constraints
  - CO_2 emissions reduction based on Kyoto Protocol
  - Reduction in quantity of final disposal of solid waste to half 2010/1997 proposed by government

Basic structure of AIM/Material



Progress in structure: (1) Waste from stock and reuse

Purpose

- **Direct reuse of waste is effective environmental policy or not?**
  - **It seems to be effective to solve waste issues.**
  - **But, it seems to delay energy efficiency improvement.**
- **In order to answer this question, following module is developed and integrated with AIM/Material**

  production/consumption (AIM/Material)

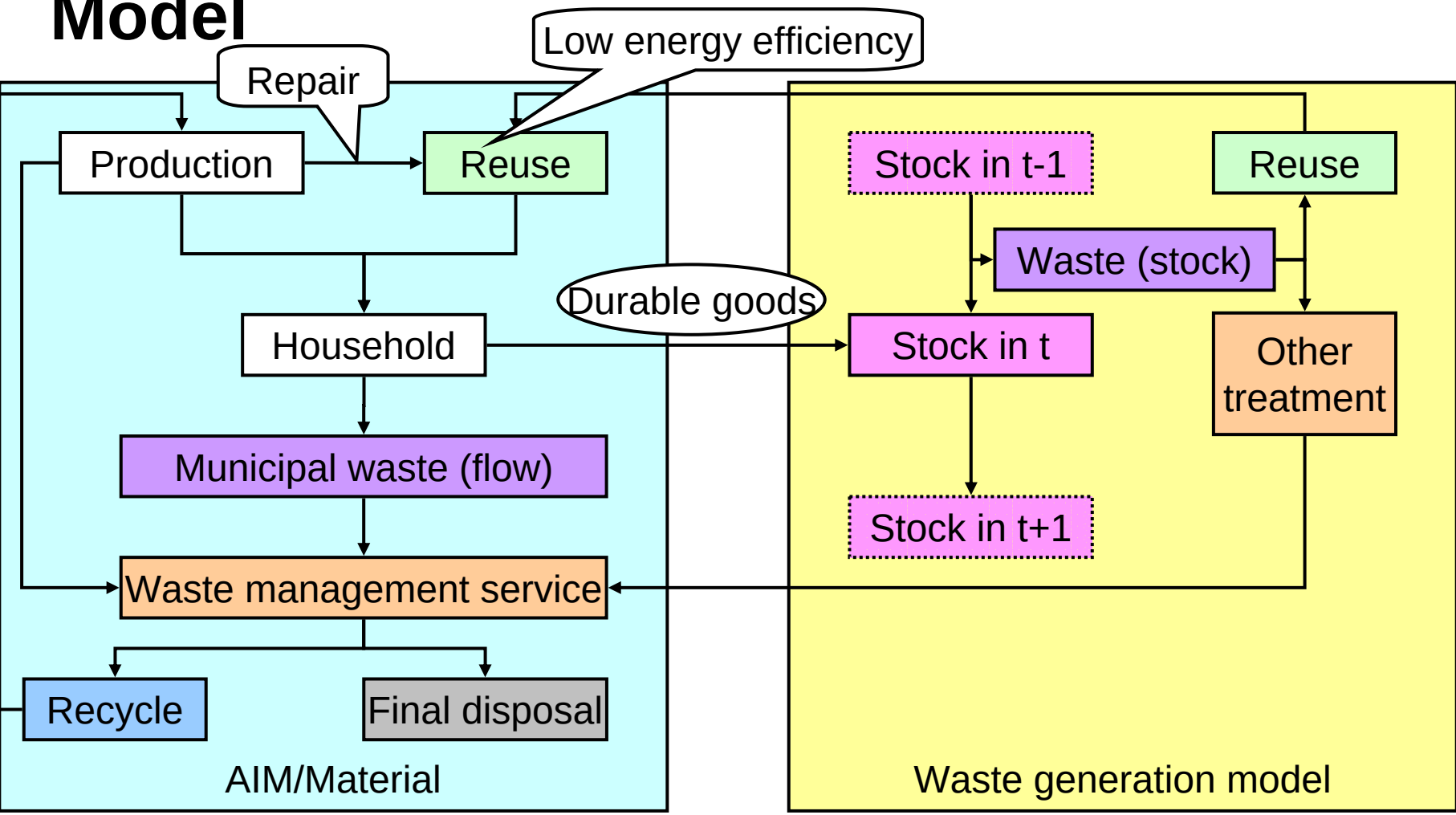
  ➔ stock (durable goods)

  ➔ waste (Weibull distribution)

  ➔ reuse / treatment

Progress in structure: (1) Waste from stock and reuse

Model



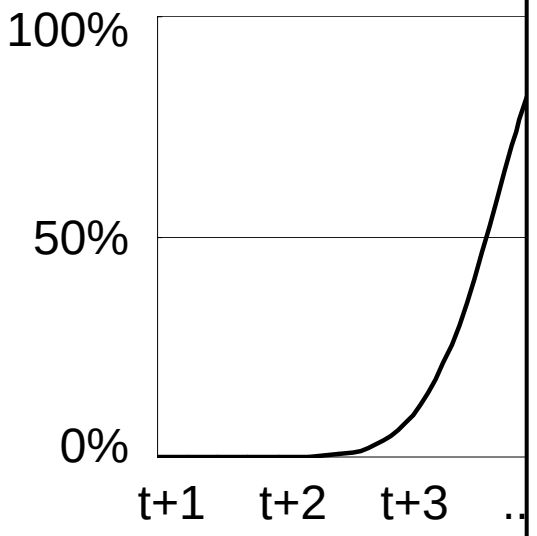
Progress in structure: (1) Waste from stock and reuse

Waste generation model

Total disposal rate:

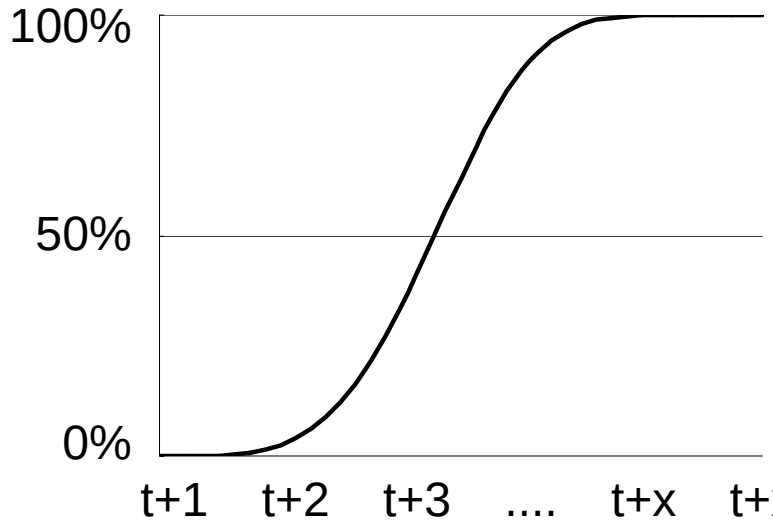
$$F(t) = 1 - \left\{ -\left(\frac{t}{\beta} \right)^{\alpha} \right\}$$

total disposal rate: Weibull distrib



equipment i consumed in t=t+1

total disposal rate: Weibull distribution



equipment j consumed in t=t+1 x=durable years

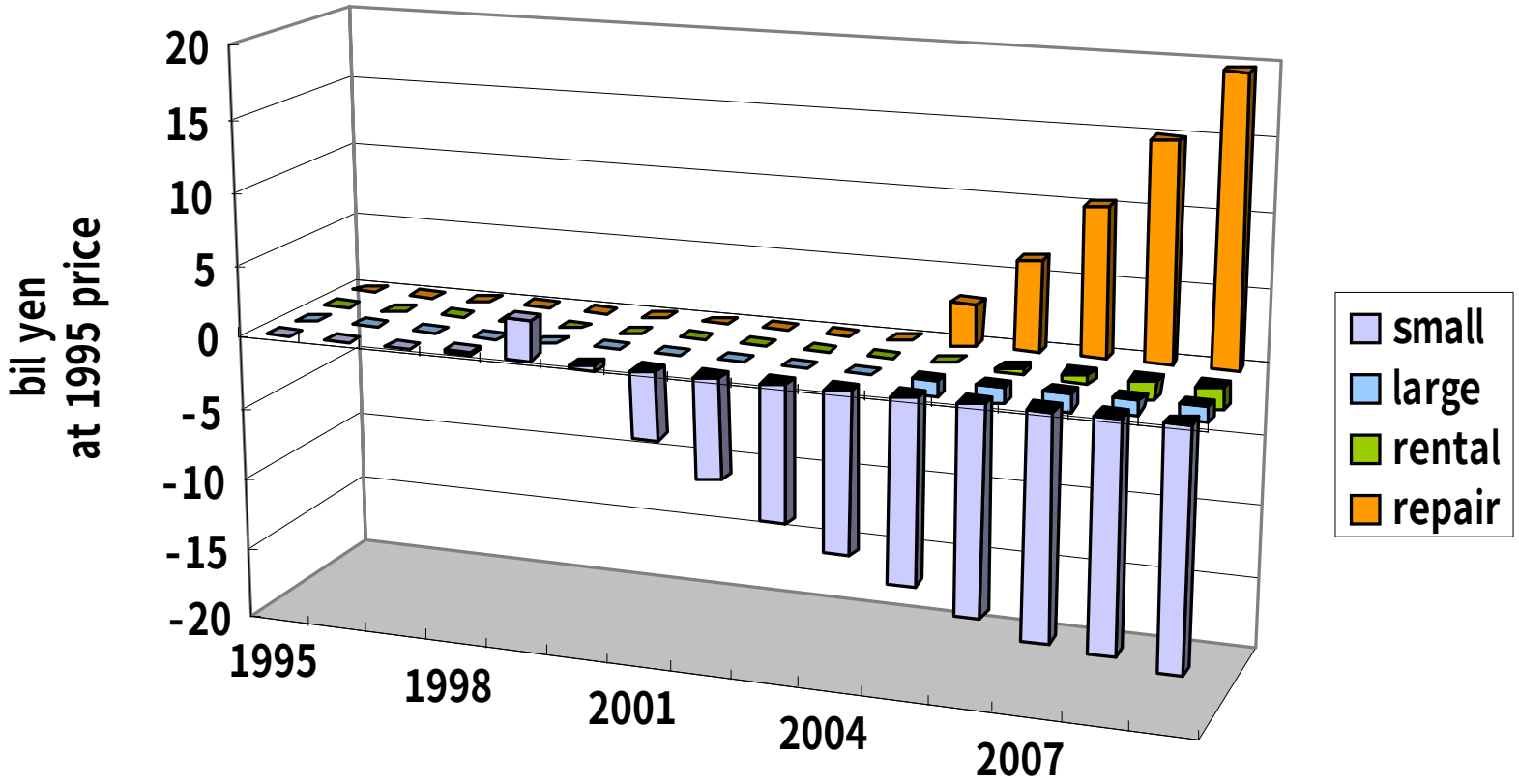
Progress in structure: (1) Waste from stock and reuse

Scenarios

- **Reference case**
- **Reuse promotion scenarios**
  - **promotion of reuse in household**
    small scale expansion of reuse
  - **expansion of reuse in government**
    large scale expansion of reuse
  - **expansion of rental service**
  - **reduction of repair cost**

Progress in structure: (1) Waste from stock and reuse

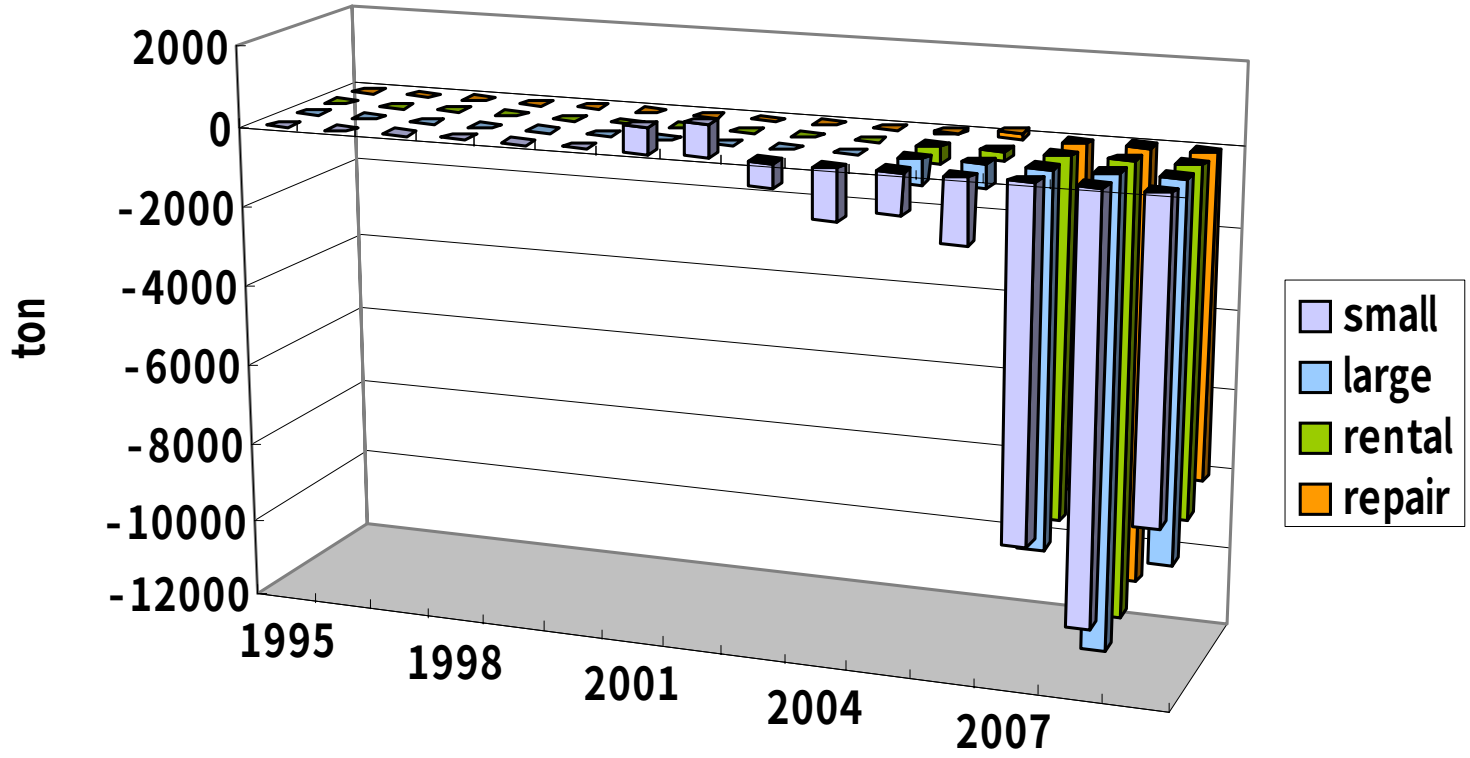
Simulation results: GDP change



Progress in structure: (1) Waste from stock and reuse

Simulation results:

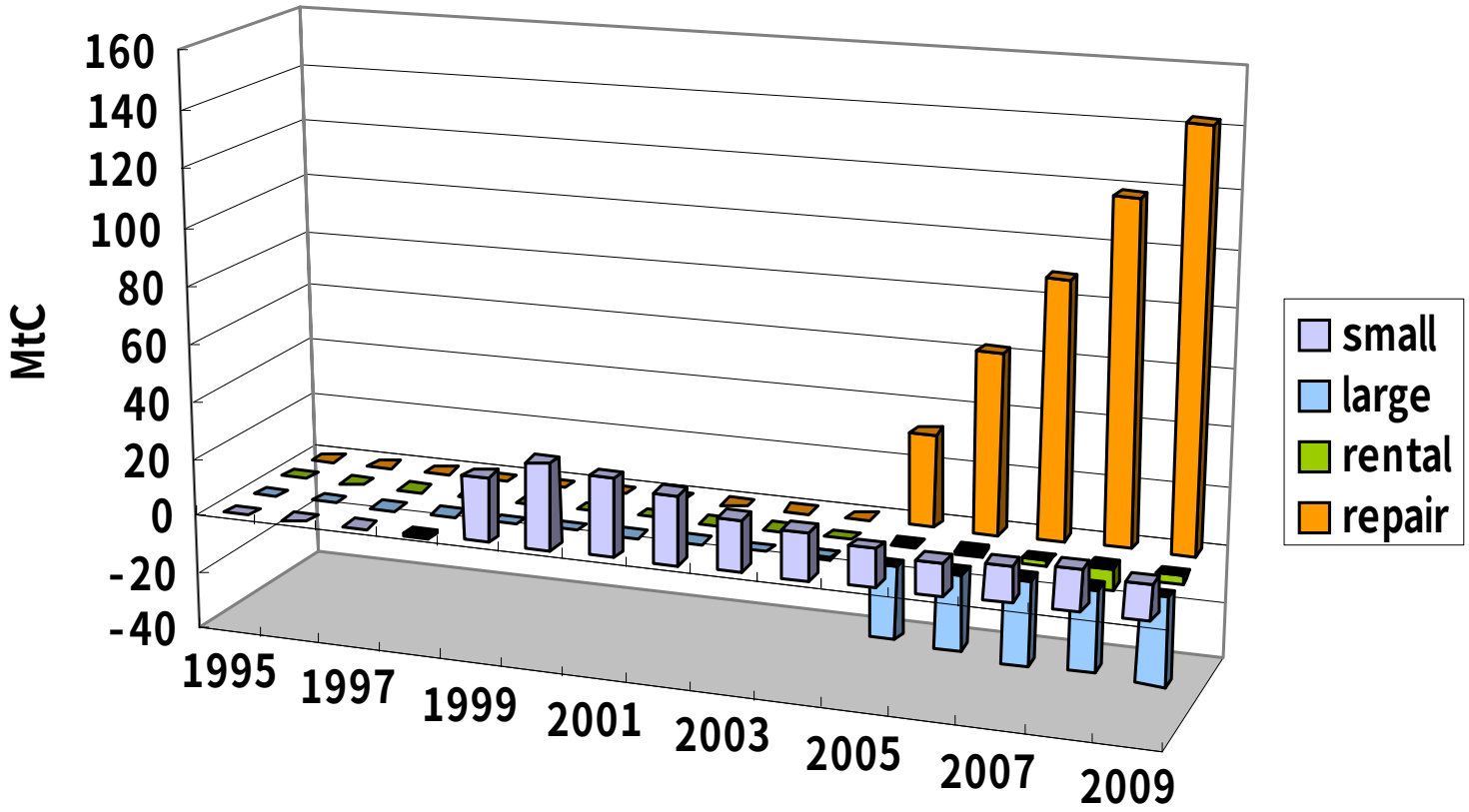
Municipal waste disposal change



Progress in structure: (1) Waste from stock and reuse

Simulation results:

CO_2 emission change

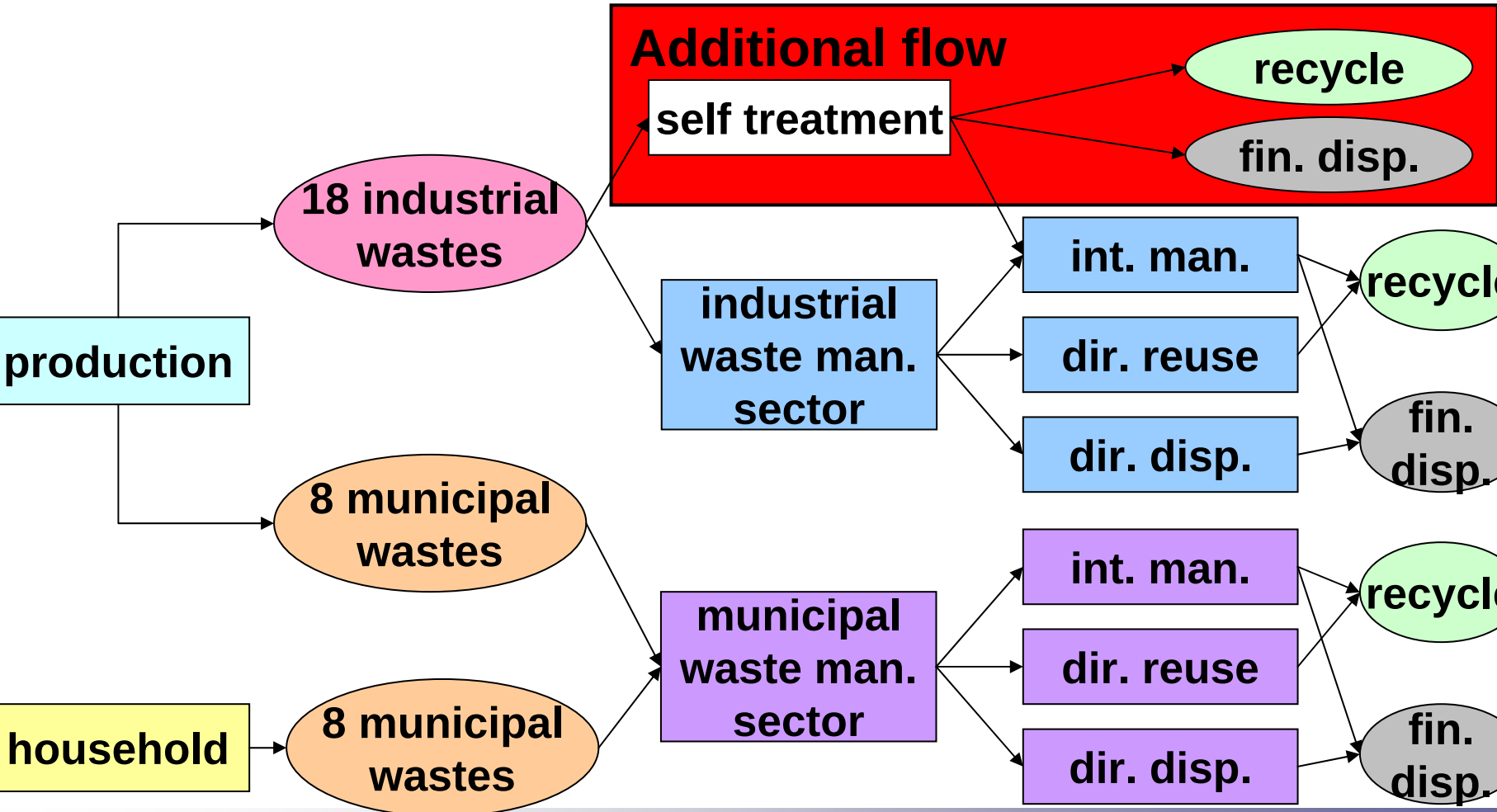


Progress in structure: (1) Waste from stock and reuse

Messages from simulation

- **Expansion of reuse will make quantity of municipal final disposal decrease.**
- **CO_2 will increase in small expansion of reuse, because reuse delay energy efficiency improvement.**
- **On the other hand, CO_2 will decrease in large amount of reuse, because economic structure itself will shift from manufacture to service industry such as repair.**
- **Please contact Ms. Miyashita for more detail!**

Progress in structure :
(2) Reproduction of detailed waste flow



Simulations :(1) Taxation reform in Japan

Outline

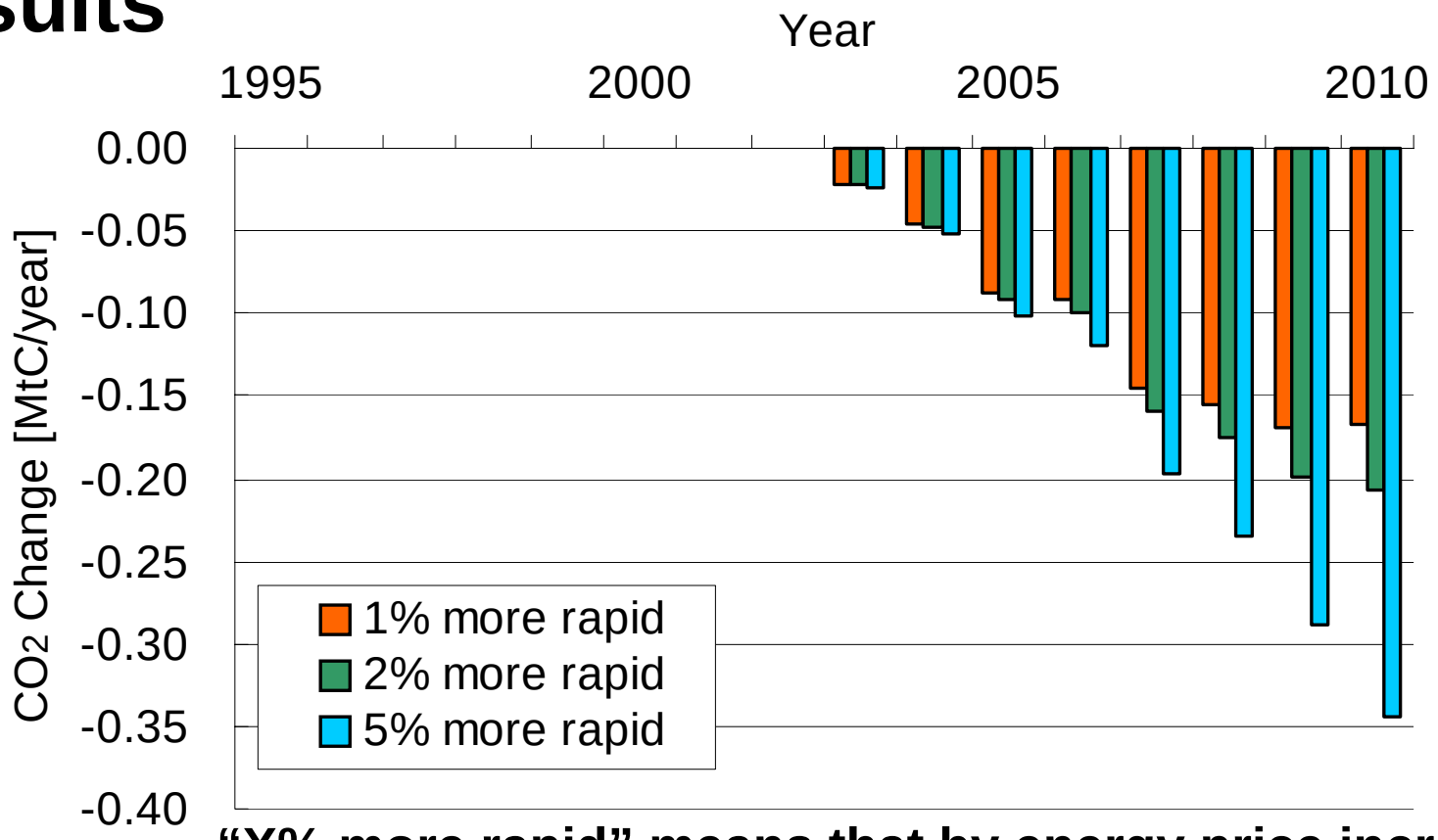
- **From 2003, taxation to energy will be reformed as follows;**

Energy [present] → [in 2007] (increase of carbon price)

- **Steam coal: 0 → 700 ¥/ton (1065 ¥/tC)**
- **Natural gas: 720 → 1080 ¥/ton (490 ¥/tC)**
- **LPG: 670 → 1080 ¥/ton (500 ¥/tC)**
- **Electricity: 0.445 → 0.375 ¥/kWh**

Simulations :(1) Taxation reform in Japan

Results



“X% more rapid” means that by energy price increase, the related energy efficiency in new capital is changed from α%/year to α(1+X/100)%/year.

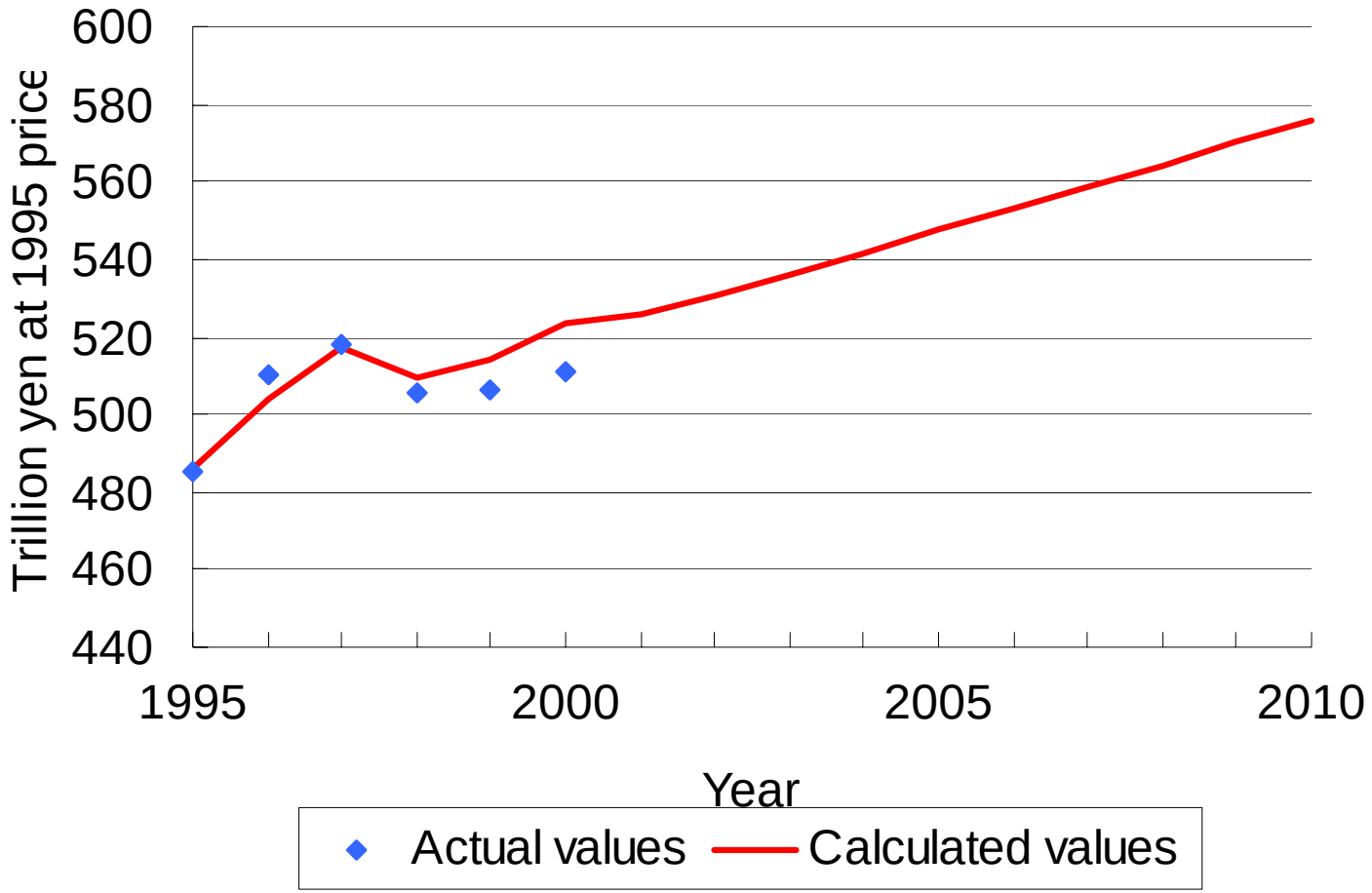
Simulations :(2) Simulation of environmental policies

Outline

- **Environmental constraints will decrease economic activity.**
  - **CO_2 reduction and solid waste disposal reduction**
- **Appropriate environmental policy will recover economic losses.**
  - **environmental investment, technology change, taxation reform, preference change**

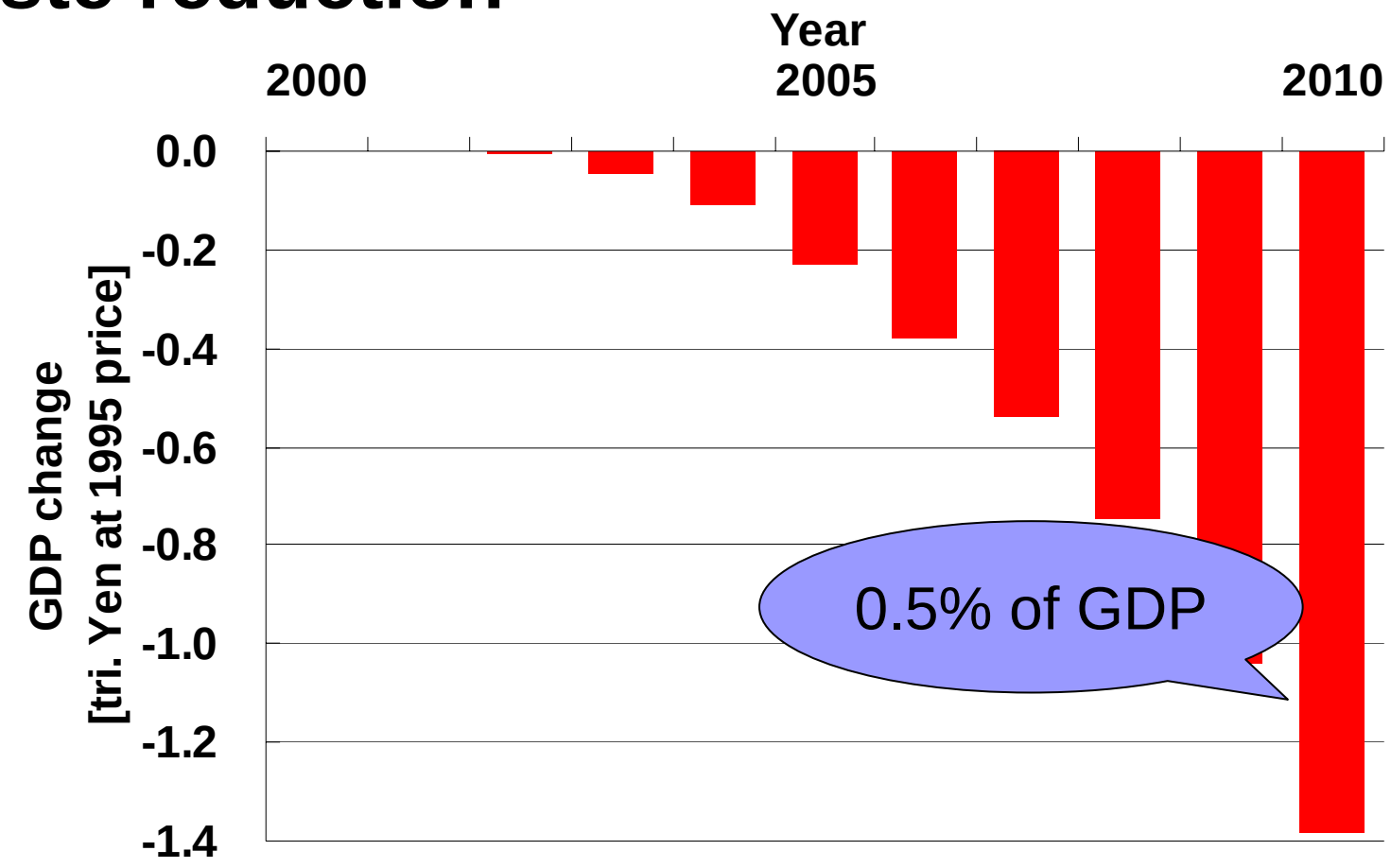
Simulations :(2) Simulation of environmental policies

Result: GDP in reference case



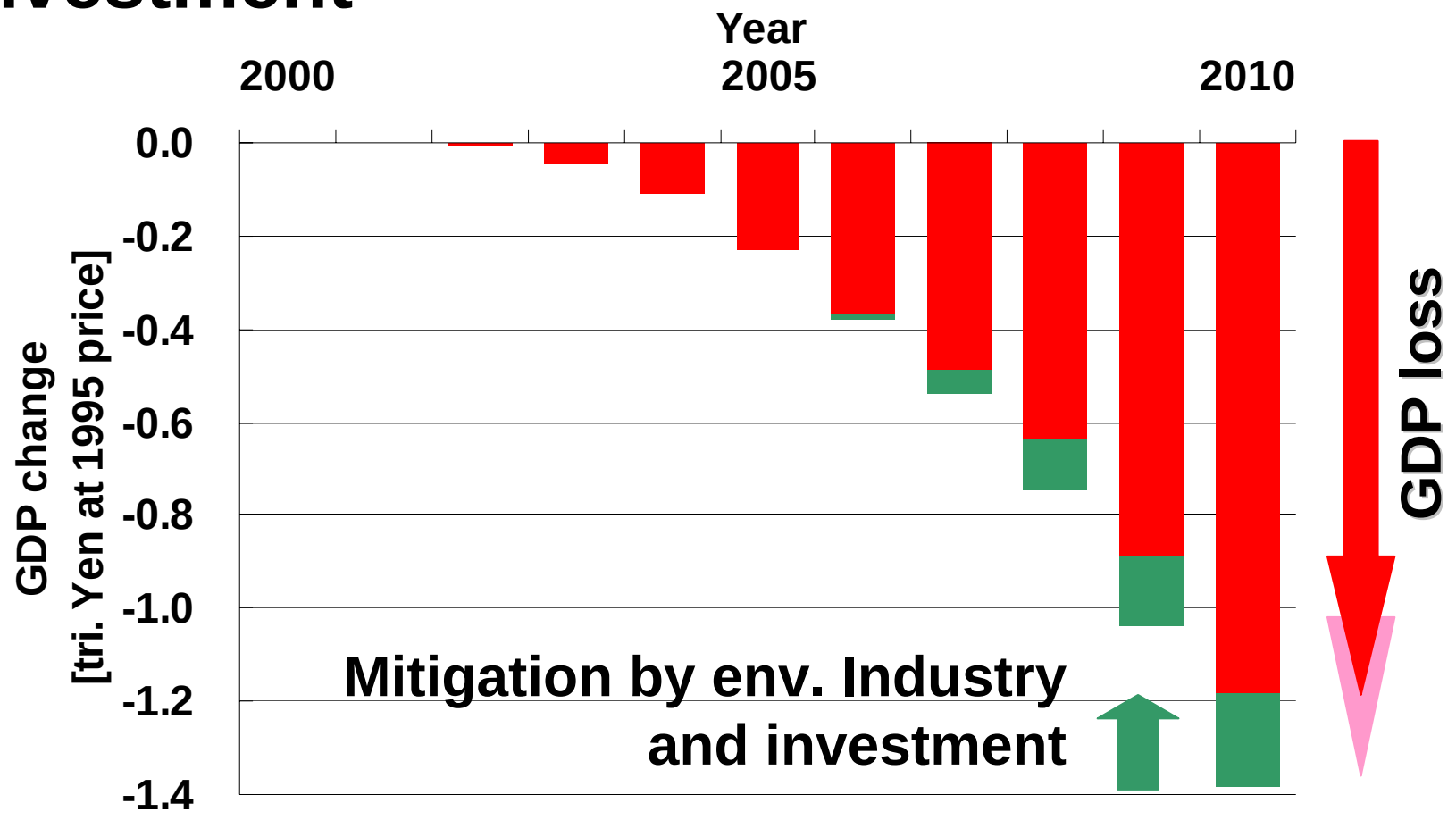
Simulations :(2) Simulation of environmental policies

Result: GDP loss by CO_2 and final disposal waste reduction



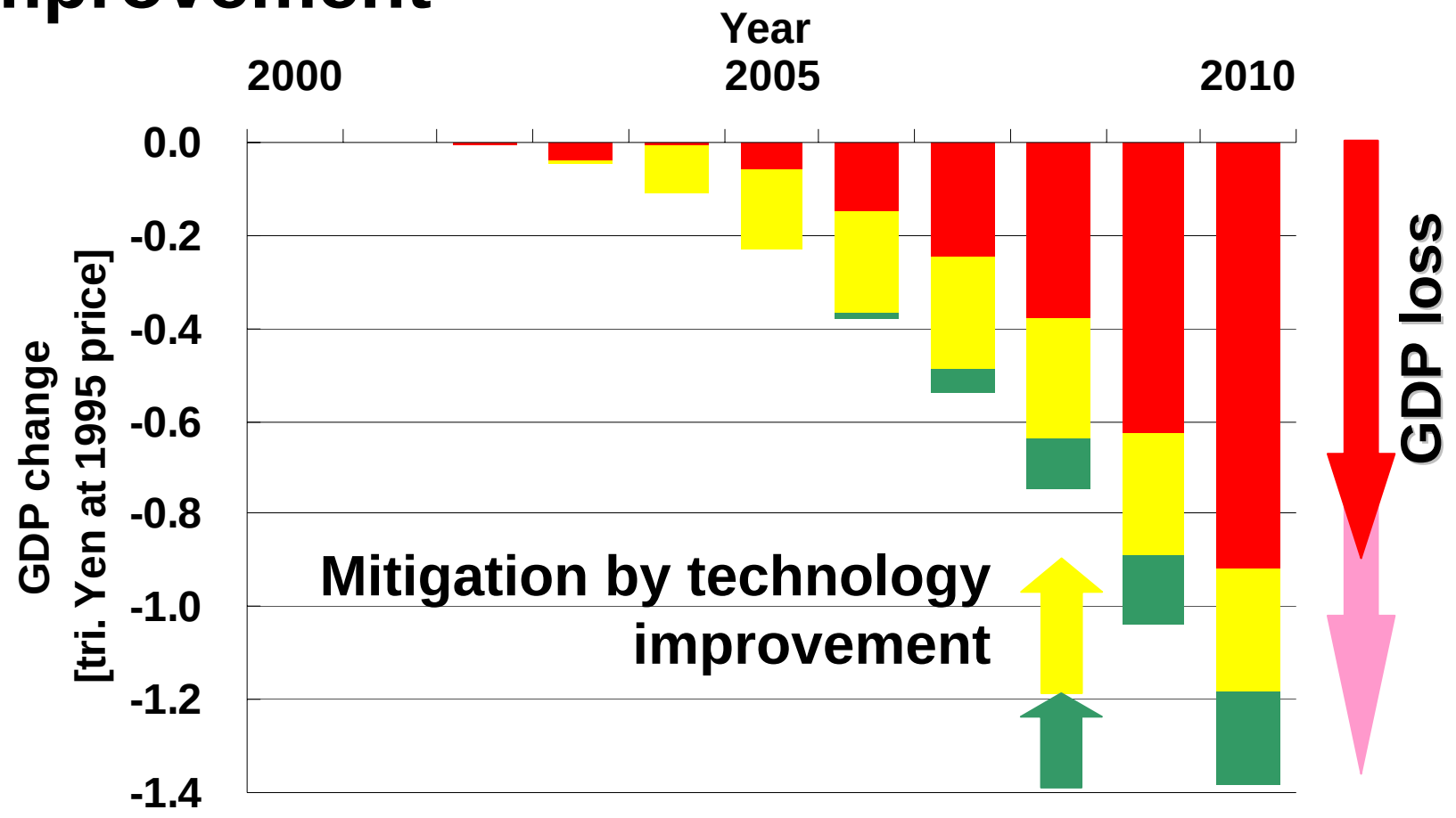
Simulations :(2) Simulation of environmental policies

Result: GDP recovery by environmental investment



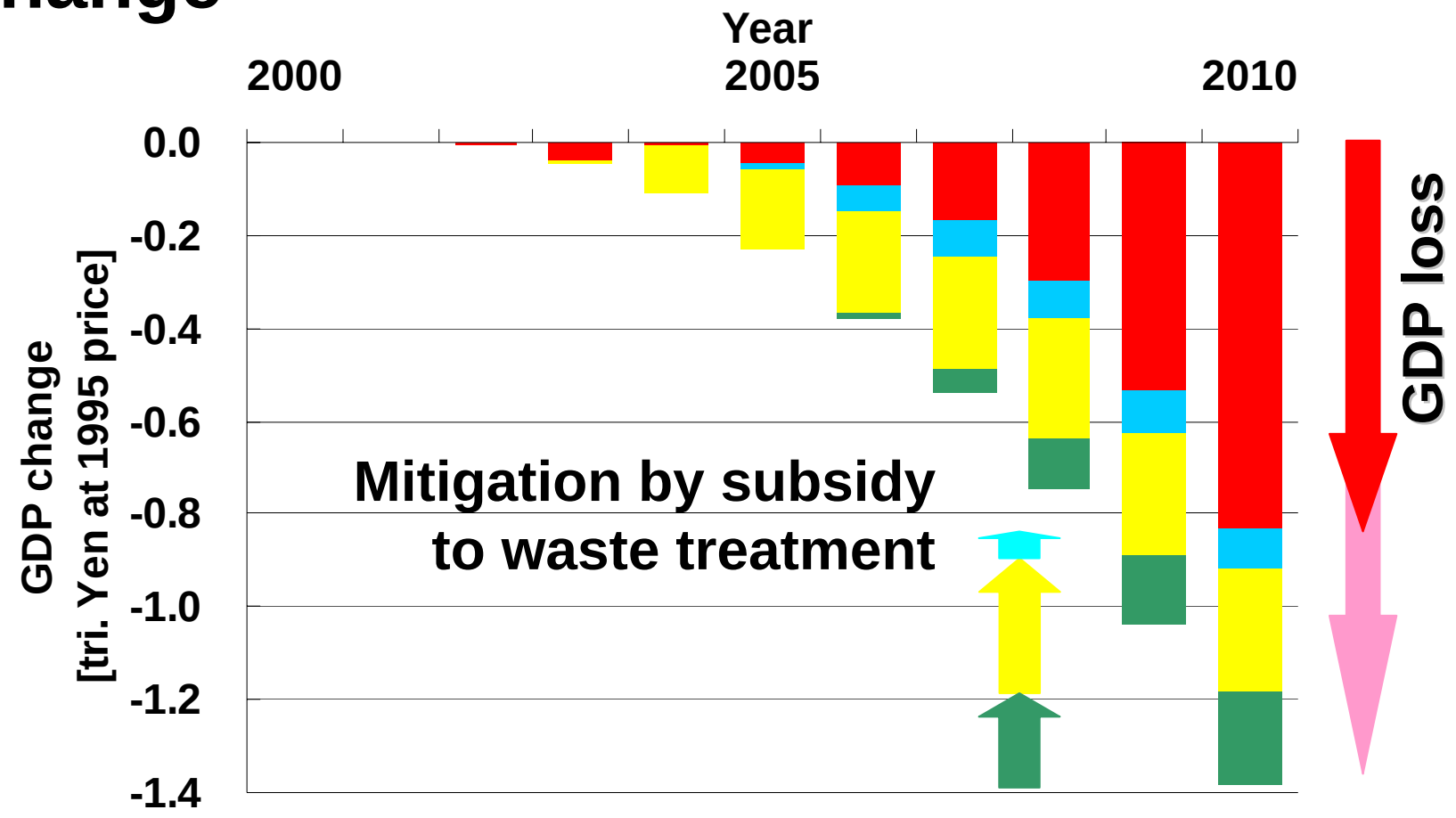
Simulations :(2) Simulation of environmental policies

Result: GDP recovery by technology improvement



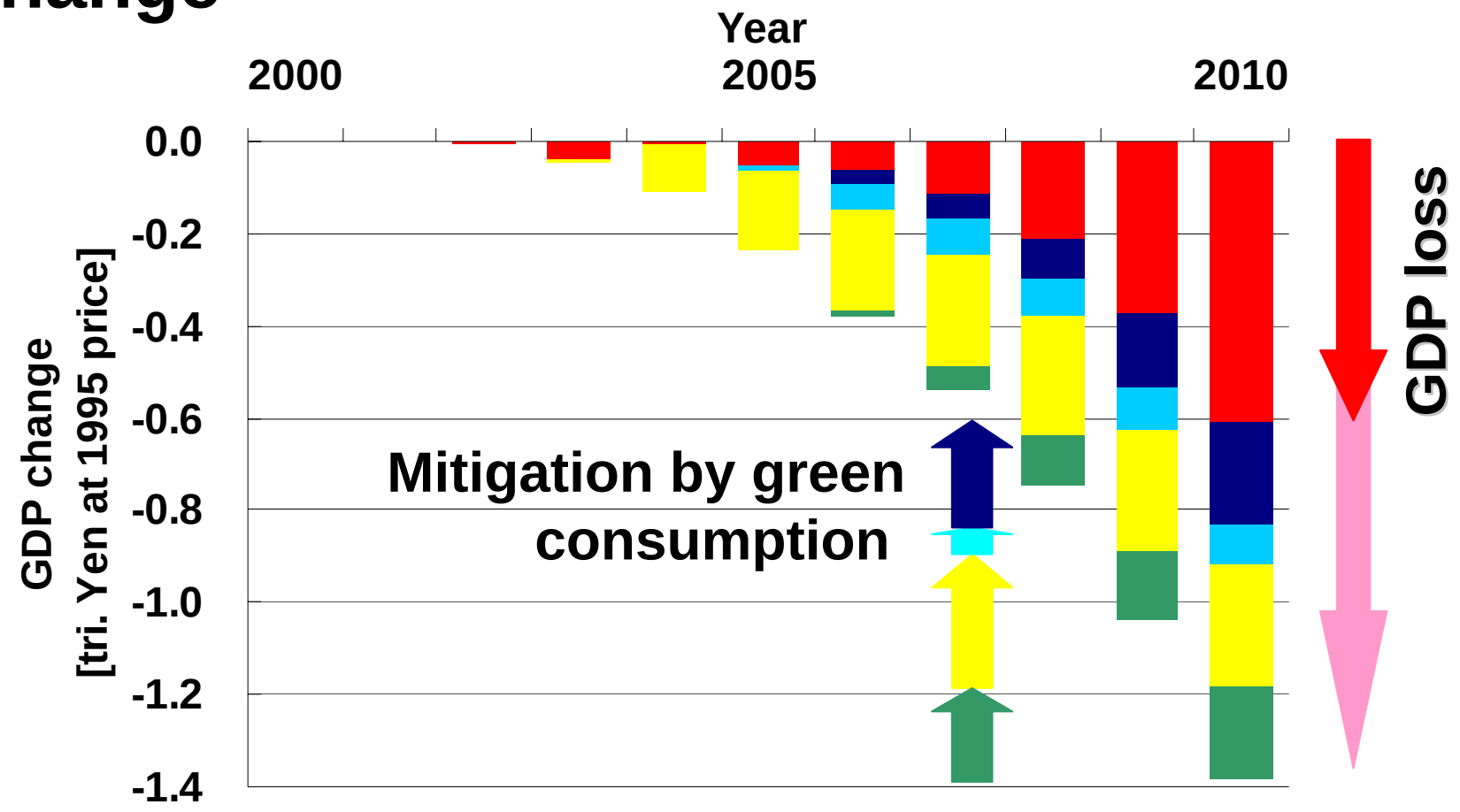
Simulations :(2) Simulation of environmental policies

Result: GDP recovery by taxation system change



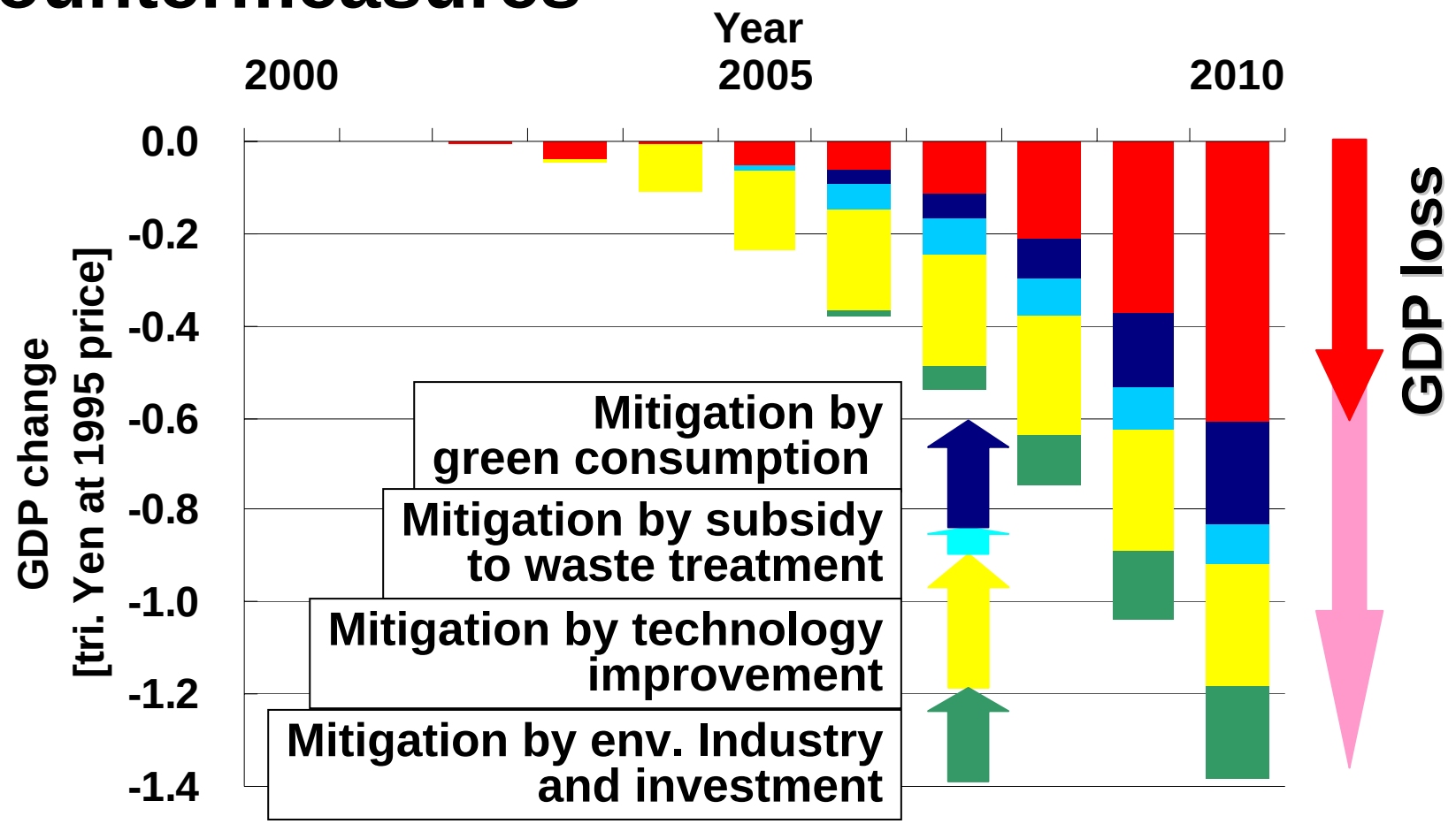
Simulations :(2) Simulation of environmental policies

Result: GDP recovery by preference change



Simulations :(2) Simulation of environmental policies

Result: GDP recovery by various countermeasures



Simulations: (2) Simulation of environmental policies

Messages from this simulation

- **In Japan, constraints on CO_2 and final disposal of solid waste will bring 1.4 trillion yen of GDP loss in 2010.**
- **But Environmental industry will mitigate more than 30% of GDP loss.**
- **Moreover, the encouragement of green consumption or related policies will improve environment and economy.**

Other topics

- **Simple AIM/Material (for India Workshop)**
- **Comparison analysis (India & China, not yet be completed)**
  - **Please refer to Dr. Rana's presentation!**
  - **Please refer to Dr. Yan's presentation!**
- **Introduction of natural assets: with Ms. Suwa (TIT)**
  - **Please refer to next my presentation!**