Towards the Preparation of Input-Output Tables for Analysis of Environmental Fields

March, 2013

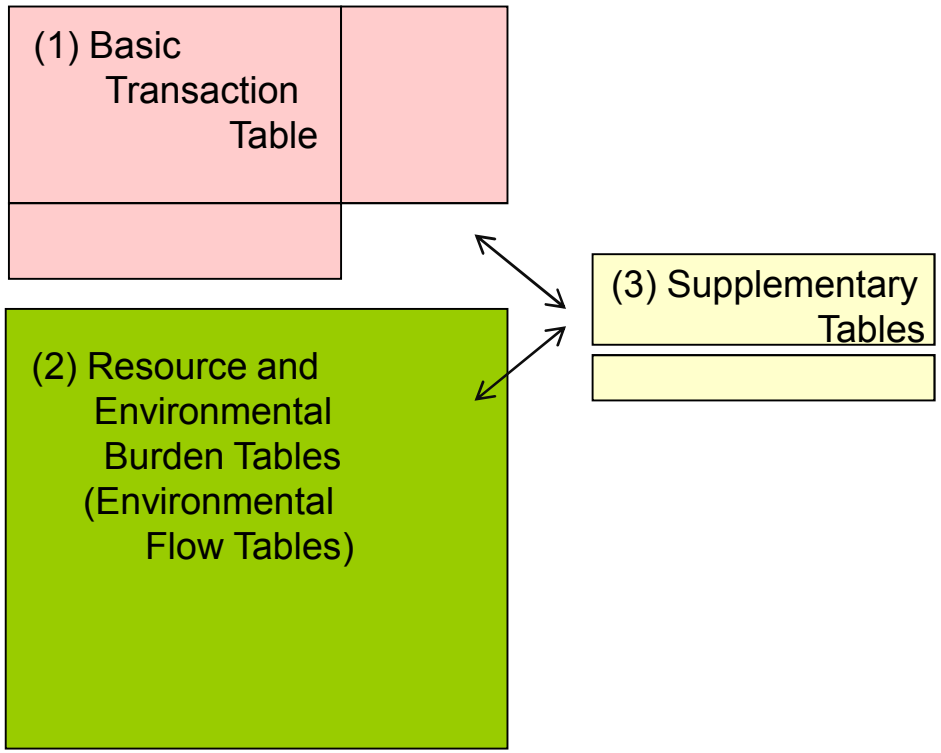
Purpose

- The Input-Output Tables for Analysis of Environmental Fields (hereinafter referred to as “E-IO”) are to be prepared to serve the purposes of: 1) publicly providing a database, as an official statistic of our country, usable in an overall grasping of structures related to economic and environmental problems; and 2) conducting an analysis on the relation of interdependence between economic and environmental problems.

- According to the Basic Plan concerning the preparation of official statistics (approved by the cabinet in March 2009), MOE, as the corresponding government ministry, is to commence studies towards development of E-IO with cooperation of MIC and METI.
- Currently, under the initiative of MOE, E-IO are prepared as official statistics based on reliable primary data, and are anticipated for use in a broad range of applications by governments, companies, researchers, etc.

Outline

- By placing, below the Basic Transaction Table of the Japanese Input-Output Tables, the “Resource and Environmental Burden Tables (Environmental Flow Tables)” which describe resource and environmental burdens, E-IO can describe, in terms of physical units, resource and environmental burdens that are being input to or generated by each of the endogenous sectors or final demand sectors.
- E-IO consist of the following three tables:



(1) Basic Transaction Table

based on Japanese Inter-Industry Input-Output Tables prepared in the joint operations of 10 government ministries and departments

(2) Resource and Environmental Burden Tables (Environmental Flow Tables)

describing, in terms of physical units, resource and environmental burdens that are input to or generated by each of the endogenous sectors or final demand sectors

(3) Supplementary Tables

listings of other factors that may be necessary for analysis, etc.

Significance of Preparing E-IO as Official Statistics

- E-IO as official statistics have the following significance:

  - Provided for utilization as platform data in application of various analyses.
  - Broad and enormous amounts of statistical data on economic and environmental problems are tabulated.
  - Continuous development of E-IO will build a long-term economic and environmental database.
  - Clarification of issues with first-order statistics, and feedback of improvements.

- E-IO are expected for use in the evaluation of measures dictated by government agencies, including MOE, especially those involving economic and environmental policies.

  - Considerations in building a Low-Carbon Society
    - ✓ Embodied Energy and Emission Intensity Data for Japan derived from Input-Output Tables (3EID)
    - ✓ Mid- and long-term roadmaps, economic impact analyses according to economic models
  - Progress check of the Basic Plans for Establishing a Sound Material-Cycle Society, and examination of top priority issues (by the Central Sound Material-Cycle Society Planning Committee)
    - ✓ Deriving industry-classified resource productivity
    - ✓ Analysis, of factors contributing to variations in resource productivity, using partial differentiation
  - Building a TMR database covering the entire range of industrial activities
  - Understanding and analyzing the correlation between a Sound Material-Cycle Society and a Low-Carbon Society

Prospects of E-IO

- Towards the establishment as statistics which are acceptable by international standards...
  - Input-Output Tables taking into account “environmental burdens” and “resources” will continue to gain importance globally.
  - Active work with this development of E-IO will open doors to further application such as analysis, etc. of Globally Tradable Goods and Sector-Based Approaches.
  - Appealing externally, while envisioning global standards.
- Considerations in application to regional editions of E-IO
  - Application to “Regional Input-Output Tables”
    - ✓ Focus placed on production activities in a certain region by mainly recording its Input-Output structure.
  - Application to “Inter-Regional Input-Output Tables”
    - ✓ Focus placed on two or more regions, manifesting the Input-Output structures and the transactions between each region.

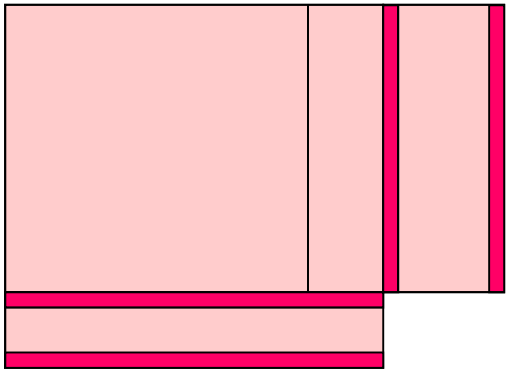
Framework for E-IO

- E-IO are based on Japanese Inter-Industry Input-Output Tables prepared in the joint operations of 10 government ministries and departments, and by placing, below the Basic Transaction Table of the Japanese Input-Output Tables, the "Resource and Environmental Burden Tables (hereinafter referred to as the "Environmental Flow Tables")" which describe resource and environmental burdens, E-IO can describe, in terms of physical units, resource and environmental burdens that are being input to or generated by each of the endogenous sectors or final demand sectors.
- In detail, E-IO consist of these three different tables:
  (1) Basic Transaction Table
  (2) Resource and Environmental Burden Tables
  (Environmental Flow Tables)
  (3) Supplementary Tables

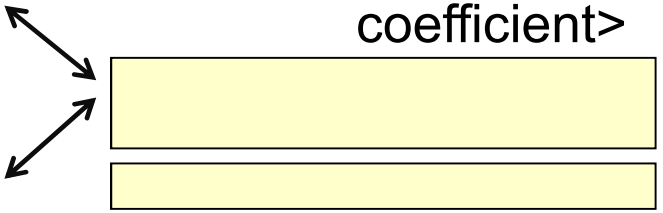
Diagram of E-IO

■ E-IO consist of these following three tables.

(1) Basic Transaction Table <monetary amount>



(3) Supplementary Tables <monetary amount / physical volume / coefficient>

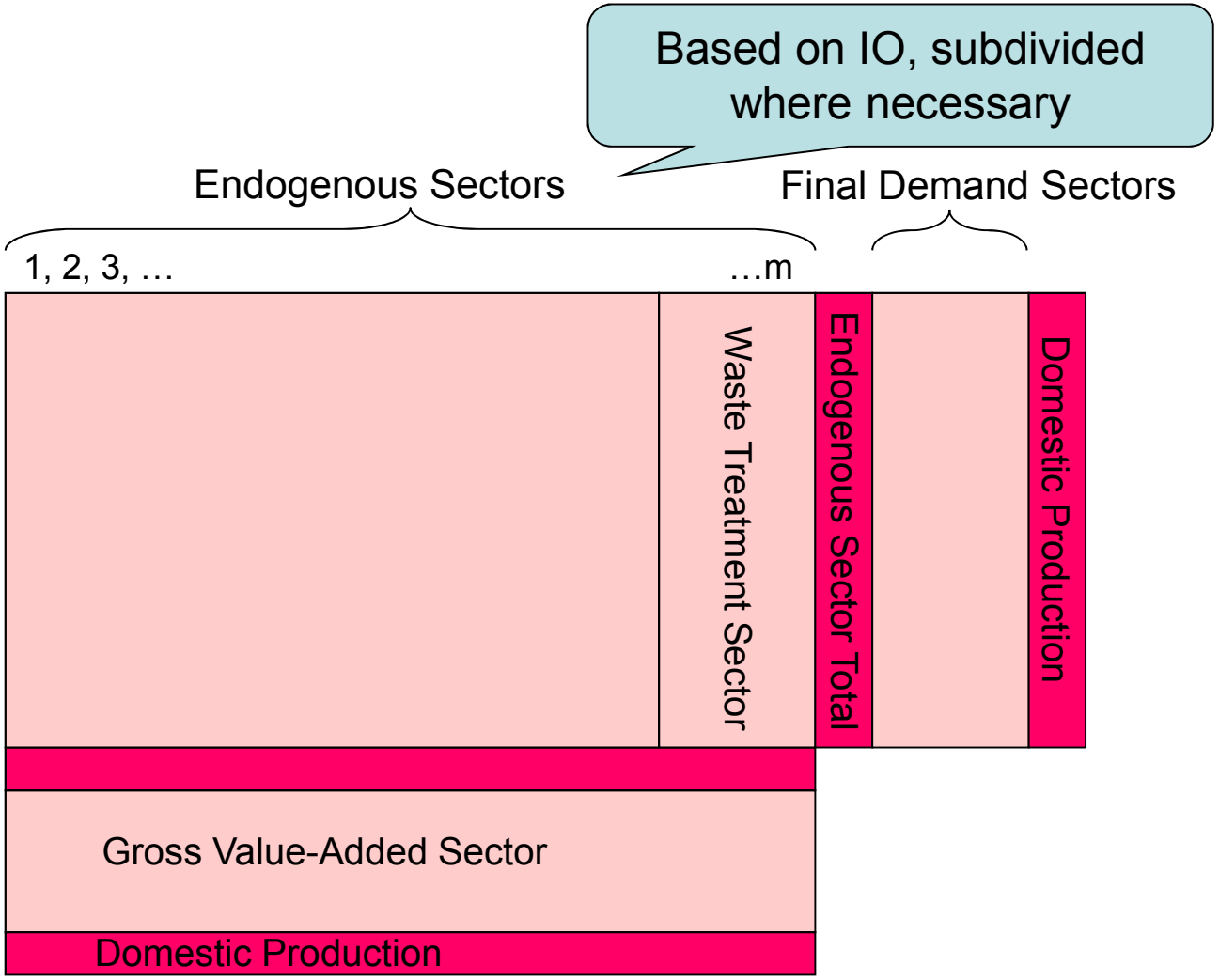


(2) Resource and Environmental Burden Tables (Environmental Flow Tables) <physical volume>

- [1] Energy Resources (Input)
- [2] Material Resources (Input)
- [3] Water Resources (Input)
- [4] GHGs (Output)
- [5] Waste (Output)
- [6] Recycled Resources (Input)
- [7] Air Pollutants
- [8] Water Pollutants
- [9] Hazardous Chemical Substances

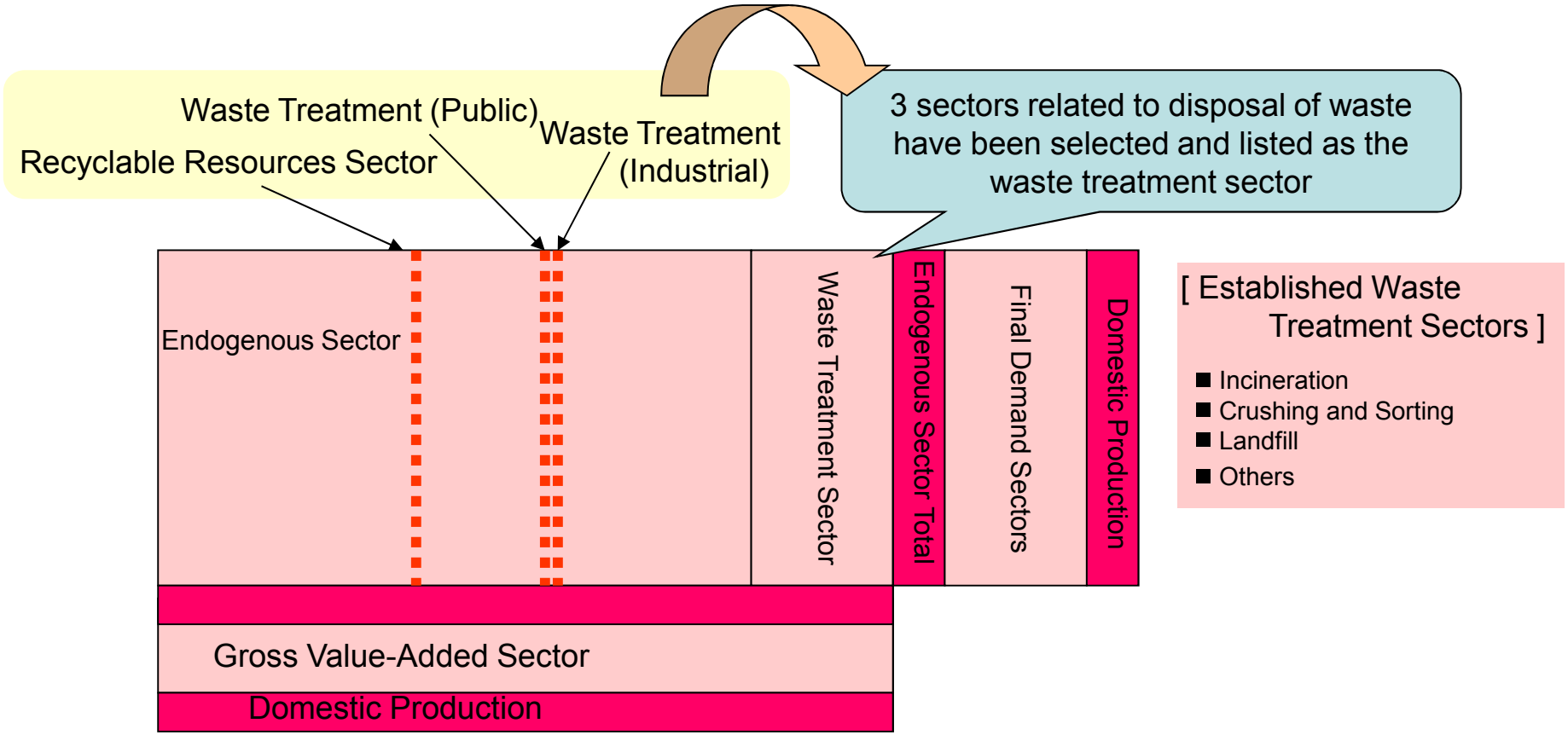
(1) Basic Transaction Table

- Based on Japanese Inter-Industry Input-Output Tables, key sectors in conducting economic and environmental analysis are subdivided and restructured.



(1) Basic Transaction Table: Waste Treatment Sector

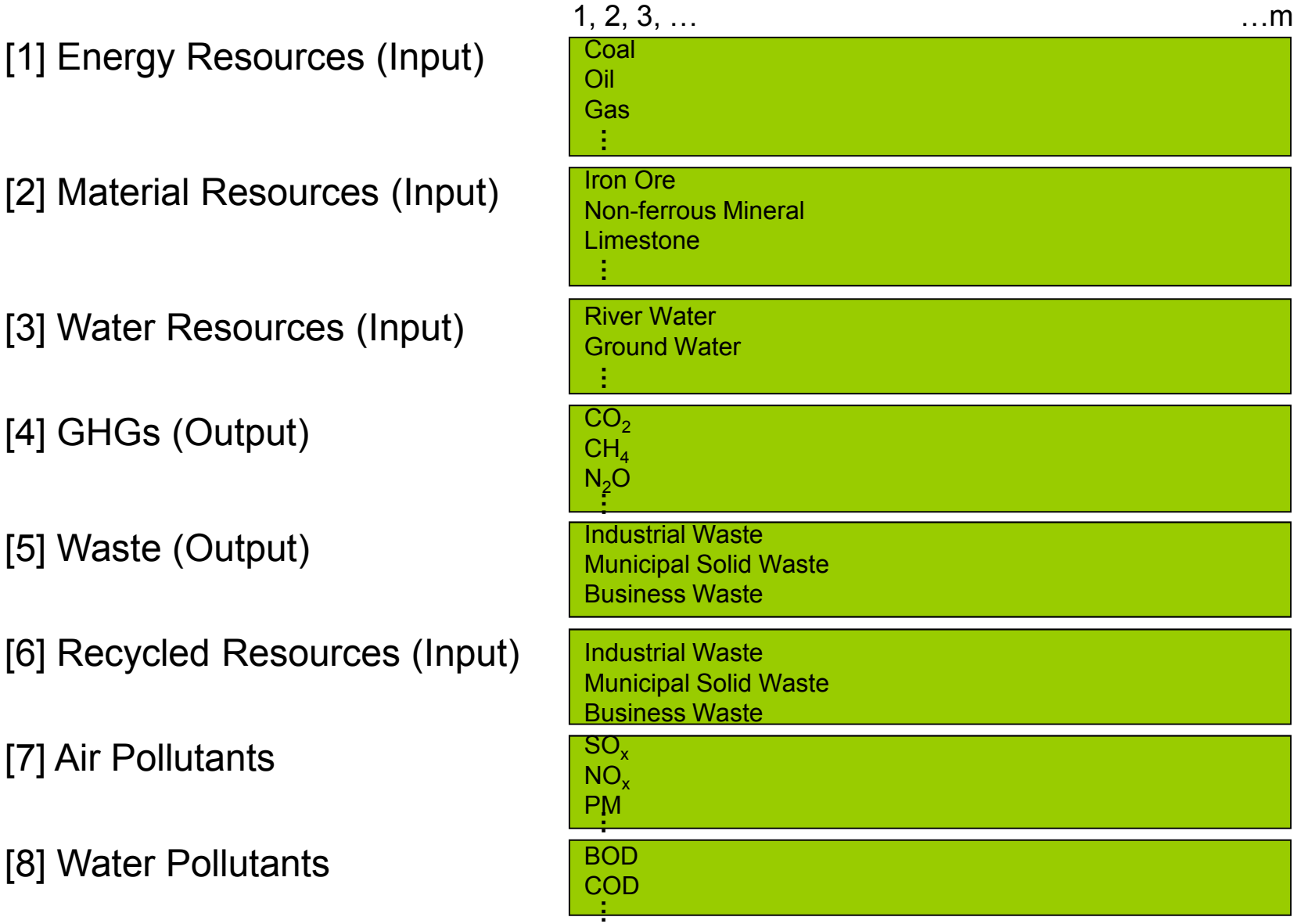
- To analyze economic effects and environmental burdens caused by waste treatment and recycling, sectors within the waste treatment sector are established according to the processes involved.
- Environmental Flow Tables shall describe waste accepted within the waste treatment sector which is later converted into another type of waste. The volumes for each process are to be complemented by Supplementary tables.



(2) Concept of Environmental Flow Tables

- Resource and environmental burden tables (Environmental Flow Tables) describe, in terms of physical units, resource and environmental burdens that are being input to or generated by each of the endogenous sectors or final demand sectors.
- Resource and environmental burdens are the resources input to, and burdens generated by production activities and transactions during the corresponding period.
  - Subjects of resource and environmental burdens are to be re-examined in order to respond to social changes that may occur.
  - As E-IO is based on the framework of Inter-Industry Input-Output Tables, matters of environmental loads other than those included in the framework are excluded from E-IO. For example, the stock concept is in general excluded from E-IO. However, in order to ensure consistency with substances subject to the Inventory, substances such as methane emission from farmlands are included in E-IO.
- Environmental burdens indicate the degree of the burdens arising directly from production activities of relevant sectors, wherein an accrual basis is adopted as a general rule.

(2) Diagram of Environmental Flow Tables



(3) Various Supplementary Tables

- In order to deal with applications in a variety of analyses involving economic and environmental problems, apart from the Basic Transaction Table and Environmental Flow Tables, Supplementary Tables are also prepared.

- (1) Table of Rates of Net Contribution classified by Raw Fuels
  - ✓ Indicating input of raw fuels contributing to CO_2 emission as a result of energy use. Deductions are applied to consumptions such as those accounting for raw material purposes and energy transformation purposes in order to avoid doubled inclusion of CO_2 emission volumes and consumption volumes that do not contribute to CO_2 emission. Values range from -1 to 1.
- (2) Heat (quantity) Conversion Table
  - ✓ Used in determining CO_2 emissions resulting from energy use.
- (3) GHG Emission Factor Table
  - ✓ Used in determining Greenhouse Gas emission volumes.
- (4) Generated Waste Processing Volume Table
  - ✓ Listing of processed volumes of waste per process, in terms of physical units.
- (5) Import/Export Tables by Country
  - ✓ Import/Export tables subdivided by countries (or regions), expressed in terms of monetary amounts.